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China.

gan to leave their caves and dwell in houses, and were taught to prepare clothes, &c. Tchine-fang, the first monarch of the eighth *ki*, taught his subjects to take off the hair from skins with rollers of wood, and cover themselves with the skins so prepared. He taught them also to make a kind of web of their hair, to serve as a covering to their heads against rain. They obeyed his orders with joy, and he called his subjects *people clothed with skins*. His reign lasted 350 years; that of one of his successors, also, named Yeou-tsao-chi, lasted more than 300; and his family continued for 12 or 18,000 years. But what is very surprising, all these thousands and millions of years had elapsed without mankind's having any knowledge of fire. This was not discovered till towards the close of this period, by one Souigine. After so useful a discovery, he taught the people to dress their victuals; whereas before they had devoured the flesh of animals quite raw, drunk their blood, and swallowed even their hair and feathers. He is also said to have been the inventor of fishing, letters, &c.

In the ninth period, we find the invention, or at least the origin of letters, attributed to one Tsang-hie, who received them from a divine tortoise that carried them on his shell, and delivered them into the hands of Tsang-hie. During this period also, music, money, carriages, merchandise, commerce, &c. were invented. There are various calculations of the length of these *ki* or periods. Some make the time from Puon-ku to Confucius, who flourished about 479 years before Christ, to contain 279,000 years; others, 2,276,000; some, 2,759,860 years; others, 3,276,000; and some no less than 96,961,740 years.

6 Fabulous history explained.

These extravagant accounts are by some thought to contain obscure and imperfect hints concerning the cosmogony and creation of the world, &c. Puon-ku, the first emperor, they think, represents eternity preceding the duration of the world. The succeeding ones, Tiene-hoang, Ti-hoang, and Gine-hoang, they imagine, signify the creation of the heavens and earth, and the formation of man. The ten *ki* or ages, nine of which preceded Fo-hi, mean the ten generations preceding Noah. This may very possibly be the case; for about 500 years before Christ, some Jews travelled into China, who might have made the Mosaic writings known there.

What we have now related, contains the substance of that part of the Chinese history which is entirely fabulous. After the nine *ki* or "ages" already taken notice of, the tenth commenced with Fo-hi; and the history, though still very dark, obscure and fabulous, begins to grow somewhat more consistent and intelligible.

7 Reign of Fo-hi.

Fo-hi was born in the province of Shensi. His mother walking upon the bank of a lake in that province, saw a very large print of a man's foot in the sand there; and, being surrounded with an iris or rainbow, became impregnated. The child was named *Fo-hi*; and, when he grew up, was by his countrymen elected king, on account of his superior merit, and styled *Tyen-tse*, that is, "the son of heaven." He invented the eight *qua*, or symbols, consisting of three lines each, which, differently combined, formed 64 characters that were made use of to express every thing. To give these the greater credit, he pretended that he had seen them inscribed on the back of a dragon-horse (an animal shaped like a horse, with the wings and scales of a dragon), which arose from the bottom of a lake. Having gained great reputation among his countrymen by this prodigy, he is said to have created mandarins or officers, under the name of *dragons*. Hence we may assign a reason why the emperors of China always carry a dragon in their banners. He also instituted marriage, invented music, &c. Having established a prime minister, he divided the government of his dominions among four mandarins, and died after a reign of 115 years.

8 Miract solstice

After Fo-hi followed a succession of emperors, of whom nothing remarkable is recorded, except that in the reign of *Yau*, the seventh after Fohi, the sun did not set for ten days, so that the Chinese were afraid of a general conflagration.

9 Hypoth concern this sol and Fo

This event the compilers of the Universal History take to be the same with that mentioned in the book of Joshua, when the sun and moon stood still for about the space of a day. Fo-hi they will have to be the same with Noah. They imagine, that after the deluge this patriarch remained some time with his descendants; but on their wicked combination to build the tower of Babel, he separated himself from them with as many as he could persuade to go along with him; and that, still travelling eastward, he at last entered the fertile country of China, and laid the foundation of that vast empire.—But, leaving these fabulous and conjectural times, we shall proceed to give some account of that part of the Chinese history which may be more certainly depended on.

As the Chinese, contrary to the practice of almost all nations, have never sought to conquer other countries, but rather to improve and content themselves with their own, their history for many ages furnishes nothing remarkable. The whole of their emperors, abstracting from those who are said to have reigned in the fabulous times, are comprehended in 22 dynasties, mentioned in the following table.

	Emperors.	Before Christ.
1. *Hya*, containing	17	2207
2. *Shang*, or *Ing*,	28	1766
3. *Chew*,	35	1122
4. *Tsin*,	4	248
5. *Han*,	25	206
		After Christ.
6. *Hew-han*,	2	220
7. *Tsin*,	15	465
8. *Song*,	8	220
9. *Tsi*,	5	479
10. *Lyang*,	4	502
11. *Chin*,	4	557
12. *Swi*,	3	
13. *Twang*,	20	618
14. *Hew-lyang*,	2	907
15. *Hew-tang*,	4	923
16. *Hew-tsin*,	2	936
17. *Hew-han*,	2	947
18. *Hew-chew*,	3	951
19. *Song*,	18	960
20. *Iwen*,	9	1280
21. *Ming*,	16	1368
22. *Tsing*,		1645

This

China.

Jin-tsong, successor to Ching-tsong, revived the courage of the Kitan; and, in 1035, war would have been renewed, had not the emperor condescended to as shameful a treaty as that concluded by his father. Two years after, the Tartars demanded restitution of ten cities in the province of Pecheli, which had been taken by Ko-ghey founder of the 18th dynasty: upon which Jin-tsong engaged to pay them an annual tribute of 200,000 taels of silver, and 300,000 pieces of silk, in lieu of these cities.

13 Kitan drivan out by the eastern Tartars;

From this time the Kitan remained in peaceable possession of their Chinese dominions till the year 1117. Whey-tsong, at that time emperor, being able neither to bear their ravages, nor by himself to put a stop to them, resolved upon a remedy which at last proved worse than the disease. This was to call in the Nu-che, Nyu-che, or Eastern Tartars, to destroy the kingdom of the Kitan. From this he was dissuaded by the king of Korea, and most of his own ministers; but, disregarding their salutary advice, he joined his forces to those of the Nu-che. The Kitan were then everywhere defeated; and at last reduced to such extremity, that those who remained were forced to leave their country, and fly to the mountains of the west.

14 who assume the name of *Kin*, and invade China.

Thus the empire of the Kitan was totally destroyed, but nothing to the advantage of the Chinese; for the Tartar general, elated with his conquest, gave the name of *Kin* to his new dominion, assumed the title of emperor, and began to think of aggrandizing himself, and enlarging his empire. For this purpose, he immediately broke the treaties concluded with the Chinese emperor; and, invading the provinces of Pecheli and Shensi, made himself master of the greater part of them. Whey-tsong, finding himself in danger of losing his dominions, made several advantageous proposals to the Tartar; who, seeming to comply with them, invited him to come and settle matters by a personal conference. The Chinese monarch complied: but, on his return, the terms agreed on seemed intolerable to his ministers; so that they told him the treaty could not subsist, and that the most cruel war was preferable to such an ignominious peace. The Kin monarch, being informed of all that passed, had recourse to arms, and took several cities. Whey-tsong was weak enough to go in person to hold a second conference; but, on his arrival, was immediately seized by the Tartar.

15 They take the emperor prisoner.

He was kept prisoner under a strong guard during the remaining part of his life; and ended his days in 1126, in the desert of Shamo, having nominated his eldest son Kin-tsong to succeed him.

Kin-tsong began his reign with putting to death six ministers of state, who had betrayed his father into the hands of the Kin Tartars. The barbarians in the meantime pursued their conquests without opposition. They crossed the Whang-ho, or Yellow river, which a handful of troops might have prevented; and marching directly towards the imperial city, took and plundered it.

16 Imperial city and another emperor taken.

Then seizing the emperor and his consort, they carried them away captives: but many of the principal lords, and several of the ministers, preferring death to such an ignominious bondage, killed themselves. The Kin being informed by the empress *Meng* that she had been divorced, they left her behind. This proved the means of saving the empire; for by her wisdom and prudence she got the crown placed on the head of Kau-tsong, ninth son of the emperor Whey-tsong by his divorced empress.

Kau-tsong fixed his court at Nanking the capital of Kyang-nan; but soon after was obliged to remove it to Kang-chew in Che-kyang. He made several efforts to recover some of his provinces from the Kin, but without effect. Ili-tsong the Kin monarch, in the mean time, endeavoured to gain the esteem of his Chinese subjects by paying a regard to their learning and learned men, and honouring the memory of Confucius. Some time after he advanced to Nanking, from whence Kau-tsong had retired, and took it: but, receiving advice that Yo-si, general of the Song, or southern Chinese, was advancing by long marches to the relief of that city, they set fire to the palace, and retired northward. 17 However, Yo-si arrived time enough to fall upon their rear-guard, which suffered very much; and from this time the Kin never dared to cross the river Kyang.

Progres the Kin checked

In a few years afterwards the Chinese emperor submitted to become tributary to the Kin, and concluded a peace with them upon very dishonourable terms. This submission, however, was of little avail: for, in 1163, the Tartars broke the peace, and, invading the southern province with a formidable army, took the city of Yang-chew. The king, having approached the river Kyang, near its mouth, where it is widest as well as most rapid, commanded his troops to cross it, threatening with his drawn sword to kill those who refused. On receiving such an unreasonable command, the whole army mutinied; and the king being killed in the beginning of the tumult, the army immediately retired. 18

They a attacke Jenghi khan a the kin of Hya.

From this time to the year 1210, nothing remarkable occurs in the Chinese history; but this year, Jenghiz-khan, chief of the western Tartars, *Moguls*, or *Mungls*, quarrelled with Yong-tsi emperor of the Kin; and at the same time the king of Hya, disgusted at being refused assistance against Jenghiz-khan, threatened him with an invasion on the west side. Yong-tsi prepared for his defence; but in 1211, receiving news that Jenghiz-khan was advancing southward with his whole army, he was seized with fear, and made proposals of peace, which were rejected. 19

Great forced Jenghi khan.

In 1212, the Mogul generals forced the great wall; or, according to some writers, had one of the gates treacherously opened to them, to the north of Shansi; and made incursions as far as Peking, the capital of the Kin empire. At the same time the province of Lyau-tong was almost totally reduced by several Kitan lords who had joined Jenghiz-khan; several strong places were taken, and an army of 300,000 Kin defeated by the Moguls. In autumn they laid siege to the city of Tay-tong-fu; where, although the governor Hujaku fled, yet Jenghiz-khan met with considerable resistance. Having lost a vast number of men, and being himself wounded by an arrow, he was obliged to raise the siege and retire into Tartary; after which the Kin retook several cities. The next year, however, Jenghiz-khan re-entered China; retook the cities which the Kin had reduced the year before; and overthrew their

China. the other hand, the Kin generals advanced with 150,000 men to relieve the city; but being obliged to divide their forces, in order to avoid in part the great road, which Toley had obstructed with trees, they were attacked by the prince at a disadvantage, and, after a faint resistance, defeated with great slaughter, and the loss of both their generals, one killed and the other taken. The emperor now ordered the army at Tong-quan and other fortified places to march to the relief of Kay-fong-fu. They assembled accordingly, to the number of 110,000 foot and 15,000 horse; and were followed by vast numbers of people, who expected by their means to be protected from the enemy. But many of these troops having deserted, and the rest being enfeebled by the fatigues of their march, they dispersed on the approach of their pursuers, who killed all they found in the highways. After this the Moguls took Tong-quan and some other considerable posts; but were obliged to raise the sieges of Quey-te-fu and Loyang by the bravery of the governors. Kyang-shin, governor of Loyang, had only 3 or 4000 soldiers under him, while his enemies were 30,000 strong. He placed his worst soldiers on the walls, putting himself at the head of 400 brave men; whom he ordered to go naked, and whom he led to all dangerous attacks. He invented engines to cast large stones, which required but few hands to play them, and aimed so true as to hit at 100 paces distance. When their arrows failed, he cut those shot by the enemy into four pieces; pointed them with pieces of brass coin; and discharged them from wooden tubes with as much force as bullets are from a musket. Thus he harassed the Moguls for three months so grievously, that they were obliged, notwithstanding their numbers, to abandon the enterprise.

27 Bravery of the be-sieged.

Oktay, at last, notwithstanding his successes, resolved to return to Tartary; and offered the Kin emperor peace, provided he became tributary, and delivered up to him 27 families which he named. These offers were very agreeable to the emperor; but Suputay, taking no notice of the treaty, pushed on the siege of the capital with more vigour than ever. By the help of the Chinese slaves in his army, the Mogul general soon filled the ditch; but all his efforts seemed only to inspire the besieged with new vigour. The Moguls at that time made use of artillery, but were unable to make the least impression upon the city walls. They raised walls round those they besieged, which they fortified with ditches, towers, and battlements. They proceeded also to sap the walls of the city; but were very much annoyed by the artillery of the besieged, especially by their bombs, which sinking into the galleries, and bursting under ground, made great havock among the miners. For 16 days and nights the attacks continued without intermission; during which time an incredible number of men perished on both sides; at length, Suputay, finding that he could not take the city, withdrew his troops, under pretence of conferences being on foot. Soon after the plague began in Kay-fong-fu; and raged with such violence, that, in 50 days, 900,000 biers were carried out, besides a vast multitude of the poorer sort, who could not afford any.

28 Peace concluded;

29 and broken.

In a short time two unlucky accidents occasioned a renewal of the war; which now put an end to the empire of the Kin. Gan-yong, a young Mogul lord, having assumed the government of some cities in Kyang-nan, and killed the officer sent to take possession of them, declared for the Kin. The emperor unwarily took Gan-yong into his service, and gave him the title of prince. Upon this Oktay sent an envoy, attended by 30 other persons, to inquire into the affair; but the Kin officers killed them all, without being punished by the emperor. Suputay, having informed his master of all these proceedings, was ordered to continue the war in Honan. Shew-fu now commanded his officers to unite their troops for the defence of the capital; but before his orders could be obeyed, they were attacked and defeated, one after another, by the Moguls. This obliged him to raise soldiers from among the peasants, for whose subsistence the people were taxed $\frac{1}{10}$ths of the rice they possessed. The city began now to be distressed for want of provisions; and as it was but in a bad posture of defence, the emperor marched with an army against the Moguls. His expedition proved unfortunate; for, sending part of his army to besiege a city called *Why-chew*, it was totally cut in pieces, and Suputay a second time sat down before the capital.

30 Capital again be-sieged,

31 and taken.

On hearing this bad news, the emperor repassed the Whang-ho, and retired to Quey-te-fu. Here he had not been long before the capital was delivered up by treachery, and Suputay put all the males of the imperial race to death; but, by the express command of Oktay, spared the inhabitants, who are said to have amounted to 1,400,000 families. After this disaster, the unhappy monarch left his troops at Quey-te-fu, and retired to Juning-fu, a city in the southern part of Honan, attended only by 400 persons. Here the distance of the Moguls made him think of living at ease; but while he flattered himself with these vain hopes, the enemy's army arrived before the city and invested it. The garrison were terrified at their approach; but were encouraged by the emperor, and his brave general Hu-sye-hu, to hold out to the last. As there was not in the city a sufficient number of men, the women, dressed in men's clothes, were employed to carry wood, stones, and other necessary materials to the walls. All their efforts, however, were ineffectual. They were reduced to such extremities, that for three months they fed on human flesh; killing the old and feeble, as well as many prisoners, for food. This being known to the Moguls, they made a general assault in January 1234. The attack continued from morning till night; but at last the assailants were repulsed. In this action, however, the Kin lost all their best officers; upon which the emperor resigned the crown to Cheng-lin a prince of the blood. Next morning, while the ceremony of investing the new emperor was performing, the enemy mounted the south walls, which were defended only by 200 men; and the south gate being at the same time abandoned, the whole army broke in. They were opposed, however, by Hu-sye-hu; who, with 1000 soldiers, continued to fight with amazing intrepidity. In the mean time Shew-fu, seeing every thing irreparably lost, lodged the seal of the empire in a house; and then causing sheaves of straw to be set round it, ordered it to be set on fire as soon as he was dead. After giving this order he hanged himself, and his commands were executed

32 Siege of Juning.

33 Unhappy fate of the emperor.

China.

Ywen was ordered to come to its relief; but, on his arrival, was put to the torture and strangled; of which the Tartars were no sooner informed, than they raised the siege, and returned to their own country. In 1636, the rebels above mentioned composed four great armies, commanded by as many generals; which, however, were soon reduced to two, commanded by Li and Chang. These agreed to divide the empire between them; Chang taking the western provinces, and Li the eastern ones. The latter seized on part of Shen-si, and then on Honan, whose capital, named *Kay-fong-fu*, he laid siege to, but was repulsed with loss. He renewed it six months after, but without success; the besieged choosing rather to feed on human flesh than surrender. The imperial forces coming soon after to its assistance, the general made no doubt of being able to destroy the rebels at once, by breaking down the banks of the Yellow river; but unfortunately the rebels escaped to the mountains, while the city was quite overflowed, and 300,000 of the inhabitants perished.

After this disaster, Li marched into the provinces of Shen-si and Honan; where he put to death all the mandarins, exacted great sums from the officers in place, and showed no favour to any but the populace, whom he freed from all taxes: by this means he drew so many to his interest, that he thought himself strong enough to assume the title of emperor. He next advanced towards the capital, which, though well garrisoned, was divided into factions. Li had taken care to introduce beforehand a number of his men in disguise: and by these the gates were opened to him the third day after his arrival. He entered the city in triumph at the head of 300,000 men, whilst the emperor kept himself shut up in his palace, busied only with his superstitions. It was not long, however, before he found himself betrayed; and, under the greatest consternation, made an effort to escape out of the palace, attended by about 600 of his guards. He was still more surprised to see himself treacherously abandoned by them, and deprived of all hopes of escaping the insults of his subjects. Upon this, preferring death to the disgrace of falling alive into their hands, he immediately retired with his empress, whom he tenderly loved, and the princess her daughter, into a private part of the garden. His grief was so great that he was not able to utter a word; but she soon understood his meaning, and, after a few silent embraces, hanged herself on a tree in a silken string. Her husband staid only to write these words on the border of his vest: "I have been basely deserted by my subjects; do what you will with me, but spare my people." He then cut off the young princess's head with one stroke of his scymitar, and hanged himself on another tree, in the 17th year of his reign, and 36th of his age. His prime minister, queens, and eunuchs, followed his example; and thus ended the Chinese monarchy, to give place to that of the Tartars, which hath continued ever since.

50 Unhappy fate of the emperor and his family.

It was some time before the body of the unfortunate monarch was found. At last it was brought before the rebel Li, and by him used with the utmost indignity; after which he caused two of Whay-tsong's sons, and all his ministers, to be beheaded; but his eldest son happily escaped by flight. The whole empire submitted peaceably to the usurper, except Prince U-san-ghey, who commanded the imperial forces in the province of Lyau-tong. This brave prince, finding himself unable to cope with the usurper, invited the Tartars to his assistance; and Tsong-te their king immediately joined him with an army of 80,000 men. Upon this the usurper marched directly to Peking; but not thinking himself safe there, plundered and burnt the palace, and then fled with the immense treasure he had got. What became of him afterwards we are not told; but the young Tartar monarch was immediately declared emperor of China, his father Tsong-te having died almost as soon as he set his foot on that empire.

The new emperor, named *Shun-chi*, or *Xun-chi*, began his reign with rewarding U-san-ghey, by conferring upon him the title of king; and assigned him the city of Si-gnan-fu, capital of Shen-si, for his residence. This, however, did not hinder U-san-ghey from repenting of his error in calling in the Tartars, or, as he himself used to phrase it, "in sending for lions to drive away dogs." In 1674, he formed a very strong alliance against them, and had probably prevailed if his allies had been faithful; but they treacherously deserted him one after another: which so affected him, that he died soon after. In 1681 Hong-wha, son to U-san-ghey, who continued his efforts against the Tartars, was reduced to such straits that he put an end to his own life.

During this time, some resistance had been made to the Tartars in many of the provinces. Two princes of Chinese extraction had at different times been proclaimed emperors; but both of them were overcome and put to death. In 1682, the whole 15 provinces were so effectually subdued, that the emperor Kang-hi, successor to Shun-chi, determined to visit his native dominions of Tartary. He was accompanied by an army of 70,000 men, and continued for some months taking the diversion of hunting. For several years he repeated his visits annually; and in his journeys took Father Verbiest along with him; by which means we have a better description of these countries than could have been otherwise obtained. This prince was a great encourager of learning and of the Christian religion; and in favour of the latter he published a decree, dated in 1692. But in 1716, he revived some obsolete laws against the Christians; nor could the Jesuits with all their art preserve the footing they had got in China. The causes of this alteration in his resolution are, by the missionaries, said to have been the slanders of the mandarins; but, from the known character of the Jesuits, it will be readily believed, that there was something more at bottom. This emperor died in 1722, and was succeeded by his son Yon-ching; who not only gave no encouragement to the missionaries, but persecuted all Christians of whatever denomination, not excepting even those of that imperial race. At the beginning of his reign he banished all the Jesuits into the city of Canton, and in 1732 they were banished from thence into Ma-kau, a little island inhabited by the Portuguese, but subject to China. He died in 1736: but though the Jesuits entertained great hopes from his successor, we have not heard that they have yet met with any success.

Ch

5 Empi tally ced.

Chris ty fir cours and t perse

Thus we have given an account of the most memorable mon pole. I was always surprised to find this river so narrow and shallow in that place: but I never thought of inquiring into the cause of it, until the loss of a bark belonging to a Christian family afforded me an opportunity. In that place where the river diminishes almost of a sudden, it flows with great impetuosity; and where it resumes its former breadth it is equally rapid. At the sixth moon, when the water was high and the wind strong, the bark I have mentioned arriving above Che-pai, was driven on a sand-bank; for between these two places the river is full of moveable sands, which are continually shifting their situation. The master of the boat dropped his anchor until the wind should abate, and permit him to continue his voyage; but a violent vortex of moveable sand, which was cast up from the bottom of the river, laid the bark on its side; a second vortex succeeded; then a third; and afterwards a fourth, which shattered the bark to pieces. When I arrived at the place where this bark had been lost, the weather was mild and serene; I perceived eddies in the current everywhere around, which absorbed, and carried to the bottom of the river, whatever floated on the surface; and I observed, at the same time, that the sand was thrown violently up with a vortical motion. Above these eddies the water was rapid, but without any fall; and in the place below, where the river resumes its usual course, no eddies are to be seen, but the sand is thrown up in the same violent manner; and in some places there are water-falls and a kind of small islands scattered at some distance from one another. These islands which appear above the surface of the water, are not solid earth, but consist of branches of trees, roots, and herbs collected together. I was told that these boughs rose up from the water, and that no one knew the place from whence they came. I was informed that these masses, which were 40 or 50 feet in extent on that side on which we passed, were immoveable and fixed in the bottom of the river; that it was dangerous to approach them, because the water formed whirlpools everywhere around them; that, however, when the river was very low, the fishermen sometimes ventured to collect the bushes that floated on its surface, and which they used for fuel. I am of opinion, that, at the place of the river which is above Che-pai, the water falls into deep pits, from whence it forces up the sand with that vortical motion; and that it flows under-ground to the other place, eight or nine leagues below, where it carries with it all the boughs, weeds, and roots, which it washes down in its course, and thus forms those islands which appear above its surface. We know there are some rivers that lose themselves entirely, or in part, in the bowels of the earth, and which afterwards arise in some other place; but I believe there never was one known to lose part of its water below its own channel, and again to recover it at the distance of some leagues."

57 Why China is subject to famines, notwithstanding its fertility.

It has already been said, that China is, in general, a fertile country; and indeed all travellers agree in this respect, and make encomiums on the extent and beauty of its plains. So careful are the husbandmen of this empire to lose none of their ground, that neither inclosure, hedge, nor ditch, nay, scarce a single tree, are ever to be met with. In several places the land yields two crops a-year; and even in the interval between the harvests the people sow several kinds of pulse and small grain. The plains of the northern provinces yield wheat; those of the southern, rice, because the country is low and covered with water. Notwithstanding all this fertility, however, the inhabitants are much more frequently afflicted with famine than those of the European nations, though the countries of Europe produce much less than China. For this two causes are assigned. 1. The destruction of the rising crops by drought, hail, inundations, locusts, &c. in which case China cannot like the European countries be supplied by importation. This is evident by considering how it is situated with regard to other nations. On the north are the Mogul Tartars, a lazy and indolent race, who subsist principally on the flesh of their flocks; sowing only a little millet for their own use. The province of Leatong, which lies to the north-east, is indeed extremely fertile, but too far distant from the capital and centre of the empire to supply it with provisions; and besides, all carriage is impracticable but in the winter, when great quantities of game and fish, preserved in ice, are sent thither. No corn is brought from Corea to China; and though the Japan islands are only three or four days sailing from the Chinese provinces of Kiang-nan and Che-kyang, yet no attempt was ever made to obtain provisions from thence; whether it be that the Japanese have nothing to spare, or on account of the insults offered by those islanders to foreign merchants. Formosa lies opposite to the province of Fo-kien; but so far is that island from being able to supply any thing, that in a time of scarcity it requires a supply from China itself. The province of Canton is also bounded by the sea, and has nothing on the south but islands and remote countries. One year, when rice was exceedingly scarce there, the emperor sent for F. Parranin, a Jesuit missionary, and asked him if the city of Macao could not furnish Canton with rice until the supply he had ordered from other provinces should arrive: but was informed that Macao had neither rice, corn, fruit, herbs, nor flocks, and that it generally got from China what was necessary for its subsistence.—The only method, therefore, the Chinese can take to guard against famines arising from these causes, is to erect granaries and public magazines in every province and most of the principal cities of the empire. This has at all times been a principal object of care to the public ministers; but though this mode of relief still takes place in theory, so many ceremonies are to be gone through before any supply can be drawn from those public repositories, that it seldom arrives seasonably at the places where it is wanted: and thus numbers of unhappy wretches perish for want. 2. Another cause of the scarcity of grain in this empire, is the prodigious consumption of it in the composition of wines, and a spirituous liquor called *rack*. But though government is well apprised that this is one of the principal sources of famine throughout the empire, it never employed means sufficient to prevent it. Proclamations indeed have frequently been issued, prohibiting the distillation of rack; and the appointed officers will visit the still-houses and destroy the furnaces if nothing is given them; but on slipping some money into their hands, they shut their eyes, and go somewhere

China.

a court; but they have neither influence nor power, and their authority is lower than that of the meanest mandarin.

61 Mandarins of different classes.

The mandarins are of two classes, viz. those of letters, and the inferior sort styled mandarins of arms. The latter by no means enjoy the same consideration with the former sort; indeed in China the literati are highly honoured, and to their influence M. Grosier supposes that we may in a great measure ascribe the mildness and equity of the government; though he thinks that the balance may incline rather too much in their favour. Several degrees, answering to those of bachelor, licentiate, and doctor, must be passed through before one can attain to the dignity of a mandarin of letters; though sometimes, by the favour of the emperor, it is conferred on those who have attained only the two first degrees: but even the persons who have gone through all the three, enjoy at first only the government of a city of the second or third class. When several vacancies happen in the government of cities, the emperor invites to court a corresponding number of the literati, whose names are written down in a list. The names of the vacant governments are then put into a box, raised so high that the candidates are able only to reach it with their hands; after which they draw in their turns, and each is appointed governor of the city whose name he has drawn.

There are eight orders of these mandarins in China. 1. The *calao*, from whom are chosen the ministers of state, the presidents of the supreme courts, and all the superior officers among the militia. The chief of this order presides also in the emperor's council, and enjoys a great share of his confidence. 2. The *te-hiose*, or man of acknowledged ability, is a title bestowed upon every mandarin of the second rank; and from these are selected the viceroys and presidents of the supreme council in the different provinces. 3. The *tchong-tchueo*, or school of mandarins, act as secretaries to the emperor. 4. *Y-tchuen-tao*. These keep in repair the harbours, royal lodging houses, and barks which belong to the emperor, unless particularly engaged in some other office by his order. 5. The *ting-pi-tao* have the inspection of the troops. 6. The *tun-tien-hao* have the care of the highways. 7. The *ho-tao* superintend the rivers. 8. The *hai-tao* inspect the sea-coasts.

Thus the whole administration of the Chinese empire is intrusted to the mandarins of letters; and the homage paid by the common people to every mandarin in office almost equals that paid to the emperor himself. This indeed flows from the nature of their government. In China it is a received opinion that the emperor is the father of the whole empire; that the governor of a province is the father of that province; and that the mandarin who is governor of a city is also the father of that city. This idea is productive of the highest respect and submission, which is not at all lessened by their great number; for though the mandarins of letters amount to more than 14,000, the same respect is paid to every one of them.

The mandarins of arms are never indulged with any share in the government of the state; however, to attain the dignity, it is also necessary to pass through the degrees of bachelor, licentiate, and doctor of arms. The accomplishments necessary for a mandarin of arms are, strength of body, with agility and readiness in performing the various military exercises, and comprehending the orders requisite for the profession of arms; an examination on these subjects must be undergone before the candidate can attain the wished-for dignity.

62 Tribunals of the mandarins of arms.

The mandarins of arms have tribunals, the members of which are selected from among their chiefs; and among these they reckon princes, counts, and dukes; for all these dignities, or something equivalent to them, are met with in China. The principal of these tribunals is held at Peking, and consists of five classes: 1. The mandarins of the rear-guard, called *heou-fou*. 2. Of the left wing, or *tsa-fou*. 3. Of the right wing, or *yeou-feou*. 4. Of the advanced main-guard, or *te-hong-fou*. 5. Of the advanced guard, or *tsien-fou*. These five tribunals are subordinate to one named *iong-tching-fou*; the president of which is one of the great lords of the empire, whose authority extends over all the military men of the empire. By his high dignity he could render himself formidable even to the emperor; but to prevent this inconvenience, he has for his assessor a mandarin of letters, who enjoys the title and exercises the function of superintendant of arms. He must also take the advice of two inspectors who are named by the emperor; and when these four have agreed upon any measure, their resolution must still be submitted to the revisal of a higher court named *ping-pou*, which is entirely of a civil nature. The chief of these mandarins is a general of course, whose powers are equivalent to those of our commanders in chief; and below him are other mandarins who act as subordinate officers.

These two classes of mandarins compose what is called the nobility of China: but as we have already hinted, their office is not hereditary; the emperor alone continues or confers it. They have the privilege of remonstrating to the emperor, either as individuals or in a body, upon any part of his conduct which appears contrary to the interest of the empire. These remonstrances are seldom ill received, though the sovereign complies with them only when he himself thinks proper. The number of literary mandarins in China is computed at upwards of 14,000; and those of arms at 18,000; the former, however, are considered as the principal body in the empire; and this preference is thought to damp the military ardour of the nation in general, and to be one cause of that weakness in war for which the Chinese are remarkable.

63 Military force.

The armies of this empire are proportioned to its vast extent and population; being computed in time of peace at more than 700,000. Their pay amounts to about two-pence halfpenny and a measure of rice per day, though some of them have double pay, and the pay of a horseman is double that of a foot soldier; the emperor furnishes a horse, and the horseman receives two measures of small beans for his daily subsistence; the arrears of the army being punctually paid up every three months.

The arms of a horseman are, a helmet, cuirass, lance, and sabre; those of a foot soldier are a pike and sabre; some have fusees, and others bows and arrows. All these are carefully inspected at every review; and if any of them are found in the least rusted, or otherwise in

China.

This second tribunal, which may be called a kind of civil inquisition, is subdivided into four others; the first entrusted with the care of selecting those who, on account of their learning or other good properties, are capable of filling the offices of government; the second appointed to take care of the conduct of the mandarins; the third affixing the seals to the different public acts, giving the seals to mandarins, and examining those of the different dispatches; while the fourth inquires into the merit of the grandees of the empire, not excepting the princes of the imperial blood themselves. The principal sovereign court to which these four last are subordinate is called *Li-pou.*

2. *Hou-pou*, or the grand treasurer, superintends all the finances of the state; is the guardian and protector of the treasures and dominions of the emperor, keeping an account of his revenues, &c. superintending the management and coining of money, the public magazines, customhouses; and, lastly, keeping an exact register of all the families in the empire. To assist this court, 14 others are appointed throughout the different provinces of the empire.

3. *Li-pou*, or the court of ceremonies. "It is an undoubted fact (says M. Grosier), that ceremonies form, in part, the base of the Chinese government. This tribunal therefore takes care to support them, and enforce their observance; it inspects also the arts and sciences. It is consulted by the emperor when he designs to confer particular honours; takes care of the annual sacrifices offered up by him, and even regulates the entertainments which he gives either to strangers or to his own subjects. It also receives and entertains foreign ambassadors, and preserves tranquillity among the different religious sects in the empire. It is assisted by four inferior tribunals.

4. *Ping-Pou*, or the tribunal of arms, comprehends in its jurisdiction the whole militia of the empire; inspecting also the fortresses, magazines, arsenals, and store-houses of every kind, as well as the manufactories of arms both offensive and defensive; examining and appointing officers of every rank. It is composed entirely of mandarins of letters; and the four tribunals depending upon it consist also of literati."

5. The *hong-pou*, is a criminal bench for the whole empire, and is assisted by 14 subordinate tribunals.

6. The *cong-pou*, or tribunal of public works, surveys and keeps in repair the emperor's palaces, as well as those of the princes and viceroys, and the buildings where the tribunals are held, with the temples, tombs of the sovereigns, and all public monuments. It has besides the superintendance of the streets, public highways, bridges, lakes, rivers, and every thing relating either to internal or foreign navigation. Four inferior tribunals assist in the discharge of these duties; the first drawing the plans of public works; the second directing the work-shops in the different cities of the empire; the third surveying the causeways, roads, bridges, canals, &c.; and the fourth taking care of the emperor's palaces, gardens, and orchards, and receiving their produce.

67
Partiality of government towards the Chinese.

All the tribunals are composed, one half of Chinese, and the other of Tartars; and one of the presidents of each superior tribunal is always a Tartar born. None of the courts above described, however, has absolute authority even in its own jurisdiction; nor can its decisions be carried into execution without the concurrence of another tribunal, and sometimes of several others. The fourth tribunal, for instance, has indeed under its jurisdiction the whole troops of the empire; but the payment of them is entrusted with the second; while the sixth has the care of the arms, tents, chariots, barks, and stores necessary for military operations; so that nothing relative to these can be put in execution without the concurrence of all the three tribunals.

6
Censo

To prevent any unlawful combination among the tribunals, each has its *censor* appointed. This is an officer whose duty is merely to watch over the proceedings of the court, without deciding upon any thing himself. He assists therefore at all assemblies, revises all their acts, and without acquainting the court in the least with either his sentiments or intentions, immediately informs the emperor of what he judges to be amiss. He likewise gives information of the behaviour of the mandarins, either in the public administration of affairs, or in their private conduct; nay, sometimes he will not scruple to reprimand the emperor for what he supposes to be erroneous in his conduct.

These censors are never removed from their places but in order to be promoted; and thus, holding their offices for life, they have the greater courage to speak out when they observe any impropriety or abuse. Their accusation is sufficient to set on foot an inquiry, which generally leads to a proof; in which case the accused is discharged from his office, and never held in any estimation afterwards. The complaints of the censors, however, are referred to the very tribunal against whose members they complain; though, being afraid of an accusation themselves, they very seldom pass sentence against the accusers.

Besides all this, the censors also form a tribunal of their own, named *tou-tche-yven*. Its members have a right of remonstrating with the emperor, whenever his own interest or that of the public renders it necessary. They inspect all lawyers and military men in public employments. "In short (says M. Grosier), they are, morally speaking, placed between the prince and the mandarins; between the mandarins and the people; between the people and families; between families and individuals; and they generally unite to the importance of their office incorruptible probity and invincible courage. The sovereign may, if he proceeds to rigour, take away their lives; but many of them have patiently suffered death, rather than betray the cause of truth or wink at abuses. It is not sufficient therefore to have got rid of one, they must all be treated in the same manner; the last that might be spared would tread in the same steps with no less resolution than those who went before him. In the annals of no nation do we find an example of such a tribunal, yet it appears to be necessary in all without exception. We must not, however, imagine, that the privileges of a censor give him a right to forget his duty to his sovereign, or to communicate to the public those remarks which he takes the liberty of making to him: were he only to give the least hint of them to his colleagues, he would be punished with death; and he would share the same fate did he, in any of his representations, ceed to the dignity or titles of their father, though they may to his estate. The emperor alone can confer honours; and even then they must be resigned when the person attains the age of 70; though this resignation is considered as an advice rather than a law. The will of a father cannot be set aside in China on account of any informality; nor can any mother in this empire make a will.

Though the Chinese laws authorize slavery, yet the power of the master extends only to those matters which concern his own service; and he would be punished with death for taking advantage of his power to debauch the wife of his slave.

By the laws of China husbandmen are exempt from the payment of taxes after they have begun to till the earth to the beginning of harvest.

73 Criminal code.

It appears, from recent information respecting many interesting particulars relating to China, that the utmost attention seems to have been paid to the different degrees of enormity attached to those actions of men which are denominated criminal. The code of laws is pronounced the reverse of sanguinary, and it is affirmed by competent judges, that if the practice in all respects coincided with the theory, few nations could boast of a milder or more effectual administration of justice. But while they do not consider the crime of pilfering a few small pieces of money as of equal enormity with the shedding of human blood, yet they pay too little attention to the three different circumstances under which that action may exist; either as accidental, unintentional as to the extent of taking away life, or maliciously premeditated. Even foreigners who have the misfortune to kill a Chinese, however casually it may be done, have been punished in the very same manner as a traitor or deliberate assassin. As foreigners intending to reside in China may be at a loss to determine how, when, and by what various means their lives may be endangered, the following abstract of the criminal code of that country may perhaps be beneficial to some of our readers.

1. A man who kills another on the supposition of theft, shall be strangled, according to the law of homicide committed in an affray.

2. A man who fires at another with a musket, and kills him, shall be beheaded, as in cases of wilful murder. If the sufferer be wounded, but not mortally, the offender shall be sent into exile.

3. A man who puts to death a criminal who had been apprehended, and made no resistance, shall be strangled, according to the law against homicide committed in an affray.

4. A man who falsely accuses an innocent person of theft (in cases of greatest criminality) is guilty of a capital offence; in all other cases the offenders, whether principals or accessaries, shall be sent into exile.

5. A man who wounds another unintentionally, shall be tried according to the law respecting blows given in an affray, and the punishment rendered more or less severe, according to the degree of injury sustained.

6. A man, who, intoxicated with liquor, commits outrages against the laws, shall be exiled to a desert country, there to remain in a state of servitude.

For this abstract we are indebted to the humane interference of the supercargoes of the East India Company, on account of the disagreeable disputes which frequently took place with the Chinese government, owing to accidents of the most trivial nature, which the people sometimes met with from the British in the port of Canton.

The blood of a traitor is supposed to be contaminated in this country to the 10th generation, although the law in general is conceived to be satisfied with implicating the nearest male relatives in the guilt of the actual perpetrator of the crime, but with commutation of punishment from death to exile. It appears to us, that nothing can be conceived more tyrannical than a law which pretends to inflict punishment on an innocent person, since no man can be a traitor, merely from the circumstance of his being the relation of one, and the absurdity of supposing that a non-existence is capable of committing a crime, must be obvious to every man. The fifth law in the forementioned extract is peculiarly cruel and unjust, since it subjects a man to different degrees of punishment, according to the different effects which those actions may produce. It is with a degree of national pride that we turn from this cruel, absurd specimen of Chinese legislation, this strange judicial thermometer, if we may be allowed the expression, to the nice discriminations which are made by the laws of our own country respecting the shedding of blood, the gradations of guilt attending which we have already mentioned, and which are distinguished by the appropriate names of *manslaughter*, *culpable homicide*, and *wilful murder*.

The denunciations of Moses, it may be said, have some resemblance to this Gothic code of the Chinese, especially when he declares that the deity would visit the iniquities of the fathers upon the children to the third and fourth generation. It is not our province, in this account of China, to write an apology for Moses in this particular instance, although it must be granted that he had a most obstinate and refractory race of beings to govern, and to preserve a becoming degree of order and subordination among them. He might therefore have nothing more in view than political expedience; an opinion which we are the more encouraged to entertain, when we find the prophet Ezekiel reprobating the idea of making the innocent suffer for the guilty, in the following beautiful passage. "What mean ye that ye use this proverb concerning the land of Israel, saying, the fathers have eaten sour grapes, and the children's teeth are set on edge? As I live, saith the Lord, ye shall not have occasion any more to use this proverb in Israel. Behold all souls are mine; as the soul of the father, so also the soul of the son, is mine. The soul that sinneth, *it* shall die. The son shall not bear the iniquity of the father, neither shall the father bear the iniquity of the son: the righteousness of the righteous shall be upon *him*, and the wickedness of the wicked shall be upon *him*."

In criminal matters every person accused must be examined before five or six tribunals; and whose inquiries are directed not only against him, but against his accuser, and the witnesses that appear in the cause. He is, however, obliged to remain in prison during the process: "but (says M. Grosier) the Chinese prisons are not horrible dungeons like those of so many other nations; they are spacious, and have even a degree

China.

making small gashes in the body, and then tearing off the skin like thongs. It is never applied but for some great crime, such as treason, or where the criminal's guilt has been clearly proved, and it is necessary to make him discover his accomplices.

79 M. Grosier's general view of the Chinese laws.

Notwithstanding these dreadful punishments, M. Grosier is at great pains to prove that the laws of the Chinese, with regard to criminal matters, are extremely mild. "One law (says he) will no doubt appear exceedingly severe and rigorous; it inflicts the punishment of death on those who use pearls. Those who read the history of China will be apt to fall into certain mistakes respecting the penal laws of that nation. Some of its sovereigns have indulged themselves in gratifying sanguinary caprices which were not authorized by the laws, and which have often been confounded with them; but these princes are even yet ranked among the number of tyrants, and their names are still abhorred and detested throughout the whole empire. The Chinese, in their criminal procedure, have a great advantage over all other nations: it is almost impossible that an innocent man should ever become a victim to a false accusation: in such cases the accuser and witnesses are exposed to too much danger. The slowness of the process, and the numberless revisions it undergoes, are another safeguard for the accused. In short, no sentence of death is ever carried into execution until it has been approved and confirmed by the emperor. A fair copy of the whole process is laid before him; a number of other copies are also made out, both in the Chinese and Tartar languages, which the emperor submits to the examination of a like number of doctors, either Tartars or Chinese. When the crime is of great enormity, and clearly proved, the emperor writes with his own hand at the bottom of the sentence, "When you receive this order, let it be executed without delay." In cases where the crime, though punishable by death according to law, is ranked only in the ordinary class, the emperor writes at the bottom of the sentence, "Let the criminal be detained in prison, and executed in autumn;" that being the season in which they are generally executed, and all on the same day.

80 Cases in which crimes may be pardoned.

The emperor of China never signs an order for the execution of a criminal till he has prepared himself by fasting. Like other monarchs he has the power of giving pardons; but in this respect is much more limited than any other. The only cases in which the Chinese monarch can remit the punishment inflicted by law are, 1. To the son of a widow who has not married again; 2. To the heir of an ancient family; 3. The descendants of great men or citizens who have deserved well of their country; and, 4. lastly, The sons or grandsons of a mandarin, who has become illustrious, and distinguished himself by faithfully discharging the duties of his office. Neither a child, nor a man of very advanced age, can be cited before a tribunal. The son of a very aged father and mother is pardoned, if private property or the public peace be not hurt by giving him a pardon; and if the sons of such a father and mother be all guilty, or accomplices in the same crime, the youngest is pardoned in order to comfort his parents.

In China the accused are always treated with tenderness and lenity, being accounted innocent until their guilt be clearly proved; and even then, liberty excepted, they are scarce allowed to want for any thing. A jailor is punished who behaves rigorously towards his prisoners; and the judges must likewise answer at their peril for any additions to the severity of the law; deposition being the slightest punishment inflicted upon them.

Substitution is sometimes allowed by the laws of China; so that the near relation of a guilty person may put himself in the criminal's place, provided however, that the chastisement be slight, and the accused his ancient friend. The sons, grandsons, wife, and brothers of a banished Chinese, are allowed to follow him into exile; and the relations of all persons are permitted to visit them in prisons, and to give them every assistance in their power; to do which good offices they are even encouraged, instead of being prevented.

Of th[e] ci[ties and] their [go]vern[ment].

Every city in China is divided into different quarters, each of which is subjected to the inspection of a certain officer, who is answerable for whatever passes in the places under his jurisdiction. Fathers of families, as we have already observed, are answerable for the conduct of their children and domestics. Neighbours are even obliged to answer for one another, and are bound to give every help and assistance in cases of robbery, fire, or any accident, especially in the night-time. All the cities are furnished with gates, which are barricaded on the commencement of night. Centinels are also posted at certain distances throughout the streets, who stop all who walk in the night, and a number of horsemen go round the ramparts for the same purpose; so that it is almost impossible to elude their vigilance by favour of the darkness. A strict watch is also kept during the day-time; and all those who give any suspicion by their looks, accent, or behaviour, are immediately carried before a mandarin, and sometimes even detained until the pleasure of the governor be known.

Private quarrels do not often happen in China, and it is rare that they are attended with a fatal issue. The champions sometimes decide the quarrel with their fists, but most frequently refer the case to a mandarin, who very often orders them both a sound drubbing. None but military people are permitted to wear arms in public; and this privilege is extended even to them only during the time of war, or when they accompany a mandarin, mount guard, or attend a review. Prostitutes are not allowed to remain within the walls of a city, or to keep a house of their own even in the suburbs. They may, however, lodge in the house of another; but that other is accountable for every disturbance which may happen on their account.

Corr[...] of m[...]

In all the Chinese cities, and even in some of their ordinary towns, there is an office where money may be borrowed upon pledges at the common rate of the country; which, however, is no less than 30 per cent. Every pledge is marked with a number when left at the office, and must be produced when demanded; but it becomes the property of the office if left there a single day longer than the term agreed upon for the payment of the money. The whole transaction remains an inviolable secret; not even the name of

China.

and for want of small coin, a Chinese always carries about him his scales, weights, and a pair of scissars to cut the metal. This operation is performed by putting the silver between the scissars, and then knocking them against a stone till the pieces drop off. In giving of change, however, people have no right to value silver by the numerical value of copper, this being entirely regulated by the intrinsic value of the metals. Thus, an ounce of silver will sometimes be worth 1000 copper pieces, and sometimes only 800; and thus the copper money of China may frequently be sold for more than it would pass for in commerce. The emperor would lose much by this recoinage, were he not the sole proprietor of all the copper mines in China. It is, however, expressly forbidden to employ copper coin in any manufacture where it might be employed as plain copper, and it is also forbidden to be sold for the purpose of melting: but if the price of the metal has not fallen, the infraction of this law is not very severely punished. On the other hand, if the value of unwrought copper exceeds that of the coin, a quantity of the latter is issued out to restore the equilibrium.

To keep up a constant circulation of all the coin in the empire, the Chinese government are attentive to preserve an equilibrium between the proportional value of the copper and silver; that is, to regulate the intrinsic value of each in such a manner that the possessor of silver may not be afraid to exchange it for copper, nor the possessor of copper for silver. The method used for this purpose is, when silver becomes scarce, to make all the payments for some time in silver; but if copper, to make them all for some time in that metal only.

87 Of the Chinese commerce.

The commerce of China is under the inspection of the tribunal of finances; but on this subject the Chinese entertain an opinion quite different from that of the Europeans. Commerce, according to them, is only useful as far as it eases the people of their superfluities, and procures them necessaries. For this reason they consider even that which is carried on at Canton as prejudicial to the interest of the empire. "They take from us (say the Chinese) our silks, teas, and porcelain: the price of these articles is raised throughout the provinces: such a trade therefore cannot be beneficial. The money brought us by Europeans, and the high-priced baubles that accompany it, are mere superfluities to such a state as ours. We have no occasion for more bullion than what may be necessary to answer the exigencies of government, and to supply the relative wants of individuals. It was said by Kouan-tse, two thousand years ago, That the money introduced does not enrich a kingdom in any other way than as it is introduced by commerce. No commerce can be advantageous long, but that which consists in a mutual exchange of things necessary or useful. That trade, whether carried on by barter or money, which has for its object the importing of articles that tend to the gratification of pride, luxury, or curiosity, always supposes the existence of luxury: but luxury, which is an abundance of superfluities among certain classes of people, supposes the want of necessaries among a great many others. The more horses the rich put to their carriages, the greater will be the number of those who are obliged to walk on foot; the larger and more magnificent their houses are, so much the more confined and wretched must those of the poor be; and the more their tables are covered with a variety of dishes, the more must the number of those increase who are reduced to the necessity of feeding upon plain rice. Men, united by society in a large and populous kingdom, can employ their industry, talents, and economy, to no better purpose than to provide necessaries for all, and procure convenience for some."

88 History of the trade with Russia.

The only commerce considered by the Chinese as advantageous to their empire, is that with Russia and Tartary; by which they are supplied with those furs so necessary in the northern provinces. The disputes concerning the limits of the respective empires of Russia and China seem to have paved the way to this commerce. These disputes were settled by treaty on the 27th of August 1689, under the reign of Ivan and Peter Alexiowitz. The chief of the embassy on the part of Russia was Golovin governor of Siberia; and two Jesuits were deputed on the part of the emperor of China; and the conferences were held in Latin, with a German in the Russian ambassador's train, who was acquainted with that language. By this treaty the Russians obtained a regular and permanent trade with China, which they had long desired; but in return they yielded up a large territory, besides the navigation of the river Amour. The first intercourse had taken place in the beginning of the 17th century; at which time a small quantity of Chinese merchandise was procured by some Russian merchants from the Kalmuck Tartars. The rapid and profitable sale of these commodities encouraged certain Siberian wayvodes to attempt a direct and open communication with China. For this purpose several deputations were sent to the emperor; and though they failed of obtaining the grant of a regular commerce, their attempts were attended with some consequences of importance. Thus the Russian merchants were tempted to send traders occasionally to Peking; by which means a faint connexion was preserved with that metropolis. This commerce, however, was at last interrupted by the commencement of hostilities on the river Amour; but after the conclusion of the treaty in 1689, was resumed with uncommon alacrity on the part of the Russians: and the advantages thence arising were found to be so considerable, that a design of enlarging it was formed by Peter the Great. Isbrand Ides, a native of the duchy of Holstein, then in the Russian service, was therefore despatched to Peking in 1692; by whose means the liberty of trade, before confined to individuals, was now extended to caravans. In the mean time, private merchants continued to trade as before, not only with the Chinese, but also at the head quarters of the Mogul Tartars. The camp of these roving Tartars, which was generally stationed near the confluence of the Orhon and Toula rivers, between the southern frontiers of Siberia and the Mogul desert, thus became the seat of an annual fair. Complaints, however, were soon made of the disorderly behaviour of the Russians; on which the Chinese monarch threatened to expel them from his dominions entirely, and to allow them neither to trade with the Chinese nor Moguls. This produced another embassy to Peking in 1719, when matters were again adjusted to the

China.

for discharging the ordinary expences of government, something is left by way of reserve for answering accidental demands, and to be ready in cases of necessity. This sum becomes gradually less from the capital to cities of the first, second, and third class. A proper statement of what is paid in the provinces, of what is reserved in the different cities, or contained in the different treasuries of the empire, is subjected to the examination of the grand tribunal of finances. This revises the whole, and keeps an exact account of what is consumed, and of whatever surplus may be left.

91 Of lending money, and deficiencies in paying interest.

Lending money upon interest has been in use in China for about 2000 years. It has often been abolished, and as often established. The interest, as has been already hinted, is no less than 30 per cent. and the year is only lunar. A tenth part of this interest is paid monthly: and concerning neglects of payment, the following laws have been enacted. "However much the debt may have accumulated by months or years, the principal and interest shall remain always the same. Whoever infringes this law shall receive 40 blows of a *pan-tsee;* or an hundred, if he uses any artifice to add the principal and interest together." This law is explained by the following. "Whoever shall be convicted before a mandarin of not having paid a month's interest, shall receive ten blows; twenty for two months, and thirty for three; and in this manner as far as sixty; that is to say, to the sixth month. The debtor is then obliged to pay principal and interest; but those who obtain payment by using violence and force are condemned to receive 24 blows.

92 Agriculture greatly encouraged.

Many Chinese writers have endeavoured unsuccessfully to show why government should allow such exorbitant interest to be taken for money; but the most satisfactory and rational account seems to be, that the great interest of money prevents the rich from purchasing much land; as landed estates would only embarrass and impoverish them, their produce being so much inferior to that of money. The patrimony of a family in China is seldom divided; and it never happens there, as in almost every other country, that wealth and riches are engrossed by one part of the nation, while the other possesses nothing.

Agriculture is by the Chinese considered as the first and most honourable of all professions; so that in this empire the husbandman enjoys many and great privileges, while the merchant and mechanic are much less esteemed. He is considered as next in dignity to officers of state, from whom indeed they very frequently originate. The soldier in China cultivates the ground, and even the priests are employed in agriculture, when their convents happen to be endowed with land. From the principle that the emperor is absolute proprietor of the soil, one would imagine that the tenant must hold his share of it by a very precarious tenure; yet it is certain that when any man is dispossessed, his own culpable conduct is the cause. The Chinese are so habituated to consider a piece of land as their own, while they continue to be punctual in the payment of their rent, that a Portuguese resident in Macao who attempted to raise the rent of his tenants, ran the hazard of losing his life. There are no prodigiously overgrown farms in China, no monopolizers of farms, no wholesale dealers in grain, but every man has it in his power to carry his produce to a free and open market. Part of the crop is allowed to be used in distillation; but if the harvest happens to be bad, this operation is prohibited. In China, the tillage of the earth is not only encouraged by law, but also by the example of the emperor, who annually tills the earth with his own hands.

9[3] Cerem[ony] of the [em]peror t[ill]ing th[e] earth [with] his ow[n] hands.

The beginning of spring in China is always reckoned to be in the month of February; but it belongs to the tribunal of mathematics to determine the precise day. The tribunal of ceremonies announces it to the emperor by a memorial; in which every thing requisite to be done by him is mentioned with the most scrupulous exactness. The sovereign then names 12 of the most illustrious persons in his court to accompany him, and to hold the plough after he has performed his part of the ceremony. Among these there are always three princes of the blood, and nine presidents of supreme courts; and if any of them are too old and infirm to undergo the fatigue, the substitutes must be authorized by the emperor. The festival is preceded by a sacrifice, which the emperor offers up to *Chang-ti* (the supreme God); after which he and his attendants prepare themselves by three days fasting and continence. Others are appointed by the emperor, on the evening before the ceremony, to go and prostrate themselves at the sepulchre of his ancestors, and to acquaint them, that, on the day following, he intends to celebrate a grand sacrifice. This is offered upon a small mount a few furlongs distant from the city, which, by the indispensable rules of the ceremony, must be 50 feet in height. The Chang-ti is invoked by the emperor, who sacrifices under the title of sovereign pontiff, and prays for an abundant harvest in favour of his people. He then descends, accompanied by the three princes and nine presidents who are to put their hands to the plough along with him; the field set apart for this purpose being at a small distance from the mount. Forty labourers are selected to yoke the oxen, and to prepare the seed which the emperor is to sow; and which are of five different kinds, viz. wheat, rice, two kinds of millet, and beans. They are brought to the spot in magnificent boxes, carried by persons of the most distinguished rank. The emperor then lays hold of the plough, and turns up several furrows; the princes of the blood do the same, and then the presidents; after which the emperor throws into the furrows the five kinds of seeds already mentioned: lastly, four pieces of cotton-cloth, proper for making dresses, are distributed to each of the labourers, who assist in yoking the oxen and preparing the seeds; and the same presents are made to forty other persons who have only been spectators of the ceremony.

94 Of the [pea]sants.

"We must not (says M. Grosier) judge of the Chinese peasants from those of Europe, especially in what relates to the lights acquired by education. Free schools are very numerous in every province of China, and even some of the villages are not destitute of this advantage. The sons of the poor are there received as readily as those of the rich; their duties and their studies are the same; the attention of the masters is equally divided between them; and from this obscure source talents often spring, which afterwards make a conspicuous figure on the grand stage of life. Nothing is more common in China than to see the son of

China.

mand and order," &c. Over these inferior mandarins the inspector of the province has a very unlimited authority, and can, by his own power, deprive them of their employments for a great offence; nor does he consult the court excepting where the immediate punishment of the criminal is not necessary. Every one of the mandarins, of whatever rank or denomination, is obliged, once in three years, to give in writing an exact account of the faults he has committed in the execution of his office. If he is a mandarin belonging to any of the four first classes, this confession is examined at court; but if it is made by any of the inferior ones, it must be laid before the provincial tribunal of the governor. Government, however, is not satisfied even with this confession; inquiry is made into the truth of it, and the conduct of the mandarin is scrutinized with the utmost severity, the informations being subjected to the tribunal of mandarins; where they are carefully examined, the merits and demerits of those subjected to this political inquisition carefully balanced, and their names afterwards divided into three classes. The first consists of those for whom rewards and preferment are intended: the second, for whom gentle reproof and admonition are thought necessary; and the third, of those who are to be suspended for some time, or removed altogether, from their offices. Of these last some are allowed to continue; but they receive no salary, and are not only deprived of all their emoluments, but even of their honours. If they have been guilty of any action tending to oppress the people, or to occasion a famine or scarcity among the lower ranks, their punishment is not confined to dismission from their offices, but they are also criminally impeached. The family burying-place of every Chinese is accounted sacred; none dares cut down the trees with which it is overshadowed until they become decayed with age; and even then, not until their condition has been attested by a mandarin: but for certain crimes against government or the people, the burying-place of a mandarin is rased to the foundation. No kind of punishment, however, inflicted on a father, is supposed in the least to affect the character of his son; and therefore, when the latter is asked by the emperor concerning his family, he will perhaps coolly answer, "My father was disgraced for such a crime, my grandfather was beheaded for such another," without the acknowledgement being in the least detrimental. On the contrary, by great and important services, it is possible for him to wipe out these stains from the memory of his ancestors.

Though the empire of China is governed by Tartar princes, the latter seem to bestow much more care and attention on the Chinese than their own natural subjects. Should any dispute arise between a Chinese and Tartar, the former must have greatly deviated from the rules of justice, if he is not acquitted even by those tribunals which are composed of half Chinese and half Tartars. The slightest fault committed by a Tartar mandarin is always severely punished; but the punishment of the Chinese is often mitigated if the delinquent be a Chinese; and the same severity is exercised towards those of the military department. Those faults, however, are punished with the greatest severity which hurt the interests of the people; for which reason they seldom fall a sacrifice to that class of petty tyrants who in other countries prey upon and devour them. Every superior mandarin is obliged to inform himself of the faults of his inferiors, and expose them; nay, he would be punished for them himself if he did not.

Privileges of princes, &c. in China.

Very little regard, as we have already had occasion to observe, is paid to hereditary rights in China. Even the princes of the blood enjoy no other privilege by birth but that of wearing a yellow girdle; and the names of their children, with the exact time of their birth, are inscribed in a yellow book appropriated to that purpose. Collateral princes are distinguished by an orange girdle, and their children are marked in a book of a red colour. The surnames of the princes of the reigning family are determined by the emperor alone; the rest not being allowed to assume any name that too much resembles those of the Moguls or Chinese. The rank even of the emperor's sons diminishes one degree every generation; so that, at the seventh, only the eldest branch has a title to wear the yellow girdle, the rest being sunk into the rank of plain citizens. An hereditary sovereignty, however, passes from one eldest son to another; and this title cannot be forfeited, unless the possessor be guilty of some crime. In this case the emperor appoints to the succession either one of his younger brothers or a cousin; but these must be always chosen from the same branch, as the lawful branch cannot be deprived of its right without the condemnation of all who compose it. The only hereditary authority of the other princes exists among these troops called the *Tartar bands*. There they enjoy, without opposition, that rank which they derive from their birth, but in every thing else are on a level with others. They are subjected to a military examination at stated periods, and are always promoted or degraded according to the degree of skill they exhibit. The same trial is undergone by the heir apparent and his sons; the only indulgence shewn them being, that schools are appointed for their particular use. The princes are likewise indulged with a tribunal appropriated on purpose for them, and before which alone they can be tried. An insult offered to a prince decorated with the yellow girdle is punished with death; but if he has omitted to put it on, the aggressor escapes with a bastinading. A prince may be put to death with the emperor's consent; but he escapes every slighter corporeal punishment by paying a fine. Untitled princes have very few privileges superior to those of common citizens; and are generally very poor, unless possessed of some lucrative office. Thus they are sometimes reduced to the necessity of accepting the highest pay of a common soldier in the Tartar bands. When they, or any of their children, however, enter into the marriage-state, the emperor usually makes them a present of 100 ounces of silver. He will also relieve them on other occasions, assist their widows and orphans, &c. but in all this never departs from the most exact rules of economy; so that the mandarins in this respect are much better than the relations of the sovereign himself.

F. Amiot's account of the ancient religion of China.

With regard to the ancient religion of China, F. Amiot informs us, that after making every possible research, comparing and reasoning upon his observations, he at last concluded, that "The Chinese are a distinct people, who have still preserved the characteristic marks of their first origin; a people whose primitive

China.

objects of their requests; but that, in offering up their prayers to the inferior objects of worship, they only implored their protection and mediation with the Chang-ti.

While the empire was confined within narrow bounds, one mountain was sufficient for the sacrifices; but in process of time it became necessary to consecrate four others. These were situated at the extremities of the empire, and were supposed to correspond with the four quarters of the world; and the prince went successively every year to one of these mountains to offer up sacrifices; taking occasion at the same time to show himself to his people, and to inform himself of their wants. This custom subsisted for a long time; but at length it was found convenient to add a fifth mountain in the centre of the empire; and ever since these have been called the five *Yo*, or the five mountains of sacrifice. This method of subjecting the emperor to regular annual journeys could not but be attended with many inconveniences. It was found necessary on this account to consecrate some spot in the neighbourhood of his palace, which might be substituted for the *Yo* upon all occasions when the emperor could not repair to them. An edifice was therefore erected, which at once represented the *Kiao*, *Tan*, and the *Hall of ancestors*. This last was a necessary part of the edifice; because it was incumbent on those who offered up sacrifices, first to repair to this hall, and acquaint their ancestors with what they were about to perform; and thither also they returned after sacrificing, to thank the same ancestors for the protection they had received from the Chang-ti; after which they offered up a sacrifice of thanksgiving in honour of them, and performed certain other ceremonies to show their respect. The building contained five separate halls, appropriated to different purposes; originally it had neither paintings nor ornaments of any kind, and a staircase of nine steps conducted to the principal entrance. Afterwards, however, it was much more richly ornamented, each of the five halls being decorated with columns, over which others were placed that supported a second roof. In succeeding times it was stripped of all its ornaments, with a view to bring back religion to its primitive simplicity. Its four gates were covered with fine moss, representing the branches of which the double fence of the ancient *Kiao* were formed. The ridge of the roof was covered with the same, and the whole was encompassed by a canal filled with water at the time of offering up the sacrifices. To this a second building was added, which they called the *temple of neatness*, and which was used only for purifications and ceremonies, the former being entirely consecrated to the worship of the Chang-ti.

At present there are only two temples in Peking, named the *Tian-tan* and the *Ti-tan*; in the construction of which all the elegance of Chinese architecture is displayed. These are both dedicated to the Chang-ti, but under different titles; in the one he is adored as the *eternal spirit*; in the other, as the creator and preserver of the world. The ceremonies of the modern sacrifices are greatly multiplied; and nothing can exceed the splendour and magnificence with which these solemnities are performed. Sometimes before the day appointed for the grand ceremony, the monarch, the grandees of the court, and all those whom their employments qualify to assist at the solemnity, prepare themselves by retirement, fasting, and continence; no audience is given by the emperor, and the tribunals are entirely shut; marriages, funerals, rejoicings, and entertainments of every kind, are then forbidden. At last, on the day appointed, the emperor appears, attended by an innumerable multitude, and his person surrounded by a vast number of princes, lords, and officers, while every part of the temple seems to correspond with the magnificence of the sovereign; all the vases and utensils employed in the sacrifices are of gold, and cannot be applied to any other purpose; even the instruments of music are of enormous magnitude, and never used anywhere else. All this grandeur, however, serves only to display in a more eminent manner the humility and abasement of the monarch during his devotion; at which time he rolls in the dust, and speaks of himself before the *Chang-ti* in terms of the most abject submission and humiliation. 10

Sect of Tao-sse.

The purity of the ancient Chinese religion has, however, been long contaminated by many idolatrous and fanatical sects. Among these, one named *Tao-sse* was founded by a philosopher called *Lao-kiun* or *Lao-tse*, who was born 603 B. C. He died in an advanced age, leaving to his disciples a book entitled *Tao-te*, being a collection of 5000 sentences. His morality has a great resemblance to that of Epicurus. It consists principally in banishing all vehement desires and passions capable of disturbing the peace and tranquillity of the soul. According to him, the care of every wise man ought to be only to endeavour to live free from grief and pain, and to glide gently down the stream of life, devoid of anxiety and care. To arrive at this happy state he advises his followers to banish all thoughts of the past, and to abstain from every vain and useless inquiry concerning futurity, as well as all tormenting thoughts of ambition, avarice, &c. It was found by the disciples of this philosopher, however, that all their endeavours to obtain a perfect tranquillity of mind were vain, as long as the thoughts of death intervened; they therefore declared it possible to discover a composition from which drink might be made that would render mankind immortal. Hence they were led to the study of chemistry; and, like the western alchemists, wearied themselves in search of the philosopher's stone, until at last they gave themselves up to all the extravagancies of magic.

The desire of avoiding death, together with the credulity natural to unenlightened minds, quickly produced a number of converts to the sect of *Tao-sse*. Magical practices, the invocation of spirits, and the art of foretelling events by divination, quickly diffused themselves over the empire, and the imbecility of the emperors contributed to propagate the deception. Temples consecrated to spirits quickly reared thei heads in every corner of the empire; and two of the most celebrated of the sect were authorized to maintain public worship there after the form which had been prescribed by their master. At the same time they distributed, and sold at a dear rate, images of the imaginary spirits with which they had peopled the heavens and the earth. These were, by their command, worshipped as so many deities independent of the Supreme Being: and in like manner, several of the ancient emperors were invoked as gods.

Being patronized by the emperors of several dynasties, China. ing the most absurd stories concerning the missionaries; as that they pluck out the eyes of their converts to construct telescopes with, &c. The literati, however, and the more sensible part of the nation, hold them in the greatest contempt.

106 Ridiculous superstition of the *fong-choui.* We shall conclude this detail of the Chinese religion with giving an account of one other superstition which seems peculiar to the nation. It is named *fong-choui*, which signifies wind and water. By this they mean the lucky or unlucky situation of a house, burying-place, &c. If any imprudent person has built a house close to that of a Chinese, in such a manner that the angle formed by its roof flanks the wall or roof of the former house, the proprietor ever after lives in terror of utter ruin and destruction from the malignant influence of that angle. An implacable hatred instantly commences betwixt the two families, and often gives rise to a law-suit, which furnishes matter of discussion for some of the superior tribunals. If no redress can be had at law, however, the Chinese is then reduced to the necessity of erecting, on the top of his house, an enormous image of a dragon, or some other monster, with its mouth gaping towards the angle, and, as it were, threatening to swallow it up; after which the apprehensions of the proprietor begin to subside, and tranquillity is restored to the family. In this manner the governor of *Kien-tchang* secured himself from the influence of the church of the Jesuits, which, being built on an eminence, overlooked his palace. Not depending, however, entirely on the good offices of his tutelary dragon, he also took the wise precaution of altering his principal apartments, and raising, at the distance of 200 paces from the church, a kind of large façade three stories high. But unluckily the death of his successor was attributed to this façade; for the mandarin being attacked with a disorder in the breast, which made him spit up a white phlegm, this symptom was thought to be owing to the walls of the façade, which were very white, and which were forthwith painted black. The salutary precaution, however, happened to be taken too late; for the governor died notwithstanding the black colour of the walls.

"We should never have done (says M. Grosier), were we to relate all the superstitious ideas of the Chinese, respecting the lucky and unlucky situation of houses, the quarter which doors ought to front, and the plan and day proper for constructing the stoves in which they cook their rice." But the object on which they employ their greatest care is the choice of the ground and situation for a burying-ground. Some quacks follow no other profession than that of pointing out hills and mountains which have an aspect favourable for works of that kind. When a Chinese is persuaded of the truth of such information, there is no sum which he would not give to be in possession of the fortunate spot. The greater part of the Chinese are of opinion that all the happiness and misfortunes of life depend upon the *fong-choui*.

107 Jews and Mahometans in China. A colony of Jews was established in China about the year 206 B. C.; but they are now reduced to a small number of families at Cai-fong, the capital of the province of Honan. The Mahometans have multiplied much more than the Jews. It is about 600 years since they first entered the empire, where they have formed different establishments. At first their number was augmented only by marriages; but for some time past they have been more particularly attentive to the extending of their sect and propagating their doctrine. The principal means employed for this purpose are, to purchase a great number of children brought up in idolatry, whom their poor parents are glad to part with; and these they circumcise, and afterwards instruct in the principles of their religion. During the time of a famine which desolated the province of Chang-tong, they purchased more than 10,000 of these children; for whom, when grown up, they procured wives, built houses, and even formed whole villages of them. They are now become so numerous, that in the places where they reside they entirely exclude every inhabitant who does not believe in their prophet, and frequent a mosque.

108 Ceremonies of marriage. With regard to the manners of the Chinese, they bear no resemblance to those of any other nation; and, if we may believe their historians, they are the same at this day that they were 4000 years ago. The women are condemned almost to perpetual imprisonment within the precincts of their own houses, and are never seen even by their intended husbands before marriage. He knows nothing of her looks or person, but from the account of some female relation or confidant, who in such cases acts the part of match-maker; though if imposed upon either with regard to her age or figure, he can have recourse to a divorce. The same matrons who negotiate the marriage, also determine the sum which the intended husband must pay to the parents of the bride: for in China a father does not give a dowry to his daughter; it is the husband who gives a dowry to the wife. When the day appointed for the marriage is arrived, the bride is placed in a chair or close palanquin, the key of which is committed to the care of a trusty domestic, who must deliver it to none but the husband. The latter, richly dressed, waits at his gate for the arrival of the procession. As soon as it approaches, the key is put into his hands; he eagerly opens the chair, and for the first time perceives his good or bad fortune. If he is contented with his new spouse, the bride descends and enters the house, where the marriage is concluded by feasting and merriment as in other countries; but if the bridegroom is very much disappointed, he suddenly shuts the chair, and sends the bride home to her relations. To get rid of her in this manner, however, costs a sum equal to what he originally gave in dowry to obtain her.

The Chinese women, even of the first rank, seldom quit their apartment, which is situated in the most retired part of the house, and in which they are secluded from all society but that of their domestics. The book of ceremonies requires that there should be two apartments in every house; the exterior one for the husband, the interior for the wife. They must even be separated by a wall or wooden partition, the door of which is carefully guarded; nor is the husband at liberty to enter the wife's apartment, or she to quit it, without sufficient reason. According to the same book, the prattling and loquacity of a woman are reckoned sufficient grounds for a divorce. If this be founded in fact, the women of China are either unexampled for taciturnity, or else multitudes of divorces must be daily occurrences. A woman, however, cannot be divorced on

China. nations which they are obliged to undergo before they can be admitted to the first degree. Du Halde gives a remarkable instance, viz. that "a candidate for degrees having, contrary to order, made use of an abbreviation in writing the character *ma*, which signifies a horse, had the mortification of seeing his composition, though in other respects excellent, rejected merely on that account; besides being severely rallied by the mandarin, who told him a horse could not walk unless he had all his legs."

After the scholar has made himself master of the characters, he is then allowed to compose; but the subject of his composition is pointed out to him only by one word. Competitions are likewise established in China, but most of them are of a private nature. Twenty or thirty families, who are all of the same name, and who consequently have only one hall for the names of their ancestors, agree among themselves to send their children twice a month to this hall in order to compose. Each head of a family in turn gives the subject of this literary contest, and adjudges the prize; but this costs him a dinner, which he must cause to be carried to the hall of competition. A fine of about tenpence is imposed on the parent of each scholar who absents himself from this exercise.

Besides these private competitions, every student is obliged to compete at least twice a-year under the inspection of an inferior mandarin of letters styled *Hio-kouan*. It frequently happens also, that the mandarins of letters order these students to be brought before them, to examine the progress they have made in their studies, to excite a spirit of emulation among them, and make them give such application as may qualify them for any employment in the state. Even the governors of cities do not think it below their dignity to take this care upon themselves; ordering all those students who reside near them to appear before their tribunal once a month: the author of the best competition is honoured with a prize, and the governor treats all the candidates on the day of competition at his own expence. In every city, town, and village in China, there are schoolmasters who teach such sciences as are known in that country. Parents possessed of a certain fortune provide masters for their children, to attend and instruct them, to form their minds to virtue, and to initiate them in the rules of good breeding and the accustomed ceremonies, as well as to make them acquainted with the laws and history, if their age will admit. These masters have, for the most part attained to one or two degrees among the literati, and not unfrequently arrive at the first employments of the state.

The education of the Chinese women is confined to giving them a taste for solitude, and accustoming them to modesty and silence; and if their parents are rich, they are likewise instructed in such accomplishments as may render them agreeable to the other sex.

111
Dress.

There is little distinction in China between the ordinary dress of men and women. Rank and dignity are distinguished by certain accessary ornaments; and the person would be severely chastised who should presume to assume them without being properly authorized. The dress in general consists of a long vest which reaches to the ground. One part of this vest, viz. that on the left side, folds over the other, and is fastened to the right by four or five small gold or silver buttons, placed at a little distance from one another. The sleeves are wide towards the shoulder, growing narrower as they approach the wrist, where they terminate in the form of a horse shoe, covering the hands entirely, and leaving nothing but the ends of the fingers to be seen. Round their middle they wear a large girdle of silk, the ends of which hang down to their knees. From this girdle is suspended a sheath containing a knife and two of those small sticks which they use as forks. Below this robe they wear a pair of drawers, in summer made of linen, and in winter of satin lined with fur, sometimes of cotton, and in some of the northern provinces of skins. These are sometimes covered with another pair of white taffety. Their shirts are always very short and wide, of different kinds of cloth, according to the season. Under these they wear a silk net to prevent it from adhering to the skin. In warm weather they have their necks always bare; when it is cold, they wear a collar made of silk and sable, or fox's skin, joined to their robe, which in winter is trimmed with sheep skin, or quilted with silk and cotton. That of people of quality is entirely lined with beautiful sable skins brought from Tartary, or with the finest fox's skin, trimmed with sable; and in the spring it is lined with ermine. Above their robe they wear also a kind of surtout with wide sleeves, but very short, which is lined in the same manner. The emperor and princes of the blood only have a right to wear yellow; certain mandarins have liberty to wear satin of a red ground, but only upon days of ceremony: in general they are clothed in black, blue, or violet. The common people are allowed to wear no other colours but blue or black; and their dress is always composed of plain cotton cloth.

11
Chine[se] oblige[d by] the T[artars] to cut their [hair].

Formerly the Chinese were at great pains to preserve their hair; but the Tartars, who subdued them, compelled them to cut off the greater part of it, and to alter the form of their clothes after the Tartar fashion. This revolution in dress was not effected without bloodshed, though the conquerors at the same time adopted in other respects the laws, manners, and customs of the conquered people. Thus the Chinese are painted as if bald, but they are not so naturally; that small portion of hair which they preserve behind, or on the tops of their heads, is all that is now allowed them. This they wear very long, and plait like a tail. In summer they wear a kind of cap shaped like an inverted cone, lined with satin, and covered with ratan or cane very prettily wrought. The top terminates in a point, to which they fix a tuft of red hair, which spreads over it, and covers it to the brim. This hair grows between the legs of a kind of cow, and is capable of taking any colour, especially a deep red. This ornament is much used, and any person who chooses may wear it.

The mandarins and literati wear a cap of the same form as the foregoing, only it is lined with red satin, and covered on the outside with white. A large tuft of the finest red silk is fixed over it, which is suffered to hang down or wave with the wind. People of distinction generally use the common cap when they mount on horseback or during bad weather; being better calculated to keep off rain, and shelter those who wear it from the rays of the sun. For winter they have another cap bordered with sable, ermine, or fox's

China. pliments, and begs to be excused from sitting in such an honourable seat, which nevertheless he accepts of; and all the rest of the guests do the same, otherwise the ceremonial would be gone through with each of them. The entertainment is concluded by some theatrical representations, accompanied with the music of the country; which, however, would give but little pleasure to an European. Besides the guests, a certain number of people are admitted into the court in order to behold these theatrical representations; and even the women are allowed to view them through a wicket, contrived so that they may behold them without being seen themselves.

The entertainments of the Chinese are begun, not by eating, but by drinking; and the liquor they drink must always be pure wine. The intendant, or *maitre d'hotel*, falling down on one knee, first invites the guests to take a glass; on which each of them lays hold with both hands of that which is placed before him, raising it as high as the forehead, then bringing it lower down than the table, and at last putting it to his mouth: they all drink together, and very slowly, taking three or four draughts. While they are drinking, the dishes on each of the tables are removed, and others brought in. Each of the guests has twenty-four set before him in succession; all of them fat, and in the form of ragouts. They never use knives in their repasts; and two small pointed sticks, ornamented with ivory or silver, serve them instead of forks. They never begin to eat, however, until they are invited by the *maitre d'hotel;* and the same ceremony must be gone through every time they are going to take a cup of wine, or begin a new dish. Towards the middle of the entertainment the soup is brought in, accompanied with small loaves or meat pies. These they take up with their small sticks, steep them in the soup, and eat them without waiting for any signal, or being obliged to keep time with the rest of the guests. The entertainment, however, continues in other respects with the utmost formality until tea is brought in; after which they retire from table and amuse themselves in another hall, or in the garden, for a short time, until the dessert be brought in. This, like the entertainment itself, consists of 24 dishes, which are made up of sweetmeats, fruits differently prepared, hams and salted ducks which have been baked or dried in the sun, with shell and other kinds of fish. The same ceremonies which preceded the repast are now renewed, and every one sits down at the same place he occupied before. Larger cups are then brought in, and the master invites the guests to drink more freely.

These entertainments begin towards evening, and never end till midnight. A small sum of money is given to the domestics; when every one of the guests goes home in a chair preceded by several servants, who carry large lanthorns of oiled paper, on which are inscribed the quality, and sometimes the name, of the master. Without such an attendance they would be taken up by the guard; and the day following they never fail to return a card of thanks to the officer.

Their method of drinking tea is not like that of other nations. A small quantity of bohea, sufficient to tinge the water and render it palatable (for they drink no green), is taken in the morning, and thrown into a vessel adapted to the number in family. This stands till milk-warm; in which state it is kept the whole day, and a cup drank now and then without sugar or milk, in order to exhilarate the spirits when exhausted by fatigue: and if a stranger call by accident, or a visitor by appointment, the first thing presented, after the usual ceremonies of meeting, is a very small pipe filled with tobacco of their own growth, and a cup of the tea already mentioned, or of some fresh made of better quality, together with sweetmeats, &c. Tea is the daily beverage in China, and is drank by all ranks of people.

Some change has been made in the ceremonial of the Chinese by the Tartar conquest, and some new dishes also introduced by the same means; and here M. Grosier observes, that the Tartars are much better cooks than the Chinese. All their dishes are highly seasoned; and by a variation in the proportions of their spiceries, they are able to form a variety of dishes out of the same materials. None of their viands, however, are more esteemed than stags sinews, and the nests of a particular species of birds, which have the property of giving a most agreeable relish to whatever is mixed with them. Other dishes are introduced at these repasts, which would be accounted very disagreeable with us; such as the flesh of wild horses, the paws of a bear, and the feet of several wild animals. The greater part of these provisions are brought preserved in salt from Siam, Camboya, and Tartary.

Chi[nese] wine[s]. The wines of China have no resemblance to ours either in taste or quality, being procured from rice, and not from the vine. A particular kind of rice is employed for making them, and the grain is steeped for 20 or 30 days in water, into which ingredients of a different nature are successively thrown: they afterwards boil it; and as soon as it becomes dissolved by the heat, it immediately ferments, and throws up a vaporous scum not unlike new wine. A very pure liquor is found under this scum, which is drawn off and put into vessels well glazed: From the remaining leys an inflammable spirit is made, little inferior, and sometimes even superior to the European. Another kind of wine is used by the Chinese, or rather Tartars, called *lamb wine*. It is very strong, and has a disagreeable smell; and the same may be believed of a kind of spirit distilled from the flesh of sheep; though this last is sometimes used by the emperors.

These entertainments exceed the bounds of ordinary repasts; the Chinese being naturally sober, and those in easy circumstances living chiefly on pork; for which reason a great number of hogs are bred in the country. Their flesh is much easier of digestion, and more agreeable to the taste than those of Europe. The Chinese hams are in high estimation. The common people live very poorly; being satisfied, in time of scarcity, with the flesh of dogs, horses, cats, and rats, which last are sold publicly in the streets.

Pu[blic fes]tiv[als]. There are several public festivals annually celebrated in China. One is that already mentioned, in which the emperor tills the ground with his own hands. This is also celebrated on the same day throughout the empire. In the morning the governor of every city comes forth

China.

The emperor marches with still more magnificence, in proportion to his superior quality. The trumpets used in this procession are about three feet long, eight inches in diameter at the lower extremity, and pretty much resembling a bell in shape: their sound is peculiarly adapted to that of the drums. His cavalcade is closed by 2000 mandarins of letters, and as many of arms. Sometimes the great mandarins, as well as the emperor, travel in barks: their attendance is then somewhat different, but the magnificence almost the same. The honours paid to a viceroy who has governed a province with equity are exceedingly great on his departure from it. He has scarcely left the capital of the province when he finds on the highway, for the space of two or three leagues, tables ranged at certain distances, each of which is surrounded with a long piece of silk that hangs down to the earth. On these wax candles are placed even in the open day: perfumes are burnt upon them; and they are loaded with a profusion of victuals, and various kinds of fruit, while tea and wine are prepared for him on others. The people throw themselves on their knees as he passes, and bow their heads even to the earth; some shed tears, or pretend to do so; some present him with wine and sweetmeats; others frequently pull off his boots and give him new ones. These boots, which he has perhaps used only for a moment, are considered as a valuable monument; those first taken off are preserved in a cage over the gate of the city; the rest are carefully kept by his friends.

118 Knavish disposition of the Chinese.

Hitherto our author, M. Grosier, has seemed inclined to give a favourable idea of the Chinese, and to cause us look upon them as many degrees superior to ourselves in the practice of virtue and morality; but when he comes to give an account of their dealings in trade, he is then obliged to confess that they are as dishonest and knavish a race as any that exist. "The most frequented fairs of Europe (says he) afford but a faint idea of that immense number of buyers and sellers with which the large cities of China are continually crowded. We may almost say, that the one half are employed in over-reaching the other. It is, above all, against strangers that the Chinese merchants exercise, without any sense of shame, their insatiable rapacity. Of this F. du Halde gives a striking example, which might be supported by many others: 'The captain of an English vessel bargained with a Chinese merchant at Canton for several bales of silk, which the latter was to provide against a certain time. When they were ready, the captain went with his interpreter to the house of the Chinese merchant to examine whether they were sound and in good condition. On opening the first bale, he found it according to his wish, but all the rest were damaged and good for nothing. The captain on this fell into a great passion, and reproached the merchant in the severest terms for his dishonesty. The Chinese, after having heard him for some time, with great coolness, replied, 'Blame, Sir, your knave of an interpreter: he assured me that you would not inspect the bales.'

"The lower class of people are, above all, very dexterous in counterfeiting and adulterating every thing they sell. Sometimes you think you have bought a capon, and you receive nothing but skin; all the rest has been scooped out, and the place so ingeniously filled, that the deception cannot be discovered till the momen[t] you begin to eat it. The counterfeit hams of Chin[a] have been often mentioned. They are made of a piec[e] of wood cut in the form of a ham, and coated ove[r] with a certain kind of earth which is covered with hog['s] skin. The whole is so curiously painted and prepare[d] that a knife is necessary to detect the fraud. Mr O[s]beck relates, that having one day observed a blind ma[n] carrying about for sale some of those trees called b[y] the Chinese, *Fokei*, he purchased one, which to appea[r]ance had fine double red and white flowers; but o[n] closer examination, he found that the flowers were take[n] from another tree, and that one calyx was so neatly fitted into the other, with nails made of bamboo, that h[e] should scarcely have discovered the deceit had not th[e] flowers begun to wither. The tree itself had buds, bu[t] not one open flower.

"The robbers in China signalize themselves also b[y] the dexterity and ingenuity which they display i[n] their profession. They seldom have recourse to acts o[f] violence, but introduce themselves into a house eithe[r] privately or by forming some connection with the family. It is as difficult in China to avoid robbery as i[t] is to apprehend the criminal in the fact. If we ar[e] desirous of finding among the Chinese openness of temper, benevolence, friendship, and, lastly, virtue, we mus[t] not seek for it in cities, but in the bosom of the country, among that class of men who have devoted themselves to labour and agriculture. A Chinese rusti[c] often discovers moral qualities which would add [a] lustre to the character of men of the most exalte[d] rank. It appears that rural life naturally inspires sentiments of benevolence; by continually receiving th[e] gifts of nature, the mind is enlarged, and men ar[e] insensibly accustomed to diffuse them to those aroun[d] them.'

The internal commerce of China is much greate[r] than that of all Europe; but its foreign trade is b[y] no means equal to that of any of the grand Europea[n] powers. Its internal commerce is greatly facilitate[d] by the vast number of canals and rivers with whic[h] the country is intersected. The Chinese, however are not at all fitted for maritime commerce: Fe[w] of their vessels go beyond the straits of Sunda; thei[r] longest voyages to Malacca extended only as far a[s] Acheen, towards the straits of Batavia, and northwards to Japan.

Their commerce with the last mentioned island, considering the article of exchange, which they procure a[t] Camboya or Siam, produces them cent. per cent. Thei[r] trade with the Manillas brings only about 50 per cent Their profit is more considerable about Batavia; an[d] the Dutch spare no pains to invite them to traffic a[t] their settlements. The Chinese traders go also, thoug[h] not very frequently, to Acheen, Malacca, Thor, Patan and Ligor, belonging to Siam and Cochin-china; fro[m] whence they bring gold and tin, together with som[e] objects of luxury for the table. A great obstacle t[o] the foreign commerce of the Chinese is their indifference about maritime affairs, and the bad constructio[n] of their vessels. This they themselves acknowledge but say, that any attempt to remove it would be derogating from the laws, and subverting the constitutio[n] of the empire.

The burying-places in China are always situated at a

China. men. The eldest son, clothed in a frock of canvas, having his body bent and leaning on a staff, follows near the coffin; and behind him his brothers and nephews, but none of them clothed in canvas. Then come the relations and friends, all clad in mourning, and followed by a great number of chairs covered with white stuff, which contain the wives and female slaves of the deceased. These make great show of sorrow by their doleful cries; but M. Grosier observes, that, in spite of all they can do, the lamentations of the Chinese are so methodical, that an European would be apt to conclude that they were the effects of art rather than the natural effusions of a mind agitated and oppressed with grief. When they arrive at the burying place, the coffin is deposited in a tomb appropriated for it, not far from which there are tables arranged in different halls, and on which the assistants are entertained with great splendour. The entertainment is sometimes followed by fresh marks of homage to the corpse; but these are often changed into thanks to the eldest son; who, however, answers only by signs. But if the deceased was a grandee of the empire, a certain number of his relations never leave the tomb for a month or two. There they reside in apartments purposely provided for them, and every day renew their marks of grief in company with the children of the deceased. The magnificence of these funeral ceremonies is proportioned to the wealth or dignity of the deceased. That of one of the brothers of the emperor was attended by 16,000 people, each of whom had a particular office assigned him relating to the ceremony.

121 Mourning.

Mourning continues in China for three years; and during all this time they are obliged to abstain from the use of flesh and wine; nor can they assist at any entertainment of ceremony, or attend any public assembly. At first they are not even permitted to go abroad; and when they do so they are carried in a chair covered with a white cloth. Sometimes the filial piety of the Chinese is carried to such a length, that they preserve the bodies of their deceased fathers in their houses for three or four years; and those who do so impose also upon themselves a great number of other duties, using no other seat during the day but a stool covered with white serge, and no other bed but a plain mat made of reeds, which is placed near the coffin.

122 Diversions of hunting and fishing.

According to M. Grosier, the only diversions of the Chinese are those of hunting and fishing, dancing not being practised, and gaming forbidden by law. Fishing is considered by them rather as an object of commerce and industry than amusement. They catch fish by various methods; using nets in their great fisheries, but lines in the private. In certain provinces also they use a certain kind of bird, whose plumage greatly resembles that of a raven, but with a much longer bill, very sharp and hooked. This method of fishing is practised in boats, of which great numbers may be seen on the river about sun-rising, with the fishing-birds perched on their prows. These birds are taught to catch fish almost in the same manner that dogs pursue game. The fishermen, after making several turns with their boats, beat the water strongly with one of their oars. This serves as a signal to the birds, who instantly plunge into the water, and diving, swallow as many small fishes as they can, repairing immediately afterwards to the boat, and carrying a large one by the middle in their bill. The small ones are prevented from passing into the stomach by a ring placed on purpose to confine its gullet: and thus the fisherman by stroaking its neck with the head downwards, makes the bird disgorge all those small fish it has swallowed. When they have done fishing, the rings are taken off, and the birds allowed to feed. When the fish happens to be too large for a single bird, the others have sagacity enough to assist it; one taking it by the tail, another by the head, &c. and thus they transport it to their master.

Another method of fishing, practised only in China, is as follows: They nail a board about two feet in breadth, which is covered with a white shining kind of varnish, upon the edges of a long narrow boat, from one end to the other. This board is placed in such a manner as to slope almost imperceptibly to the water. It is used only in the night-time, and is always turned towards the moon, that the reflection of light from the luminary may increase the splendour of the varnish. The fish in sporting, often mistake this varnished board for water; and endeavouring to throw themselves into it, fall into the boat.

The soldiers have a particular method of fishing with a bow and arrow; the latter of which is fixed to the bow by a string, both to prevent it from being lost, and to enable them to draw out the fish which the arrow has pierced; others make use of tridents to catch large fish which are sometimes found in the mud.

Besides these diversions the Chinese have some strolling players, but no regular theatres; they have likewise musicians and singers, but no operas, or indeed any public spectacle worthy of notice.

The language of the Chinese is not only very ancient, but, in M. Grosier's opinion, is still spoken as in the most early ages without any variation. His reasons for this opinion are, 1. We do not perceive in history, nor even in the most fabulous traditions, a single fact tending to occasion any doubt of the language spoken by the ancient Chinese being different from that used at present. 2. China has never changed its inhabitants; and if revolutions have occasioned any mixture of new languages, it appears that the ancient language has always been predominant, and that the new settlers have learned and spoken it, as the Manchew Tartars after their conquest. 3. The most intelligent and discerning of the literati agree, that the first chapters of the *Chou-king* were written under the reign of Yao, 2300 years before Christ; and in these several speeches of the first emperors are related word for word; and it is not probable that the language of these princes was different from that of the historian. 4. A compliment paid to Yao by one of his subjects, with the answer of that prince, are still preserved, as well as two songs composed under the same reign. 5. The most ancient inscriptions in China are all in the language spoken throughout the empire at this day. 6. The Chinese have borrowed nothing from other nations; and their attachment to their own customs, and to antiquity, must undoubtedly be very unfavourable to any innovation. The language spoken by the vulgar, indeed, must have undergone some changes; but these may be accounted trivial, affecting only

12[illegible] Of the [illegible]nese la[illegible]guage.

China. decline. They pretend indeed, but without adducing any satisfactory proof of its truth, that the monuments of literature were destroyed by the tyrant She-whang-te, 200 years before the Christian era, that succeeding generations might consider him as the first civilized emperor who had swayed the sceptre over that extensive country. The chief works at present among them which are most valued, studied, and least understood, are the five classics collected by their favourite Cong-foo-tse, 450 years B. C. and which it seems had the good fortune to escape the unlettered fury of She-whang-te. These classics are enumerated by Mr Barrow in the following order.

1. *Shoo-king*. A collection of records and annals of various princes, commencing more than 2000 years B. C.

2. *Shee-king*. Odes, sonnets, and maxims; most of them so abundant in metaphor, and so obscure, that much of the sense is to be made out by the translator.

3. *Ye-king*. The perfect and the broken lines of Fo-shee; the most ancient relick in China, and perhaps the first attempt at written language: now perfectly incomprehensible.

4. *Chung-choo*. Spring and autumn. The history of some of the kings of Loo: the work principally of Cong-foo-tse.

5. *Lee-kee*. Ceremonies and moral duties, a compilation of Cong-foo-tse.

Without a complete change of the Chinese language, and a more extensive and friendly intercourse with foreign nations, it is not at all probable that that people will ever rank high for their knowledge of literature.

124 Chinese writing.

There are five kinds of writing mentioned by the Chinese literati; the most modern of which is a method of tracing out the characters with a pencil. This is difficult, and requires much experience; at any rate it disfigures the characters greatly, and is therefore only used in the prescriptions of physicians, prefaces to books, and inscriptions of fancy. The tracing of characters with neatness and accuracy, however, as we have already had occasion to observe, is greatly admired in China. They are often preferred to the most elegant painting; and some will give a most exorbitant price for a page of an old book, if it happens to be neatly written. They pay particular attention to well formed characters even in the most common books; and if any of the leaves happen to fall off, will replace them with the greatest attention. To apply them to any vile purpose, tread them under foot, &c. would be reckoned an unpardonable violation of decency and politeness; nay, it often happens, that workmen, such as masons and joiners, dare not tear a printed leaf of paper fixed to the wall.

125 Of their poetry.

Punctuation was not formerly used in China, nor are points as yet employed in works of an elevated style, or such as are to be presented to the emperor. Poetry is seldom an object of attention, though the taste for it seems to be pretty general in China. Their versification has its rules, and is no less difficult than that of other nations. Only the most harmonious, energetic, and picturesque words, are to be employed, and they must always be used in the same sense in which they were used by the ancients. Each verse can contain only a certain number of words; all of which must be ranged according to the rules of quantity, and terminate in rhyme. The number of verses in a strophe is not determined; but they must be uniform, and present the same distribution of rhymes. The small number of poetical expressions contained in the Chinese language has rendered it necessary to extend the poetical licence to a great length in this respect. The Chinese poets are allowed to employ a blank verse in every four. They are acquainted with most kinds of poetry in use among us. They have stanzas, odes, elegies, idyls, eclogues, epigrams, satires, and even *bouts rimes*. The common people have also ballads and songs peculiar to themselves. Some of the most distinguished of the literati have even thought it of importance enough to turn the most celebrated maxims of morality, with the rules of civility, into verse. Their poetry is seldom disgraced by any kind of obscenity; and indeed any such thing would be severely punished by government. That severe attention with which every thing tending to corrupt the morals is watched in China, prohibits not only poems of this kind, but likewise romances of all sorts. The police, however, permits such novels as have a useful tendency, and in which nothing is introduced prejudicial to sound morality. Every author who writes against government is punished with death, as well as all those who have had any hand in the printing or distribution of his works.

The arts of making paper and printing have been long known among the Chinese. That kind of paper now in use was first manufactured about 105 years before the Christian era. Before that period they used cloth, and various kinds of silk stuff, instead of paper; and to this day they still preserve a custom of writing the praises of the dead upon large pieces of silk, which are suspended on one side of the coffin, and carried in funeral processions; and of ornamenting their apartments with maxims and moral sentences written in the same manner. In ages still more early, they wrote with a kind of style upon pieces of bamboo, or even upon plates of metal. The first paper was invented by a mandarin. He took the bark of trees, hemp, and old pieces of silk-stuff, boiling them together until they were reduced to a kind of paste, of which he formed his paper; which by degrees was brought to perfection, and the art of whitening and giving it a lustre found out. A great number of different substances are now used in this empire for making paper; such as the bamboo reed, the cotton shrub, the bark of the plant called kou-chu, and of the mulberry tree; hemp, the straw of wheat and rice, parchment, the cods of the silk-worm, and several other substances unknown in Europe. In this manufacture the bark of trees and shrubs is used, and the woody substance of the bamboo and cotton tree, after it has been macerated and reduced to a thin paste. Most of the Chinese paper, however, is attended with the disadvantage of being very susceptible of moisture, readily attracts the dust, and worms insensibly get into it: to prevent which inconveniences, it is necessary to beat the books often, and expose them to the sun. That made of cotton is the prettiest, and most used of any. All of them, however, are much softer and smoother than ours; which is absolutely necessary for their method of writing with a

126 Chinese paper.

China. particular use of two kinds; one named *touan-tse*, a kind of satin much stronger, but which has less lustre, than that of Europe; the other a kind of taffety, of which they make drawers and linings. It is woven exceedingly close, and is yet so pliable that it may be rumpled and rubbed between the hands without any crease; and even when washed like cotton-cloth, it loses very little of its lustre. They manufacture also a kind of gold brocades, but of such a slight nature, that they cannot be worn in clothes: they are fabricated by wrapping fine slips of gilt paper round the threads of silk.

130
Porcelain.

Porcelain is another great branch of Chinese manufacture, and employs a vast number of workmen. The finest is made in a village called *King-te-Ching* in the province of *Kiang-si.* Manufactories have also been erected in the provinces of Fo-kien and Canton, but their produce is not esteemed: and one which the emperor caused to be erected at Peking, in order to be under his own inspection, miscarried entirely.

The Chinese divide their porcelain into several classes, according to its different degrees of fineness and beauty. The whole of the first is reserved for the use of the emperor, so that none of it ever comes into the hands of other persons, unless it happen to be cracked or otherwise damaged in such a manner as to be unworthy of being presented to the sovereign. Among that sent to the emperor, however, there is some porcelain of an inferior quality, which he disposes of in presents. There is some doubt, therefore, whether any of the finest Chinese porcelain was ever seen in Europe. Some value, however, is now put upon the European porcelain by the Chinese themselves.

131
Glass of little estimation.

The use of glass is very ancient in China, though it does not appear that great value was ever put upon this kind of ware, the art of manufacturing it having been frequently lost and revived again in this empire. They greatly admire the workmanship of the European crystal, but prefer their own porcelain, which stands hot liquors, and is much less liable to be broken. The little estimation in which this substance was held, is even mentioned by their own writers in speaking of the false pearls, mirrors, and other toys which were made in former ages. The remembrance of a very large glass vessel, however, which was made in 627, is still preserved; and of which it was said that a mule could as easily enter it as a gnat could enter a pitcher. In order to transport this monstrous vessel from the place where it was manufactured to the emperor's palace, it was necessary to inclose it in a net, the four corners of which were fixed to four carriages. The same indifference with regard to glass is still entertained by the present emperors; however, a glass-house is established at Peking, where a number of vases and other works are made; and these are so much the more difficult in the execution, as none of them are blown. This manufactory, as well as many others, is considered only as an appendage of the court, destined for the purposes of pomp and magnificence.

132
Medicine.

It seems evident that medicine must have been one of the earliest studies to which mankind turned their attention, at least when they had attained to some degree of civilization. It is the common lot of humanity to be born to trouble as the sparks fly upward, and therefore an assiduous application to the study of those diseases to which man is subject, either with a view to effect a radical cure, or even to mitigate the virulence of their symptoms, must have secured to such characters the esteem and admiration of the world. Even savages have discovered respect for such of their own nation as could remove obstructions, heal bruises, or administer relief to the miserable in any shape whatever. The Chinese in this respect are perfectly unique, and seem to differ from every nation under heaven in their notions of medicine. They have no public seminaries where the healing art may be taught, because they do not consider the knowledge of any branch of medicine as in the smallest degree necessary. The very best performances of this nature to be met with in China, are little more than mere enumerations of the names and supposed qualities of different plants, —a sufficient stock of knowledge for constituting a Chinese physician. In a country where the people are so credulous, and the medical art at such a low ebb, it would be a singular circumstance to find no quacks. In every city, therefore, of this vast empire, multitudes are to be met with continually vending nostrums, as pretended specifics for some disease or other, and the easy credulity of the people affords them a comfortable subsistence.

Were the Chinese perpetual strangers to every species of disease, it would enable us to account for their unnatural apathy or indifference about the study of physic; but it will remain an inexplicable paradox, when we are assured upon undoubted authority, that they are subject to a multiplicity of distempers. The smallpox, ophthalmia, contagious fevers, sometimes the venereal or Canton ulcer, as it is denominated by themselves, are a few of the maladies incident to the Chinese, which might constitute a powerful stimulus, one would imagine, to the study of physic, with unremitting assiduity, which it is certain they do not, as appears from the subsequent assertion of Dr Gregory. "In the greatest, most ancient, and most civilized empire on the face of the earth, an empire that was great, populous, and highly civilized 2000 years ago, when this country was as savage as New Zealand is at present, no such good medical aid can be obtained among the people of it, as a smart boy of 16, who had been but 12 months apprentice to a good and well employed Edinburgh surgeon, might reasonably be expected to afford." This gives us a melancholy picture of the state of medicine in China, which, however, is confirmed by the united testimony of Sir George Staunton and Mr Barrow.

The people of China are said to be in the possession of a method for ascertaining whether a man has been murdered, or committed an act of suicide, of the probability of which our readers will be able to judge from the following process. The body to be examined is washed with vinegar. A large fire is kindled in a pit dug for the purpose, six feet long, three wide, and the same in depth. The fire receives new accession of fuel till the pit acquires the temperature of a heated oven, when the whole of the remaining fuel is taken out, and a large quantity of wine is poured into the pit. The body is then placed at full length on osier twigs over the mouth of it, and covered with a cloth for two hours, that the steam of the wine may act upon the body in all directions. The Chinese, it is of China there are bells for marking the hours and watches of the night. They generally divide the night into five watches, beginning at seven or eight in the evening. On the commencement of the first they give one stroke, which is repeated a moment after; and thus they continue for two hours till the beginning of the second: they then give two strokes, which are repeated at equal intervals till the beginning of the third watch; and thus they proceed to the fourth and fifth, always increasing the number of the strokes. For the same purpose also they use enormous drums, which they beat in a similar manner. F. Magaillans mentions one at Peking upwards of 40 feet in circumference.

The instrument called *huien*, which is made of baked earth, is highly esteemed by the Chinese on account of its antiquity. It is distinguished into two kinds, the great and small; the former being of the size of a goose's egg; the latter of that of a hen's. It has six holes for the notes, and a seventh for the mouth.

The *kin* and *tche* have been known from the remotest antiquity. The kin has seven strings made of silk, and is distinguished into three kinds, differing only in size. The body is formed of a kind of wood varnished black, and its whole length is about five feet five inches. The *tche* is about nine feet in length, has 25 strings, and is divided into 25 kinds. F. Amiot assures us, that we have no instrument in Europe which deserves to be preferred to it.

The instruments which emit the sound of wood are the *tchou*, the *yu*, and the *tchoung-ton*. The first is shaped like a bushel, and is beat on the inside with a hammer; the second, which represents a tyger squatting, is made to sound by scraping its back gently with a rod; the third is a collection of twelve pieces of boards tied together, which are used for beating time, by holding them in the right hand, and knocking them gently against the palm of the left.

Many instruments are constructed of the bamboo. These consist of pipes joined together, or separate, and pierced with more or fewer holes. The principal of all these wind instruments is the *cheng*, which emits the sound of a gourd. This is formed by cutting off the neck of a gourd, and reserving only the lower part. To this a cover is fitted, having as many holes as are equal to the number of sounds required. In each of these holes a pipe made of bamboo is fixed, and shorter or longer according to the tone intended. The mouth of the instrument is formed of another pipe shaped like the neck of a goose; which is fixed to the gourd on one side; and serves to convey the air to all the pipes it contains. The ancient *cheng* varied in the number of their pipes; those used at present have only 13.

136 Chinese paintings.

The painting of the Chinese is undoubtedly inferior to that of the Europeans, though we are not by any means to judge of the abilities of the painters of this empire by the performances which are brought to Europe. M. Grosier remarks, that the works of the eminent Chinese painters are never brought to Canton, because they cannot find purchasers among the European merchants. The latter delight only in obscene pictures, which are not permitted by government, nor indeed will any artist of character execute them, though they prevail upon some of the inferior daubers to gratify them in this respect. It seems, however, to be universally agreed, that the Chinese have no notion of correctness or perspective, and little knowledge of the proportions of the human body, though it cannot be denied that they excel in painting flowers and animals. In these they pride themselves in a scrupulously exact imitation of nature, insomuch that it is no uncommon thing to hear a painter ask his pupil how many scales there are between the head and tail of a carp.

Painting was formerly much esteemed in China, but has now fallen into disrepute on account of its political inutility. The cabinets and galleries of the emperor, however, are filled with European paintings, and the celebrated artists Castiglioni and Attiret were both employed; but their offer of erecting a school of painting was rejected, lest they should by this means revive the taste for that art which it had been formerly thought prudent to suppress.

Painting in fresco was known in China long before the Christian era; and, like the Grecians, the Chinese boast much of their celebrated painters of antiquity. Thus we are told of a door painted by Fan-hien, which was so perfect an imitation, that the people who entered the temple where it was, attempted to go out by it, unless prevented by those who had seen it before. The present emperor has in his park an European village painted in fresco, which produced the most agreeable deception. The remaining part of the wall represents a landscape and little hills, which are so happily blended with the distant mountains, that nothing can be conceived more agreeable. This was the production of Chinese painters, and executed from designs sketched out for them.

After this account of the state of painting in China, chiefly on the authority of M. Grosier, we beg leave to remark, upon the authority of more recent, and seemingly more competent as well as more inquisitive observers, that painting in China is at a low ebb, which made a certain artist once exclaim, "These Chinese are fit for nothing but weighing silver, and eating rice." They can copy with tolerable exactness what is laid before them, but so deficient are they in respect to a judicious alternation of light and shade; and therefore without discovering a single symptom of taste, beauties and defects are alike slavishly imitated. Their supposed excellence in drawing flowers, birds, and insects to the life, is most remarkable in the city of Canton; from which Mr Barrow conjectures that they acquire their eminence by copying the productions of Europe, occasionally sent over to be transferred to the porcelain designed for exportation.

137 Engraving.

Engraving in three, four, or five colours, is very ancient among the Chinese, and was known in this empire long before its discovery in Europe.

138 Sculpture.

Sculpture is very little known in this empire; nor is there a single statue in any of the squares or public edifices of Peking, not even in the emperor's palace. The only real statues to be met with in the empire are those which, for the sake of ceremonious distinction, are used to ornament the avenues leading to the tombs of princes and men of great rank; or those that are placed near the emperor's coffin, and that of his sons and daughters, in the interior part of the vault, where their remains are deposited.

139 Architecture.

The Chinese architecture is entirely different from that disorders. With this view it was made use of for some time; but has long since given place to more powerful medicines.

China-Ware. See Porcelain.

CHINCA, a sea-port town in Peru in South America, situated in an extensive valley of the same name, in W. Long. 76. 0. S. Lat. 13. 0.

CHINCOUGH, a convulsive kind of cough to which children are generally subject. See Medicine *Index.*

CHINESE, in general, denotes any thing belonging to China or its inhabitants.

Chinese Swanpan. See Abacus.

CHINKAPIN. See Fagus, Botany *Index.*

CHINNOR, a musical instrument among the Hebrews, consisting of 32 chords. Kircher has given a figure of it, which is copied on Plate CXLV.

CHINON, an ancient town of Tourrain in France, remarkable for the death of Henry II. king of England, and for the birth of the famous Rabelais. It is seated on the river Vienne, in the department of Indre and Loire. E. Long. 0. 18. N. Lat. 47. 2.

CHIO, or Chios, an Asiatic island lying near the coast of Natolia, opposite to the peninsula of Ionia. It was known to the ancients by the name of Ethalia, Macris, Pithyusa, &c. as well as that of Chios. According to Herodotus, the island of Chios was peopled originally from Ionia. It was at first governed by kings: but afterwards the government assumed a republican form, which by the direction of Isocrates was modelled after that of Athens. They were, however, soon enslaved by tyrants, and afterwards conquered by Cyrus king of Persia. They joined the other Grecians in the Ionian revolt; but were shamefully abandoned by the Samians, Lesbians, and others of their allies: so that they were again reduced under the yoke of the Persians, who treated them with the utmost severity. They continued subject to them till the battle of Mycale, when they were restored to their ancient liberty: this they enjoyed till the downfal of the Persian empire, when they became subject to the Macedonian princes. In the time of the emperor Vespasian the island was reduced to the form of a Roman province; but the inhabitants were allowed to live according to their own laws under the superintendence of a prætor. It is now subject to the Turks, and is called *Scio.* See that article.

CHICOCCA. See Botany *Index.*

CHIONANTHUS, the Snow-drop or Fringe-tree. See Botany *Index.*

CHIONE, in fabulous history, was daughter of Dædalion, of whom Apollo and Mercury became enamoured. To enjoy her company, Mercury lulled her to sleep with his caduceus; and Apollo, in the night under the form of an old woman, obtained the same favours as Mercury. From this embrace Chione became mother of Philammon and Autolycus; the former of whom, as being son of Apollo, became an excellent musician; and the latter was equally notorious for his robberies, of which his father Mercury was the patron. Chione grew so proud of her commerce with the gods, that she even preferred her beauty to that of Juno; for which impiety she was killed by the goddess and changed into a hawk.—Another of the same name was daughter of Boreas and Orithia, who had Eumolpus by Neptune. She threw her son into the sea; but he was preserved by his father.

CHIOS. See Chio and Scio.

CHIOURLIC, an ancient town of Turkey in Europe, and in Romania, with a see of a Greek bishop. It is seated on a river of the same name, in E. Long. 7. 47. N. Lat. 41. 18.

CHIOZZO, an ancient and handsome town of Italy in the Venetian territories of Austria, and in a small island, near the Lagunes, with a podesta, a bishop's see, and a harbour defended by a fort. E. Long. 12. 23. N. Lat. 45. 17.

CHIPPENHAM, a town of Wiltshire, seated on the river Avon, containing 3410 inhabitants in 1811. It has a handsome stone bridge over the river, consisting of 21 arches; and sends two members to parliament. There is here a manufacture of the best superfine woollen cloth in England. W. Long. 2. 12. N. Lat. 51. 25.

CHIPPING, a phrase used by the potters and china men to express that common accident both of our own stone and earthen ware, and the porcelain of China, the flying off of small pieces, or breaking at the edges. Our earthen wares are particularly subject to this, and are always spoiled by it before any other flaw appears in them. Our stone wares escape it better than these; but not so well as the porcelain of China, which is less subject to it than any other manufacture in the world. The method by which the Chinese defend their ware from this accident, is this: They carefully burn some small bamboo canes to a sort of charcoal, which is very light, and very black; this they reduce to a fine powder, and then mix it into a thin paste, with some of the varnish which they use for their ware; they next take the vessels when dried, and not yet baked, to the wheel; and turning them softly round, they, with a pencil dipt in this paste, cover the whole circumference with a thin coat of it; after this, the vessel is again dried; and the border made with this paste appears of a pale grayish colour when it is thoroughly dry. They work on it afterwards in the common way, covering both this edge and the rest of the vessel with the common varnish. When the whole is baked on, the colour given by the ashes disappears, and the edges are as white as any other part; only when the baking has not been sufficient, or the edges have not been covered with the second varnishing, we sometimes find a dusky edge, as in some of the ordinary thick tea-cups. It may be a great advantage to our English manufacturers to attempt something of this kind. The willow is known to make a very light and black charcoal: but the elder, though a thing seldom used, greatly exceeds it. The young green shoots of this shrub, which are almost all pith, make the lightest and the blackest of all charcoal; this readily mixes with any liquid, and might be easily used in the same way that the Chinese use the charcoal of the bamboo cane, which is a light hollow vegetable, more resembling the elder shoots than any other English plant. It is no wonder that the fixed salt and oil contained in this charcoal should be able to penetrate the yet raw edges of the ware, and to give them in the subsequent baking a somewhat different degree of vitrification from the other parts of the vessel; which, though, if given to the whole, it tise on the *diseases incident to horses* and other quadrupeds, ἱππιατρικὸν; the lexicographer even pretends, that it is from this work the Centaur derived his name. Fabricius gives a list of the works attributed to Chiron, and discusses the claims which have been made for others to the same writings: and in vol. xiii. he gives him a distinguished place in his catalogue of ancient physicians.

CHIRONIA. See Botany *Index*.

CHIRONOMY, in antiquity, the art of representing any past transaction by the gestures of the body, more especially by the motions of the hands: this made a part of liberal education; it had the approbation of Socrates, and was ranked by Plato among the political virtues.

CHIROTONY, among ecclesiastical writers, denotes the imposition of hands used in conferring priestly orders. However, it is proper to remark, that chirotony originally was a method of electing magistrates, by holding up the hands.

CHIRURGEON, or Surgeon. See Surgeon.

CHIRURGERY. See Surgery.

CHISLEY-land, in *Agriculture*, a soil of a middle nature between sandy and clayey land, with a large admixture of pebbles.

CHISON, Kison, or Kisson, (Judges iv. and v.) a river of Galilee; said to rise in Mount Tabor, to run by the town of Naim, and to fall into the Mediterranean between Mount Carmel and Ptolemais, (1 Kings xviii. 40.).

CHISSEL, or Chisel, an instrument much used in sculpture, masonry, joinery, carpentry, &c.

These are chissels of different kinds; though their chief difference lies in their different size and strength, as being all made of steel well sharpened and tempered: but they have different names, according to the different uses to which they are applied. The chissels used in carpentry and joinery are, 1. The former; which is used first of all before the parting chissel, and just after the work is scribed. 2. The paring chissel; which has a fine smooth edge, and is used to pare off or smooth the irregularities which the former makes. This is not struck with a mallet as the former is, but is pressed with the shoulder of the workman. 3. Skew-former: this is used for cleansing acute angles with the point or corner of its narrow edge. 4. The mortise-chissel; which is narrow, but very thick and strong, to endure hard blows, and it is cut to a very broad basil. Its use is to cut deep square holes in the wood for mortises. 5. The gouge, which is a chissel with a round edge; one side whereof serves to prepare the way for an augre, and the other to cut such wood as is to be rounded, hollowed, &c. 6. Socket-chissels, which are chiefly used by carpenters, &c. have their shank made with a hollow socket at top; to receive a strong wooden sprig, fitted into it with a shoulder. These chissels are distinguished, according to the breadth of the blade, into half-inch chissels, three quarters of an inch chissels, &c. 7. Ripping chissels; which is a socket chissel of an inch broad, having a blunt edge, with no basil to it. Its use is to rip or tear two pieces of wood asunder, by forcing in the blunt edge between them.

CHITON, in *Zoology*, a genus of the order of vermes testaceæ. The name *chiton* is from χιτων, *lorica*, a coat of mail. The shell is plated, and consists of many parts lying upon each other transversely: the inhabitant is a species of the Doris. See Conchology *Index*.

CHITTIM, in *Ancient Geography*, according to Le Clerc, Calmet, and others, was the same with Macedonia, peopled by Kittim the son of Javan and grandson of Noah.

CHITTRICK's medicine for the stone. This medicine was some years ago kept as a secret, and had great reputation as a lithontriptic, which indeed it seems in many cases to deserve. It was discovered by Dr Blackrie to be no more than soap-lye; and the following receipt for using it was procured by General Dunbar: "Take one tea-spoonful of the strongest soap-lye, mixed in two table-spoonfuls of sweet milk, an hour before breakfast, and at going to bed. Before you take the medicine, take a sup of pure milk, and immediately after you have swallowed the medicine take another. If you find this agrees with you for two or three days, you may add half as much more to the dose."

1 Definition.

CHIVALRY, (from *cheval*, "a horse"); an abstract term, used to express the peculiar privileges, obligations, and turn of mind, with all the other distinguishing characteristics of that order of men who flourished in Europe in the dark ages, during the vigour of the feudal systems of government, under the name of *Knights* or *Knights Errant*.

2 Difficulty of tracing the origin of chivalry.

To ascertain the period at which the order sprung up, and the circumstances to which its origin was owing, is no easy task. In the history of society, such a multiplicity of collateral facts appear interwoven together, and causes and effects run into each other by a gradation so imperceptible, that it is exceedingly difficult, even for the nicest eye, to discern causes from their immediate effects, or to distinguish to which among a number of collateral circumstances the origin of any particular event is to be referred. The age to which we must look for the origin of chivalry was singularly rude and illiterate. Even the principal events of that period, emigrations, wars, and the establishment of systems of laws and forms of government, have been but imperfectly, and in many instances unfaithfully, recorded. But the transactions which took place in the ordinary course of civil and domestic life, and which, though less striking, must have always prepared the way for the more remarkable events, have been generally thought unworthy of transmission to posterity, and have very seldom found a historian. Add to these difficulties which oppose our researches on this subject, that the nations of Europe were in that age a mixed multitude, consisting of the aboriginal inhabitants, who, though either subdued by the Roman arms, or at least compelled to retire to the woods and mountains, still obstinately retained their primitive manners and customs; Roman colonies, and such of the original inhabitants of the countries in which these were established, as had yielded not only to the arms of the Romans, but also to the influence of their laws, arts, and manners; and the barbarians, who proceeding from the northern regions of Asia and Europe, the wilds of Scythia and Germany, dissolved the fabric of the Roman empire, and made themselves lords of Europe. Amid this confusion of nations, institutions, and tesy, were imputed to the heroic ages. Achilles was at once the most relentless, vindictive, implacable, and the friendliest of men. We have the very same representation in the Gothic romances. As in those lawless times, dangers and distresses of all kinds abounded, there would be the same demand for compassion, gentleness, and generous attachment to the unfortunate, those especially of their own clan, as of resentment, rage, and animosity against their enemies.

7. Again, the martial games celebrated in ancient Greece, on great and solemn occasions, had the same origin and the same purpose as the tournaments of the Gothic warriors.

8. Lastly, the passion for adventures so natural in their situation, would be as naturally attended with the love of praise and glory. Hence the same encouragement, in the old Greek and Gothic times, to panegyrists and poets. In the affairs of religion and gallantry, indeed, the resemblance between the hero and the knight is not so striking. But the religious character of the knight was an accident of the times, and no proper effect of his civil condition. And that his devotion for the fair sex should so far surpass that of the hero, is a confirmation of the system here advanced. For the consideration had of the females in the feudal constitution, will of itself account for this deference. It made them capable of succeeding to fiefs, as well as the men. And does not one instantly perceive what respect and dependence this privilege would draw upon them?

It was of great consequence who should obtain the favour of a rich heiress. And though, in the strict feudal times, she was supposed to be in the power and at the disposal of her superior lord, yet this rigid state of things did not last long. Hence we find some distressed damsel was the spring and mover of every knight's adventure. She was to be rescued by his arms, or won by the fame and admiration of his prowess. The plain meaning of all which was this: That as, in these turbulent times, a protector was necessary to the weakness of the sex, so the courteous and valorous knight was to approve himself fully qualified for that purpose.

It may be observed, that the two poems of Homer were intended to expose the mischiefs and inconveniences arising from the political state of Old Greece; the *Iliad*, the dissensions that naturally spring up among independent chiefs; and the *Odyssey*, the insolence of their greater subjects, more especially when unrestrained by the presence of their sovereign. And can any thing more exactly resemble the condition of the feudal times, when, on occasion of any great enterprise, as that of the crusades, the designs of the confederate Christian states were perpetually frustrated, or interrupted at least, by the dissensions of their leaders; and their affairs at home, as perpetually disordered by the rebellious usurpations of their greater vassals? Jerusalem was to the European what Troy had been to the Grecian princes. See the article KNIGHT. See also CHIVALRY, SUPPLEMENT.

CHIVALRY, in *Law*, is used for a tenure of lands by knight's service, whereby the knight was bound to perform service in war unto the king, or the mesne lord of whom he held by that tenure. And chivalry was either general or special: *general*, when it was only in the feoffment that the tenant held *per servitium militare*, without any specification of sergeantry, escuage, &c.; *special*, when it was declared particularly by what kind of knight service the land was held.

For the better understanding of this tenure it hath been observed, that there is no land but is holden mediately or immediately of the crown by some service; and therefore all freeholds that are to us and our heirs, are called *feuda* or *feoda*, "fees;" as proceeding from the king for some small yearly rent, and the performance of such services as were originally laid upon the land at the donation thereof. For as the king gave to the great nobles, his immediate tenants, large possessions for ever, to hold of him for this or that service or rent; so they in time parcelled out to such others as they liked the same lands for rents and services as they thought good; and these services were by Littleton divided into two kinds, *chivalry* and *socage*; the first whereof was martial and military, the other rustical. Chivalry, therefore, was a tenure of service, whereby the tenant was obliged to perform some noble or military office unto his lord: and it was of two kinds; either *regal*, that is, held only of the king; or *common*, where held of a common person. That which might be held only of the king was called *servitium* or *sergentia*; and was again divided into *grand* and *petit* serjeantry. The grand serjeantry was where one held lands of the king by service, which he ought to do in his own person: as, to bear the king's banner or spear, to lead his host, to find men at arms to fight, &c. Petit serjeantry was when a man held lands of the king, to yield him annually some small thing towards his wars, as a sword, dagger, bow, &c. Chivalry that might be holden of a common person was termed *scutagium*, "escuage;" that is, service of the shield; which was either uncertain or certain.

Escuage uncertain, was likewise two-fold: first, where the tenant was bound to follow his lord, going in person to the king's wars, either himself, or sending a sufficient man in his place, there to be maintained at his expence, so long as was agreed upon between the lord and his first tenant at the granting of the fee; and the days of such service seem to have been rated by the quantity of land so holden; as, if it extended to a whole knight's fee, then the tenant was to follow his lord 40 days; and if but to half a knight's fee, then 20 days: if a fourth part, then ten days, &c. The other kind of this escuage was called *castle ward*, where the tenant was obliged, by himself, or some other, to defend a castle as often as it should come to his turn. And these were called *escuage uncertain*; because it was uncertain how often a man should be called to follow his lord to the wars, or to defend a castle, and what his charge would be therein.

Escuage certain, was where the tenure was set at a certain sum of money to be paid in lieu of such service; as that a man should pay yearly for every knight's fee 20s. for half a knight's fee 10s. or some like rate; and this service, because it is drawn to a certain rent, groweth to be of a mixed nature, not merely socage, and yet socage in effect, being now neither personal service nor uncertain. The tenure called chivalry had other conditions annexed to it: but there is a great alteration made in these things by the stat. 12 Car. II. c. 24. whereby tenures by knight's service of the king, or thalmic medicines. Hence Scribonius Largus directs the dry ingredients in collyria for the eyes to be made up with Chian wine.

CHIUN, or CHEVAN, in Hebrew antiquity. We meet with this word in the prophet Amos, cited in the Acts of the Apostles. St Luke reads the passage thus: "Ye took up the tabernacle of Moloch, and the star of your god Remphan, figures which ye made to worship them." The import of the Hebrew is as follows: "Ye have borne the tabernacle of your kings, and the pedestal (the *chiun*) of your images, the star of your gods, which ye made to yourselves." The Septuagint in all probability read *Repham* or *Revan*, instead of *Chiun* or *Chevan*, and took the pedestal for a god.

Some say that the Septuagint, who made their translation in Egypt, changed the word *Chiun* into that of *Remphan*, because they had the same signification. M. Basnage, in his book entitled *Jewish Antiquities*, after having discoursed a good deal upon *Chion*, or *Remphan*, concludes that Moloch was the sun, and *Chion*, *Chiun*, or *Remphan*, the moon.

CHLAMYS, in antiquity, a military habit worn by the ancients over the tunica. It belonged to the patricians, and was the same in the time of war that the toga was in the time of peace. This sort of gown was called *picta*, from the rich embroidery with figures in Phrygian work; and *purpurea*, because the groundwork was purple. The chlamydes of the emperors were all purple, adorned with a golden and embroidered border.

CHLOEIA, in antiquity, a festival celebrated at Athens in honour of Ceres, to whom, under the name Χλοη, *i. e. grass*, they sacrificed a ram.

CHLORA. See BOTANY *Index*.

CHLOROSIS, in *Medicine*, a disease, commonly called the *green sickness*, incident to young girls. See MEDICINE *Index*.

CHOCOLATE, in commerce, a kind of paste or cake prepared of certain ingredients, the basis of which is cacao. See CACAO.

The Indians, in their first making of chocolate, used to roast the cacao in earthen pots; and having afterwards cleared it of the husks, and bruised it between two stones, they made it into cakes with their hands. The Spaniards improved this method. When the cacao is properly roasted and well cleaned, they pound it in a mortar, to reduce it into a coarse mass, which they afterwards grind on a stone till it be of the utmost fineness: the paste being sufficiently ground, is put quite hot into tin moulds, in which it congeals in a very little time. The form of these moulds is arbitrary; the cylindrical ones, holding two or three pounds, are the most proper, because the bigger the cakes are, the longer they will keep. Observe, that these cakes are very liable to take any good or bad scent, and therefore they must be carefully wrapt up in paper, and kept in a dry place. Complaints are made, that the Spaniards mix with the cacao nuts too great a quantity of cloves and cinnamon, besides other drugs without number, as musk, ambergris, &c. The grocers of Paris use few or none of these ingredients; they only choose the best nuts, which are called *caracca*, from the place from whence they are brought; and with these they mix a very small quantity of cinnamon, the freshest vanilla, and the finest sugar, but very seldom any cloves. In England the chocolate is made of the simple cacao, excepting that sometimes sugar and sometimes vanilla is added.

Chocolate ready made, and cacao paste, are prohibited to be imported from any part beyond the seas. If made and sold in Great Britain, it pays inland duty 1s. 6d. per lb. avoirdupoise: it must be inclosed in papers containing one pound each, and produced at the excise office to be stamped. Upon three days notice given to the officer of excise, private families may make chocolate for their own use, provided no less than half an hundred weight of nuts be made at one time.

The chocolate made in Portugal and Spain is not near so well prepared as the English, depending perhaps on the machine employed there, viz. the double cylinder, which seems very well calculated for exact triture. If perfectly prepared, no oil appears on the solution. London chocolate gives up no oil like the foreign; and it also may in some measure depend on the thickness of the preparation. The solution requires more care than is commonly imagined. It is proper to break it down, and dissolve it thoroughly in cold water by milling it with the chocolate stick. If heat is applied, it should be done slowly; for, if suddenly the heat will not only coagulate it, but separate the oil; and therefore much boiling after it is dissolved is hurtful. Chocolate is commonly required by people of weak stomachs; but often rejected for want of proper preparation. When properly prepared, it is easily dissolved; and an excellent food where a liquid nutrient vegetable one is required, and is less flatulent than any of the farinacea.

Mr Henly, an ingenious electrician, has lately discovered that chocolate, fresh from the mill, as it cools in the tin pans into which it is received, becomes strongly electrical; and that it retains this property for some time after it has been turned out of the pans, but soon loses it by handling. The power may be once or twice renewed by melting it again in an iron ladle, and pouring it into the tin pans as at first; but when it becomes dry and powdery, the power is not capable of being revived by simple melting: but if a small quantity of olive-oil be added, and well mixed with the chocolate in the ladle, its electricity will be completely restored by cooling it in the tin-pan as before. From this experiment he conjectures, that there is a great affinity between carbonic acid and the electric fluid, if indeed they be not the same thing.

CHOCOLATE Nut-tree. See CACAO.

CHOENIX, χοινιξ, an ancient dry measure, containing the 48th part of a *medimnus*, or six bushels.

CHOERILUS, a tragic poet of Athens about the 64th Olympiad. He wrote 150 tragedies, of which 13 had obtained the prize.—An historian of Samos.—Two other poets, one of whom was very intimate with Herodotus. He wrote a poem on the victory which the Athenians had obtained over Xerxes; and on account of the excellence of the composition he received a piece of gold for each verse from the Athenians. The other was one of Alexander's flatterers and friends.

CHOERINÆ,

Chords.

the name of *perfect* to all chords, even to dissonances, whose fundamental sounds are below. Imperfect *chords* are those in which the sixth, instead of the fifth, prevails, and in general all those whose lowest are not their fundamental sounds. These denominations, which had been given before the fundamental bass was known, are now most unhappily applied: those of chords *direct* and *reversed* are much more suitable in the same sense.

Chords are once more divided into consonances and dissonances. The chords denominated *consonances*, are the perfect chord, and its derivatives; every other chord is a *dissonance*.

A table of both, according to the system of M. Rameau, may be seen in Rousseau's Musical Dictionary, vol. i. p. 27.

After the table to which our readers have been remitted, Rousseau adds the following observations, which are at the same time so just and so important, that we should be very sorry if they escape the reader's attention.

At the words *harmony*, *fundamental bass*, *composition*, &c. he promises to treat concerning the manner of using all the chords to form regular harmony; and only adds, in this place, the subsequent reflections.

1. It is a capital error to imagine, that the methods of inverting the same chord are in all cases equally eligible for the harmony and for the expression. There is not one of these different arrangements but had its proper character. Every one feels the contrast between the softness of the false fifth, and the grating sound of the tritone, though the one of these intervals is produced by a method of inverting the other. With the seventh diminished, and the second redundant, the case is the same with the interval of the second in general use, and the seventh. Who does not feel how much more vocal and sonorous the fifth appears when compared with the fourth? The *chord* of the great sixth, and that of the lesser sixth minor, are two forms of the same fundamental *chord*: but how much less is the one harmonious than the other? On the contrary, the *chord* of the lesser sixth major is much more pleasing and cheerful than that of the false fifth. And only to mention the most simple of all *chords*, reflect on the majesty of the perfect chord, the sweetness of that which is called the chord of the sixth, and the insipidity of that which is composed of a sixth and a fourth: all of them, however, composed of the same sounds. In general, the redundant intervals, the sharps on the higher part, are proper by their severity to express violent emotions of mind, such as anger and the rougher passions. On the contrary, flats in the higher parts, and diminished intervals, form a plaintive harmony, which melts the heart. There are a multitude of similar observations, of which, when a musician knows how to avail himself, he may command at will the affections of those who hear him.

2. The choice of simple intervals is scarcely of less importance than that of the *chords*, with regard to the stations in which they ought to be placed. It is, for instance, in the lower parts that the fifth and octave should be used in preference; in the upper parts, the third and sixth are more proper. If you transpose this order, the harmony will be ruined, even though the same *chords* are preserved.

Chord ‖ Choriambus.

3. In a word, the *chords* are rendered still more harmonious by being approximated and only divided by the smallest practicable intervals, which are more suitable to the capacity of the ear than such as are remote. This is what we call *contracting* the harmony; an art which few composers have skill and abilities enough to put in practice. The limits in the natural compass of voices, afford an additional reason for lessening the distance of the intervals, which compose the harmony of the chorus, as much as possible. We may affirm, that a chorus is improperly composed, when the distance between the *chords* increases; when those who perform the different parts are obliged to scream when the voices rise above their natural extent, and are so remotely distant one from the other, that the perception of harmonical relations between them is lost.

We say likewise, that an instrument is in *concord* when the intervals between its fixed sounds are what they ought to be; we say in this sense, that the *chords* of an instrument are true or false, that it preserves or does not preserve its *chords*. The same form of speaking is used for two voices which sing together, or for two sounds which are heard at the same time, whether in unison or in parts.

CHORDS, or *CORDS of Musical Instruments*, are strings, by the vibration of which the sensation of sound is excited, and by the divisions of which the several degrees of tone are determined.

CHORDEE, in *Medicine* and *Surgery*, a symptom attending a gonorrhœa, consisting in a violent pain under the frenum, and along the duct of the urethra, during the erection of the penis, which is incurvated downwards. These erections are frequent and involuntary.

CHOREA SANCTI VITI. See *VITUS's Dance*, MEDICINE *Index*.

CHOREPISCOPUS, an officer in the ancient church, about whose function the learned are much divided. The word comes from χωρος, a *region*, or *little country*, and επισκοπος, a *bishop* or *overseer*.

The Chorepiscopi were suffragan or local bishops, holding a middle rank between bishops and presbyters, and delegated to exercise episcopal jurisdiction within certain districts, when the boundaries of particular churches, over which separate bishops presided, were considerably enlarged. It is not certain when this office was first introduced; some trace it to the close of the first century: others tell us, that chorepiscopi were not known in the east till the beginning of the fourth century; and in the west about the year 439. They ceased both in the east and west in the tenth century.

CHOREPISCOPUS is also the name of a dignity still subsisting in some cathedrals, particularly in Germany; signifying the same with *chori episcopus*, or "bishop of the choir." The word, in this sense, does not come from χωρος, *place*, but χορος, *choir*, &c. In the church of Cologne, &c. the first chanter is called *chorepiscopus*.

CHOREUS, Χορειος, a foot in the ancient poetry, more commonly called *trochæus*. See TROCHEE.

CHORIAMBUS, in ancient poetry, a foot consisting person is first advanced to it, he is called a *kuchuk*, or little *chous*; after this he is advanced to be the *alloy chous*, that is, the messenger of ceremonies; and from this, having passed through the office of *petelma*, or procurator of the effects of the body, he is advanced to be the *bas chous*.

CHOWDER-BEER, a provincial phrase of Devonshire, denoting a cheap and easily prepared drink, highly commended for preventing the scurvy in long voyages, or for the cure of it where it may have been contracted. It is prepared in the following manner: Take twelve gallons of water, in which put three pounds and a half of black spruce: boil it for three hours, and having taken out the fir or spruce, mix with the liquor seven pounds of melasses, and just boil it up; strain it through a sieve, and when milk-warm put to it about four spoonfuls of yeast to work it. In two or three days stop the bung of the cask: and in five or six days, when fine, bottle it for drinking. Two gallons of melasses are sufficient for a hogshead of liquor; but if melasses cannot be procured, treacle or coarse sugar will answer the purpose.

CHREMNITZ, the principal of the mine towns in Upper Hungary, situated about 68 miles north-east of Presburg, and subject to the house of Austria. E. Long. 19. N. Lat. 48. 45.

CHRENECRUDA, a term occurring in writers of the middle ages, and expressing a custom of those times; but its signification is doubtful. It is mentioned in *Lege Salica*, tit. 61. which says, he who kills a man, and hath not wherewithal to satisfy the law or pay the fine, makes oath that he hath delivered up every thing he was possessed of; the truth of which must be confirmed by the oaths of 12 other persons. Then he invites his next relations by the father's side to pay off the remainder of the fine, having first made over to them all his effects by the following ceremony. He goes into his house, and taking in his hand a small quantity of dust from each of the four corners, he returns to the door, and with his face inwards throws the dust with his left hand over his shoulders upon his nearest of kin. Which done, he strips to his shirt; and coming out with a pole in his hand, jumps over the hedge. His relations, whether one or several, are upon this obliged to pay off the composition for the murder. And if these (or any one of them) are not able to pay *iterum super illum chrenecruda, qui pauperior est, jactat, et ille totam legem componat.* Whence it appears, that *chrenecruda jactare*, is the same with throwing the dust gathered from the four corners of the house. Goldastus and Spelman translate it *viridem herbam*, "green grass," from the German *gruen kraut*, or from the Dutch *groen*, "green," and *gruid*, "grass." Wendelinus is of a contrary opinion, who thinks that by this word *denotari purificationis approbationem*, from *chrein*, "pure, chaste, clean;" and *keuren*, "to prove;" so that it must refer to the oaths of the twelve jurors. Be this as it will, King Childebert reformed this law by a decree, chap. 15. both because it savoured of Pagan ceremonies, and because several persons were thereby obliged to make over all their effects: *De chrenecruda lex quam paganorum tempore observabant, deinceps nunquam valeat, quia per ipsam cecidet multorum potestas.*

CHRISM (from χριω, *I anoint*), oil consecrated by the bishop, and used in the Romish and Greek churches, in the administration of baptism, confirmation, ordination, and extreme unction, which is prepared on holy Thursday with much ceremony. In Spain it was anciently the custom for the bishop to take one-third of a sol for the chrism distributed to each church, on account of the balsam that entered its composition.

Du Cange observes, that there are two kinds of chrism; the one prepared of oil and balsam, used in baptism, confirmation, and ordination; the other of oil alone, consecrated by the bishop, used anciently for the catechumens, and still in extreme unction. The Maronites, before their reconciliation with Rome, besides oil and balsam, used musk, saffron, cinnamon, roses, white frankincense, and several other drugs mentioned by Rynaldus, in 1541, with the doses of each. The Jesuit Dandini, who went to Mount Libanus in quality of the pope's nuncio, ordained, in a synod held there in 1596, that chrism for the future should be made only of two ingredients, oil and balsam; the one representing the human nature of Jesus Christ, the other his divine nature. The action of imposing the chrism is called *chrismation*: this the generality of the Romish divines hold to be the next matter of the sacrament of confirmation.

The chrismation in baptism is performed by the priest; that in confirmation by the bishop; that in ordination, &c. is more usually styled *unction*.

Chrism Pence, *Chrismatis Denarii*, or *Chrismales Denarii*, a tribute anciently paid to the bishop by the parish clergy, for their chrism, consecrated at Easter for the ensuing year: this was afterwards condemned as simoniacal.

CHRISOM, a white garment put upon a child by the priest immediately after baptism, accompanied with this devout prayer; "Take this white vesture as a token of the innocency which, by God's grace in this holy sacrament of baptism is given unto thee, and for a sign whereby thou art admonished, so long as thou livest, to give thyself to innocence of living, that after this transitory life thou mayest be partaker of life everlasting. Amen."

From this circumstance the white garment got the name of *chrisom*, which, after being worn a few days, was delivered to the priest as a sacred deposit, to be produced in future as an evidence against the person, should he be so impious as to renounce his baptismal engagements. This ceremony continued in use for a considerable time after the reformation in the church of England, which required the mother of the child, when churched, to offer the chrisom and other customary oblations. On pronouncing the above mentioned prayer, the priest anointed the head of the infant, saying, "Almighty God, the father of our Lord Jesus Christ, who hath regenerated thee by water and the Holy Ghost, and hath given unto thee the remission of all thy sins, vouchsafe to anoint thee with the unction of his Holy Spirit, and bring thee to the inheritance of everlasting life. Amen."

CHRIST, an appellation synonymous with *Messiah*, usually added to Jesus: and, together therewith, denominating the Saviour of the world. See Christianity and Messiah.

The word χριστος signifies *anointed*, from χριω, *inungo*, "I anoint." Sometimes the word *Christ* is used singly, which cannot be broken but by an absolute subversion of all historical authenticity. Nor is this all: for, according to him, the facts on which Christianity is founded, not only constitute a series of themselves, but are likewise in several periods the best resources for supplying the chasms in the history of our nature, and preserving the tenor of its annals entire. The facts themselves are either natural or supernatural. By natural facts we mean such occurrences as happen or may happen from the various operations of mechanical powers, or from the interposition of natural agents without higher assistants. Such are all the common occurrences of history, whether natural, biographical, or civil. By supernatural facts, we mean such as could not have been produced without the interposition of Deity, or at least of powers superior to the laws of mechanism or the agency of embodied spirits. Among these may be reckoned the immediate change of water into wine, the instantaneous cure of diseases without the intervention of medicine, the resuscitation of the dead, and others of the same kind. In this order of occurrences may likewise be numbered the exertions and exhibitions of prophetic power, where the persons by whom these extraordinary talents were displayed could neither by penetration nor conjecture unravel the mazes of futurity, and trace the events of which they spoke from their primary causes to their remote completions. So that they must have been the passive organs of some superior Being, to whom the whole concatenation of causes and effects which operate from the origin to the consummation of nature, was obvious at a glance of thought.

7 Natural facts, what, and how conducive to the elucidation of history.

It has already been hinted, that the facts which we have called *natural*, not only agree with the analogy of human events, and corroborate each other, but in a great many emergencies nobly illustrate the history of nature in general. For this a Christian might offer one instance, of which philosophy will not perhaps be able to produce any tolerable solution, without having recourse to the facts upon which Christianity is founded. For if mankind were originally descended from one pair alone, how should it have happened that long before the date of authentic history every nation had its own distinct language? Or, if it be supposed, as some late philosophers have maintained, that man is an indigenous animal in every country; or, that he was originally produced in, and created for, each particular soil and climate which he inhabits; still it may be demanded, whence the prodigious multiplicity, the immense diversity of languages? Is the language of every nation intuitive, or were they dictated by exigences, and established by convention? If the last of these suppositions be true, what an immense period of time must have passed! How many revolutions of material and intellectual nature must have happened! What accessions of knowledge, refinement, civilization, must human intercourse have gained before the formation and establishment even of the most simple, imperfect, and barbarous language! Why is a period so vast obliterated so entirely as to escape the retrospect of history, or tradition, and even of fable itself? Why was the acquisition and improvement of other arts so infinitely distant from that of language, that the era of the latter is entirely lost, whilst we can trace the former from their origin through the various gradations of their progress.

These difficulties, inextricable by all the lights of history or philosophy, this more than Cimmerian darkness, is immediately dissipated by the Mosaic account of the confusion of tongues; wisely intended to separate the tribes of men one from another, to replenish the surface of the globe, and to give its multiplied inhabitants those opportunities of improvement which might be derived from experiment and industry, variously exerted, according to the different situations in which they were placed, and the different employments which these situations dictated. Thus the time of nature's existence is limited to a period within the ken of human intellect. Thus whatever has happened might have happened during the present mode of things; whereas, if we deduce the origin and diversity of language from a period so remotely distant as to be absolutely lost, and entirely detached from all the known occurrences and vicissitudes of time, we must admit the present forms and arrangements of things to have subsisted perhaps for a much longer duration than any mechanical philosopher will allow to be possible. Other instances equally pregnant with conviction might be multiplied; but precluded by the limits of our plan, we proceed to a single observation upon the facts which have been termed *supernatural*.

8 This ob rity ine: plicable but by t Mosaic count.

9 Miracle how co ducive prove t truth of Christia ty.

Of those changes which happen in sensible objects, sensation alone can be judge. Reason has nothing to do in the matter. She may draw conclusions from the testimonies of sense, but can never refute them. If, therefore, our senses inform us that snow is white, in vain would the most learned and subtile philosopher endeavour to convince us, that it was of a contrary colour. He might confound, but never could persuade us. Such changes, therefore, as appear to happen in sensible objects, must either be real or fallacious. If real, the miracle is admitted; if fallacious, there must be a cause of deception equally unaccountable from the powers of nature, and therefore equally miraculous. If the veracity or competency of the witnesses be questioned, the Christian answers, that they must be competent, because the facts which they relate are not beyond their capacity to determine. They must likewise be faithful, because they had no secular motives for maintaining, but many for suppressing or disguising, what they testified. Now the Christian appeals to the whole series of history and experience, whether such a man is or can be found, as will offer a voluntary, solemn, and deliberate sacrifice of truth at the shrine of caprice. But such facts as after a long continuance of time have been found exactly agreeable to predictions formerly emitted, must supersede the fidelity of testimony, and infallibly prove that the event was known to the Being by whom it was foretold. In vain it has been urged, that prophecies are ambiguous and equivocal. For though they may prefigure subordinate events, yet if the grand occurrences to which they ultimately relate, can alone fulfil them in their various circumstances, and in their utmost extent, it is plain, that the Being by whom they were revealed must have been actually prescient of those events, and must have had them in view when the predictions were uttered. For this see a learned and

10 Prophe eviden its ow ture in pende its veh cies.

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violate the freedom of moral agents, in recalling them to the paths of virtue and happiness by a mechanical and irresistible force.

16 Miraculous as possible, and perhaps as necessary, as natural events.

It will be granted to philosophy by the Christian, that as no theory of mechanical nature can be formed without presupposing sacred and established laws, from which she ought rarely if ever to deviate, so in fact she tenaciously pursues these general institutions, and from their constant observance result the order and regularity of things. But he cannot admit, that the important ends of moral and intellectual improvement may be uniformly obtained by the same means. He affirms, that if the hand of God should either remain always entirely invisible, or at least only perceptible in the operation of second causes, intelligent beings would be apt in the course of time to resolve the interpositions of Deity into the general laws of mechanism; to forget his connexion with nature, and consequently their dependence upon him. Hence, according to the dictates of common sense, and to the unanimous voice of every religion in every age or clime, for the purposes of wisdom and benevolence, God may not only controul, but has actually controuled, the common course and general operations of nature. So that, as in the material world the law of *cause* and *effect* is generally and scrupulously observed for the purposes of natural subsistence and accommodation: thus suspenses and changes of that universal law are equally necessary for the advancement of moral and intellectual perfection.

17 Christianity not only explains the phenomena, but consoles the miseries of human nature.

But the disciple of Jesus not only contends, that no system of religion has ever yet been exhibited so consistent with itself, so congruous to philosophy and the common sense of mankind, as Christianity; he likewise avers that it is infinitely more productive of real and sensible consolation than any other religious or philosophical tenets, which have ever entered into the soul, or been applied to the heart of man. For what is death to that mind which considers eternity as the career of its existence? What are the frowns of fortune to him who claims an eternal world as his inheritance? What is the loss of friends to that heart which feels, with more than natural conviction, that it shall quickly rejoin them in a more tender, intimate, and permanent intercourse than any of which the present life is susceptible? What are the fluctuations and vicissitudes of external things to a mind which strongly and uniformly anticipates a state of endless and immutable felicity? What are mortifications, disappointments, and insults, to a spirit which is conscious of being the original offspring and adopted child of God; which knows that its omnipotent Father will, in proper time, effectually assert the dignity and privileges of its nature? In a word, as earth is but a speck of creation, as time is not an instant in proportion to eternity, such are the hopes and prospects of the Christian in comparison of every sublunary misfortune or difficulty. It is therefore, in his judgment, the eternal wonder of angels, and indelible opprobrium of man, that a religion so worthy of God, so suitable to the frame and circumstances of our nature, so consonant to all the dictates of reason, so friendly to the dignity and improvement of intelligent beings, pregnant with genuine comfort and delight, should be rejected and despised. Were there a possibility of suspense or hesitation between this and any other religion extant, he could freely trust the determination of a question so important to the candid decision of real virtue and impartial philosophy.

It must be allowed that the utmost extent of human investigation and research into the doctrine of a future life, reached no farther than splendid conjecture before the promulgation of Christianity, at which period life and immortality were clearly brought to light. It is therefore a singular circumstance that the deist should not perceive the wonderful superiority of the Christian over every other system, if it had nothing else to boast of but this single doctrine, so pregnant with unalloyed felicity. If Christianity be false, the believer of it has nothing to lose, since it inculcates a mode of conduct which must ever be amiable in the eye of infinite goodness; but if it be true, he has every thing to gain: while upon this hypothesis the deist has every thing to lose and nothing to gain. This is a momentous consideration, and that man must be truly infatuated who can treat such an idea with contempt. 18

Mr Gibbon attempts to prove, that the propagation of Christianity was owing to causes from the operation of which no arguments can be deduced in proof of its authenticity.

Mr Gibbon, in his History of the Decline and Fall of the Roman Empire, mentions five secondary causes to which he thinks the propagation of Christianity, and all the remarkable circumstances which attended it, may with good reason be ascribed. He seems to insinuate, that Divine Providence did not act in a singular or extraordinary manner in disseminating the religion of Jesus through the world; and that, if every other argument which has been adduced to prove the sacred authority of this religion can be parried or refuted, nothing can be deduced from this source to prevent it from sharing the same fate with other systems of superstition. The causes of its propagation were in his opinion founded on the principles of human nature and the circumstances of society. If we ascribe not the propagation of Mahometism, or of the doctrines of Zerdust, to an extraordinary interposition of Divine Providence, operating by an unperceived influence on the dispositions of the human heart, and controuling and confounding the ordinary laws of nature; neither can we, upon any reasonable grounds, refer the promulgation of Christianity to such an interposition. 19

The causes.

The secondary causes to which he ascribes these effects are, 1. The inflexible and intolerant zeal of the Christians; derived from the Jewish religion, but purified from the narrow and unsocial spirit which, instead of inviting, deterred the Gentiles from embracing the law of Moses. 2. The doctrine of a future life, improved by every additional circumstance which could give weight and efficacy to that important truth. 3. The miraculous powers ascribed to the primitive church. 4. The pure and austere morals of the Christians. 5. The union and discipline of the Christian republic, which gradually formed an independent and increasing state in the heart of the Roman empire.

Before we enter on the examination of Mr Gibbon's causes in the order in which they are here enumerated, we beg leave to remark, that we cannot perceive the propriety of denominating some of these *secondary* causes, since the miraculous powers ascribed to the primitive church, if they were real, must have constituted a primary cause, and if fallacious, could have been no cause at all, if not of its complete subversion. As little can we conceive how such an elegant and learned author

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author could imagine a zeal strictly and properly inflexible and intolerant, as qualified to produce any other effect than the destruction of the system which they are allowed to have been anxious to promote. But our sentiment of these causes assigned by Mr Gibbon will be more fully developed as we proceed in our candid and impartial examination of them.

20 Cause I.

In pointing out the connexion between the *first* of these causes and the effects which he represents as arising from it, this learned and ingenious writer observes, that the religion of the Jews does not seem to have been intended to be propagated among the Heathens, and that the conversion of proselytes was rather accidental than consistent with the purport of the general spirit of the institutions of Judaism. The Jews were, of consequence, studious to preserve themselves a peculiar people. Their zeal for their own religion was intolerant, narrow, and unsocial.

In Christianity, when it made its appearance in the world, all the better part of the predominant spirit of Judaism was retained; but whatever might have a tendency to confine its influence within narrow limits was laid aside. Christians were to maintain the doctrines and adhere to the constitutions of their religion with sacred fidelity. They were not to violate their allegiance to Jesus by entertaining or professing any reverence for Jupiter or any other of the Heathen deities; it was not even necessary for them to comply with the positive and ceremonial institutions of the law of Moses,—although these were acknowledged to have been of divine origin. The zeal, therefore, which their religion inculcated, was inflexible. It was even intolerant: for they were not to content themselves with professing Christianity and conforming to its laws; they were to labour with unremitting assiduity, and to expose themselves to every difficulty and every danger, in converting others to the same faith.

But the same circumstances which rendered it thus intolerant, communicated to it a more liberal and a less unsocial spirit than that of Judaism. The religion of the Jews was intended only for the few tribes; Christianity was to become a catholic religion; its advantages were to be offered to all mankind.

All the different sects which arose among the primitive Christians uniformly maintained the same zeal for the propagation of their own religion, and the same abhorrence for every other. The orthodox, the Ebionites, the Gnostics, were all equally animated with the same exclusive zeal, and the same abhorrence of idolatry, which had distinguished the Jews from other nations.

21 Observations in answer.

Such is the general purport of what Mr Gibbon advances concerning the influence of the first of those secondary causes in the propagation of Christianity. It would be uncandid to deny, that his statement of facts appears to be, in this instance, almost fair, and his deductions tolerably logical. The first Christians *were* remarkable for their detestation of idolatry, and for the generous disinterested zeal with which they laboured to convert others to the same faith. The first of these principles, no doubt, contributed to maintain the dignity and purity of Christianity; and the second to disseminate it through the world. But the facts which he relates are scarce consistent throughout. He seems to represent the zeal of the first Christians as so hot and intolerant, that they could have no social intercourse with those who still adhered to the worship of Heathen deities. In this case, how could they propagate their religion? Nay, we may even ask, How could they live? If they could not mingle with the Heathens in the transactions either of peace or war; nor witness the marriage or the funeral of the dearest friend, if a heathen; nor practise the elegant arts of music, painting, eloquence, or poetry; nor venture to use freely in conversation the language of Greece or of Rome;—it is not easy to see what opportunities they could have of disseminating their religious sentiments. If, in such circumstances, and observing rigidly such a tenor of conduct, they were yet able to propagate their religion with such amazing success as they are said to have done; they must surely either have practised some wondrous arts unknown to us, or have been assisted by the supernatural operation of divine power.

But all the historical records of that period, whether sacred or profane, concur to prove, that the primitive Christians in general did not retire with such religious horror from all intercourse with the Heathens. They refused not to serve in the armies of the Roman empire: they appealed to Heathen magistrates, and submitted respectfully to their decision; the husband was often a Heathen, and the wife a Christian; or, again, the husband a Christian, and the wife a Heathen. These are facts so universally known and believed, that we need not quote authorities in proof of them.

This respectable writer appears therefore not to have stated the facts which he produces under this head with sufficient ingenuousness; and he has taken care to exaggerate and improve those which he thinks useful to his purpose with all the dazzling and delusive colours of eloquence. But had the zeal of the first Christians been so intolerant as he represents it, it must have been highly unfavourable to the propagation of their religion: all their wishes to make converts would, in that case, have been counteracted by their unwillingness to mix in the ordinary intercourse of life, with those who were to be converted. Their zeal and the liberal spirit of their religion, were indeed secondary causes which contributed to its propagation: but their zeal was by no means so ridiculously intolerant as this writer would have us believe; if it had, it must have produced effects directly opposite to those which he ascribes to it.

22 Cause

In illustrating the influence of the *second* of these secondary causes to which he ascribes the propagation of Christianity, Mr Gibbon displays no less ingenuity than in tracing the nature and the effects of the first. The doctrine of a future life, improved by every additional circumstance which can give weight and efficacy to that important truth, makes a conspicuous figure in the Christian system; and it is a doctrine highly flattering to the natural hopes and wishes of the human heart.

Though the Heathen philosophers were not unacquainted with this doctrine; yet to them the spirituality of the human soul, its capacity of existence in a separate state from the body, its immortality, and its prospect of lasting happiness in a future life, rather appeared things possible and desirable, than truths fully established upon solid grounds. These doctrines, Mr Gibbon would persuade us, had no influence on the

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the influence of the society of which they were become members: all together operated so powerfully as to enable them to display both active and passive virtue in a very extraordinary degree. Their virtues did not flow from the purest and noblest source; yet they attracted the notice and moved the admiration of mankind. Of those who admired, some were eager to imitate; and, in order to that, thought it necessary to adopt the same principles of action.

Their virtues, too, were rather of that species which excite wonder, because uncommon, and not of essential utility in the ordinary intercourse of society; than of those which are indispensably necessary to the existence of social order, and contribute to the ease and convenience of life. Such virtues were well calculated to engage the imitation of those who had failed egregiously in the practice of the more social virtues.

Thus they practised extraordinary, but useless and unsocial virtues, upon no very generous motives; those virtues drew upon them the eyes of the world, and induced numbers to embrace their faith.

27
Observations in answer.

We must, however unwillingly, declare that this is plainly an uncandid account of the virtues of the primitive Christians, and the motives from which they originated. The social virtues are strongly recommended through the gospel. No degree of mortification or self-denial, or seclusion from the ordinary business and amusements of social life, was required of the early converts to Christianity; save what was indispensably necessary to wean them from the irregular habits in which they had before indulged, and which had rendered them nuisances in society, and to form them to new habits equally necessary to their happiness and their usefulness in life. We allow that they practised virtues which in other circumstances would, however splendid, have been unnecessary. But in the difficult circumstances in which the first Christians were placed, the virtues which they practised were in the highest degree social. The most prominent feature in their character was, "their continuing to entertain sentiments of generous benevolence, and to discharge scrupulously all the social duties," towards those who exercised neither charity nor humanity, and frequently not even bare integrity and justice, in their conduct towards them.

It cannot be said with truth, that such a proportion of the primitive Christians were people whose characters had been infamous and their circumstances desperate, as that the character of the religion which they embraced can suffer from this circumstance. Nor were they *only* the weak and illiterate whom the apostles and their immediate successors converted by their preaching. The criminal, to be sure, rejoiced to hear that he might obtain absolution of his crimes; the mourner was willing to receive comfort; minds of refined and generous feelings were deeply affected with that goodness which had induced the Son of God to submit to the punishment due to sinners: but the simplicity, the rationality, and the beauty of the Christian system, likewise prevailed in numerous instances over the pride and prejudices of the great and the wise: in so many instances, as are sufficient to vindicate the Christian church from the aspersions by which it has been represented as being in the first period of its existence merely a body of *criminals and idiots*.

The principles, too, from which the virtues of the first Christians originated, were not peculiarly mean and selfish; nay, they seem to have been uncommonly sublime and disinterested. Remorse in the guilty mind, is a natural and reasonable sentiment; the desire of happiness in every human breast is equally so. It is uncandid to cavil against the first Christians for being, like the rest of mankind, influenced by these sentiments: And when we behold them overlooking temporary possessions and enjoyments, extending their views to futurity, and "living by faith;" when we observe them "doing good to those who hated them, blessing those who cursed them, and praying for those by whom they were despitefully used:" can we deny their virtues to have been of the most generous and disinterested kind.

We allow then that the virtues of the first Christians must have contributed to the propagation of their religion: but it is with pain that we observe this respectable writer studiously labouring to misrepresent the principles from which those virtues arose; and not only the principles from which they arose, but also their importance in society.

28
Cause V. with observations.

The *fifth cause* was the mode of church government adopted by the first Christians, by which they were knit together in one society; who preferred the church and its interests to their country and civil concerns. We wish not to deny, that the mutual attachment of the primitive Christians contributed to spread the influence of their religion; and the order which they maintained, in consequence of being animated with this spirit of brotherly love, and with such ardent zeal for the glory of God, must no doubt have produced no less happy effects among them than order and regularity produce on every other occasion on which they are strictly observed. But whether the form of church-government, which was gradually established in the Christian church, was actually the happiest that could possibly have been adopted; or whether, by establishing a distinct society, with separate interests, within the Roman empire, it contributed to the dissolution of that mighty fabric, we cannot here pretend to inquire. These are subjects of discussion, with respect to which we may with more propriety endeavour to satisfy our readers elsewhere.

29
General conclusion concerning the influence of the five causes.

From the whole of this review of what Mr Gibbon has so speciously advanced concerning the influence of these five secondary causes in the propagation of the gospel, we think ourselves warranted to conclude, That the zeal of the first Christians was not, as he represents it, intolerant: That the doctrine of the immortality of the human soul was somewhat better understood in the Heathen world, particularly among the Greeks and Romans, and the Jews, than he represents it to have been; and had an influence somewhat happier than what he ascribes to it: That the additional circumstances by which, he tells us, the first preachers of Christianity improved the effects of this doctrine, were far from being calculated to allure converts: That the heathens, therefore, were not quite so well prepared for an eager reception of this doctrine as he would persuade us they were; and, of consequence, could not be influenced by it in so considerable a degree in their conversion: That real, unquestionable miracles, performed by our Saviour, by his apostles, and by

Christians. that part of the world. The emperor advises them to "take care, lest, in torturing and punishing those whom they accused of Atheism (meaning the Christians), they should render them more obstinate, instead of prevailing upon them to change their opinion; since their religion taught them to suffer with pleasure for the sake of God." As to the earthquakes which had happened, he put them in mind, "that they themselves are always discouraged, and sink under such misfortunes; whereas the Christians never discovered more cheerfulness and confidence in God than upon such occasion." He tells them, that "they pay no regard to religion, and neglect the worship of the Eternal; and, because the Christians honour and adore Him, therefore they are jealous of them, and persecute them even to death." He concludes: "Many of the governors of provinces have formerly written to my father concerning them; and his answer always was, that they should not be molested or disturbed, provided they quietly submitted to the authority of the government. Many persons have likewise consulted me upon this affair, and I have returned the same answer to them all; namely, that if any one accuses a Christian merely on account of his religion, the accused person shall be acquitted, and the accuser himself punished." This ordinance, according to Eusebius, was publicly fixed up at Ephesus in an assembly of the states.

It is no difficult matter to discover the causes of the many persecutions to which the Christians were exposed during the three first centuries. The purity of the Christian morality, directly opposite to the corruption of the Pagans, was doubtless one of the most powerful motives of the public aversion. To this may be added, the many calumnies unjustly spread about concerning them by their enemies, particularly the Jews. And this occasioned so strong a prejudice against them, that the Pagans condemned them without inquiring into their doctrine, or permitting them to defend themselves. Besides, their worshipping Jesus Christ as God, was contrary to one of the most ancient laws of the Roman empire, which expressly forbade the acknowledging of any God which had not been approved by the senate.

But notwithstanding the violent opposition made to the establishment of the Christian religion, it gained ground daily, and very soon made a surprising progress in the Roman empire. In the third century, there were Christians in the camp, in the senate, in the palace: in short everywhere, but in the temples and the theatres: they filled the towns, the country, the islands. Men and women of all ages and conditions, and even those of the first dignities, embraced the faith; insomuch that the Pagans complained that the revenues of their temples were ruined. They were in such great numbers in the empire, that (as Tertullian expresses it) were they to have retired into another country, they would have left the Romans only a frightful solitude.

The primitive Christians were not only remarkable for the practice of every virtue; they were also very eminently distinguished by the many miraculous gifts and graces bestowed by God upon them. "Some of the Christians (says Irenæus) drive out devils, not in appearance only, but so as that they never return: whence it often happens, that those who are dispossessed of evil spirits embrace the faith and are received into the church. Others know what is to come, see visions, and deliver oracles as prophets. Others heal the sick by laying their hands on them, and restore them to perfect health: and we find some who even raise the dead.—It is impossible to reckon up the gifts and graces which the church has received from God—what they have freely received they as freely bestow. They obtain these gifts by prayer alone, and invocation of the name of Jesus Christ, without any mixture of enchantment or superstition."

We shall here subjoin the remarkable story, attested by Pagan authors themselves, concerning the *Christian Legion* in the army of the emperor Marcus Aurelius. That prince having led his forces against the Quadi, a people on the other side of the Danube, was surrounded and hemmed in by the enemy in a disadvantageous place, and where they could find no water. The Romans were greatly embarrassed, and, being pressed by the enemy, were obliged to continue under arms, exposed to the violent heat of the sun, and almost dead with thirst; when, on a sudden, the clouds gathered, and the rain fell in great abundance. The soldiers received the water in their bucklers and helmets, and satisfied both their own thirst and that of their horses. The enemy, presently after, attacked them; and so great was the advantage they had over them, that the Romans must have been overthrown, had not Heaven again interposed by a violent storm of hail, mixed with lightning, which fell on the enemy, and obliged them to retreat. It was found afterwards, that one of the legions, which consisted of Christians, had by their prayers, which they offered upon their knees before the battle, obtained this favour from heaven: and from this event that legion was surnamed *The Thundering Legion*. See, however, the criticism of Mr Moyle on this story in his *Works*, vol. ii. p. 81—390. See also *Mosheim's Church History*, vol. i. p. 124.

Such were the primitive Christians, whose religion has by degrees spread itself over all parts of the world, though not with equal purity in all. And though, by the providence of God, Mahometans and Idolaters have been suffered to possess themselves of those places in Greece, Asia, and Africa, where the Christian religion formerly most flourished; yet there are still such remains of the Christian religion among them as to give them opportunity sufficient to be converted. For, in the dominions of the Turk in Europe, the Christians make two third parts at least of the inhabitants; and in Constantinople itself there are above twenty Christian churches, and above thirty in Thessalonica. Philadelphia, now called *Ala-shahir*, has no fewer than twelve Christian churches. The whole island of Chio is governed by Christians; and some islands of the Archipelago are inhabited by Christians only. In Africa, besides the Christians living in Egypt, and in the kingdom of Congo and Angola, the islands upon the western coasts are inhabited by Christians; and the vast kingdom of Abyssinia, supposed to be as big as Germany, France, Spain, and Italy, put together, is possessed by Christians. In Asia, most part of the empire of Russia, the countries of Circassia and Mingrelia, Georgia, and Mount Libanus, are inhabited bitress of this treaty; at least as to the affairs of Sweden, to which this peace confirmed the possession of many important countries. No public event of importance took place during the rest of Christina's reign; for there were neither wars abroad, nor troubles at home. This quiet might be the effect of chance; but it might also be the effect of a good administration, and the great reputation of the queen; and the love her people had for her ought to lead us to this determination. Her reign was that of learning and genius. She drew about her, wherever she was, all the distinguished characters of her time: Grotius, Paschal, Bochart, Descartes, Gassendi, Saumaise, Naude, Vossius, Heinsius, Meibom, Scudery, Menage, Lucas, Holstentius, Lambecius, Bayle, Madame Dacier, Filicaia, and many others. The arts never fail to immortalize the prince who protects them; and almost all these illustrious persons have celebrated Christina, either in poems, letters, or literary productions of some other kind, the greater part of which are now forgotten. They form, however, a general cry of praise, and a mass of testimonials which may be considered as a solid basis of reputation. Christina, however, may be justly reproached with want of taste, in not properly assigning the rank of all these persons, whose merits, though acknowledged, were yet unequal; particularly for not having been sufficiently sensible of the superiority of Descartes, whom she disgusted, and at last wholly neglected. The rapid fortune which the adventurer Michon, known by the name of *Bourdelot*, acquired by her countenance and liberality, was also a great scandal to literature. He had no pretensions to learning; and though sprightly was yet indecent. He was brought to court by the learned Saumaise; and, for a time, drove literary merit out of it, making learning the object of his ridicule, and exacting from Christina an exorbitant tribute to the weakness and inconstancy of her sex; for even Christina, with respect to this man, showed herself to be weak and inconstant. At last she was compelled, by the public indignation, to banish this unworthy minion: and he was no sooner gone than her regard for him was at an end. She was ashamed of the favour she had shown him; and, in a short time, thought of him with hatred or contempt. This Bourdelot, during his ascendency over the queen, had supplanted Count Magnus de la Gardie, son of the constable of Sweden, who was a relation, a favourite, and perhaps the lover of Christina. M. de Mottville, who had seen him ambassador in France, says, in his memoirs, that he spoke of his queen in terms so passionate and respectful, that every one concluded his attachment to her to be more ardent and tender than a mere sense of duty can produce. This nobleman fell into disgrace because he showed an inclination to govern; while M. Bourdelot seemed to aim at nothing more than to amuse; and concealed, under the unsuspected character of a droll, the real ascendency which he exercised over the queen's mind.

About this time, an accident happened to Christina which brought her into still greater danger than that which has been related already. Having given orders for some ships of war to be built at the port of Stockholm, she went to see them when they were finished; and as she was going on board of them, cross a narrow plank, with Admiral Fleming, his foot slipping, he fell, and drew the queen with him into the sea, which in that place was near 90 feet deep. Anthony Steinberg, the queen's first equerry, instantly threw himself into the water, laid hold of her robe, and, with such assistance as was given him, got the queen ashore: during this accident, her recollection was such, that the moment her lips were above water, she cried out, "Take care of the admiral." When she was got out of the water, she discovered no emotion either by her gesture or countenance; and she dined the same day in public, where she gave a humorous account of her adventure.

But though at first she was fond of the power and splendour of royalty, yet she began at length to feel that it embarrassed her; and the same love of independency and liberty which had determined her against marriage, at last made her weary of the crown. As, after her first disgust, it grew more and more irksome to her, she resolved to abdicate; and, in 1652, communicated her resolution to the senate. The senate zealously remonstrated against it; and was joined by the people; and even by Charles Gustavus himself, who was to succeed her: she yielded to their importunities, and continued to sacrifice her own pleasure to the will of the public till the year 1654, and then she carried her design into execution. It appears by one of her letters to M. Canut, in whom she put great confidence, that she had meditated this project for more than eight years; and that she had communicated it to him five years before it took place.

The ceremony of her abdication was a mournful solemnity, a mixture of pomp and sadness, in which scarce any eyes but her own were dry. She continued firm and composed through the whole; and, as soon as it was over, prepared to remove into a country more favourable to science than Sweden was. Concerning the merit of this action, the world has always been divided in opinion; it has been condemned alike both by the ignorant and the learned, the trifler and the sage. It was admired, however, by the great Conde: "How great was the magnanimity of this princess (said he), who could so easily give up that for which the rest of mankind are continually destroying each other, and which so many throughout their whole lives pursue without attaining!" It appears, by the works of St Evremond, that the abdication of Christina was at that time the universal topic of speculation and debate in France. Christina, besides abdicating her crown, abjured her religion: but this act was universally approved by one party and censured by another; the Papists triumphed, and the Protestants were offended. No prince, after a long imprisonment, ever showed so much joy upon being restored to his kingdom, as Christina did in quitting hers. When she came to a little brook, which separates Sweden from Denmark, she got out of her carriage; and leaping on the other side, cried out in a transport of joy, "At last I am free, and out of Sweden, whither, I hope, I shall never return." She dismissed her women, and laid by the habit of her sex: "I would become a man (said she); yet I do not love men because they are men, but because they are not women." She made her abjuration at Brussels; where she saw the great Conde, who, after his

Christopher's || Chromatic.

The air is good; the soil light, sandy, and fruitful; but the island is subject to hurricanes. The produce is chiefly sugar, cotton, ginger, indigo, and the tropical fruits. W. Long. 62. 32. N. Lat. 17. 30.

CHROASTACES, an old term in *Natural History*, applied to gems, and comprehending all those of variable colours, as viewed in different lights and in different positions; of which kinds are the *opal* and the *asteria* or cat's eye.

CHROMATIC, a kind of music which proceeds by several semitones in succession. The word is derived from the Greek χρωμα, which signifies *colour*. For this denomination several causes are assigned, of which none appear certain, and all equally unsatisfactory. Instead, therefore, of fixing upon any, we shall offer a conjecture of our own; which, however, we do not impose upon the reader as more worthy of his attention than any of the former. Χρωμα may perhaps not only signify a *colour*, but that of a shade of a colour by which it melts into another, or what the French call *nuance*. If this interpretation be admitted, it will be highly applicable to semitones; which being the smallest interval allowed in the diatonic scale, will most easily run one into another. To find the reasons assigned by the ancients for this denomination, and their various divisions of the chromatic species, the reader may have recourse to the same article in Rousseau's Musical Dictionary. At present, that species consists in giving such a procedure to the fundamental bass, that the parts in the harmony, or at least some of them, may proceed by semitones, as well in rising as descending; which is most frequently found in the minor mode, from the alterations to which the sixth and seventh note are subjected, by the nature of the mode itself.

The successive semitones used in the *chromatic* species are rarely of the same kind; but alternately major and minor, that is to say, *chromatic* and *diatonic*: for the interval of a minor tone contains a minor or chromatic semitone, and another which is major or diatonic, a measure which temperament renders common to all tones: so that we cannot proceed by two minor semitones which are conjunctive in succession, without entering into the enharmonic species; but two major semitones twice follow each other in the *chromatic* order of the scale.

Chromatic

The most certain procedure of the fundamental bass to generate the chromatic elements in ascent, is alternately to descend by thirds, and rise by fourths, whilst all the chords carry the third major. If the fundamental bass proceeds from dominant to dominant by perfect cadences avoided, it produces the *chromatic* in descending. To produce both at once, you interweave the perfect and broken cadences, but at the same time avoid them.

As at every note in the *chromatic* species one must change the tone, that succession ought to be regulated and limited for fear of deviation. For this purpose, it will be proper to recollect, that the space most suitable to *chromatic* movements, is between the extremes of the dominant and the tonic in ascending, and between the tonic and the dominant in descending. In the major mode, one may also chromatically descend from the dominant upon the second note. This transition is very common in Italy; and, notwithstanding its beauty, begins to be a little too common amongst us.

The chromatic species is admirably fitted to express grief and affliction; these sounds boldly struck in ascending tear the soul. Their power is no less magical in descending; it is then that the ear seems to be pierced with real groans. Attended with its proper harmony, this species appears proper to express every thing; but its completion, by concealing the melody, sacrifices a part of its expression; and for this disadvantage, arising from the fulness of the harmony, it can only be compensated by the nature and genius of the movement. We may add, that in proportion to the energy of this species, the composer ought to use it with greater caution and parsimony; like those elegant viands, which, when profusely administered, immediately surfeit us with their abundance; as much as they delight us when enjoyed with temperance, so much do they disgust when devoured with prodigality.

CHROMATIC, *Enharmonic*. See ENHARMONIC.

CHROMATICS;

THAT part of optics which explains the several properties of the colours of light, and of natural bodies.

1
Different hypothesis concerning colours.

Before the time of Sir Isaac Newton, we find no hypothesis concerning colours of any consequence. The opinions of the old philosophers, however, we shall briefly mention, in order to gratify the curiosity of our readers. The Pythagoreans called colour the superfices of body. Plato said that it was a flame issuing from them. According to Zeno, it is the first configuration of matter; and Aristotle said, it was that which moved bodies actually transparent. Des Cartes asserted, that colour is a modification of light; but he imagined, that the difference of colour proceeds from the prevalence of the direct or rotatory motion of the particles of light. Father Grimaldi, Dechales, and many others, thought the difference of colour depended upon the quick or slow vibrations of a certain elastic medium filling the whole universe. Rohault imagined that the different colours were made by the rays of light entering the ray at different angles with respect to the optic axis; and from the phenomena of the rainbow, he pretended to calculate the precise quantity of the angle that constituted each particular colour. Lastly, Dr Hooke, the rival of Newton, imagined that colour is caused by the sensation of the oblique or uneven pulse of light; and this being capable of no more than two varieties, he concluded there could be no more than two primary colours.

2
This subject investigated by Sir Isaac Newton

In the year 1666, Sir Isaac Newton began to investigate this subject; and finding the coloured image of the sun, formed by a glass prism, to be of an oblong, which we subjoin the following table, wherein on one side are mentioned the colours appearing on the plates by reflected light, and on the other those which were opposite to them, and which became visible when the glasses were held up between the eye and the window. We have already observed, that the centre, when the glasses were in full contact, was perfectly transparent. This spot, therefore, when viewed by reflected light, appeared black, because it transmitted all the rays; and for the same reason it appeared white when viewed by transmitted light.

Colours by Reflected Light.	*Colours by Transmitted Light.*
Black	White
Blue	Yellowish-red
White	Black
Yellow	Violet
Red	Blue
Violet	White
Blue	Yellow
Green	Red
Yellow	Violet
Red	Blue
Purple	Green
Blue	Yellow
Green	Red
Yellow } Red	Bluish-green
Green	Red
Red	Bluish-green
Greenish-blue	Red
Red	

The colours of the rings produced from reflection by the thick plates, followed the order of those produced by transmission through the thin ones; and by the analogy of their phenomena with those produced from the thin plates, Sir Isaac Newton concluded that they were produced in a similar manner. For he found, that if the quicksilver was rubbed off from the back of the speculum, the glass alone would produce the same rings, but much more faint than before; so that the phenomenon did not depend upon the quicksilver, except in as far as, by increasing the reflection at the back of the glass, it increased the light of the coloured rings. He also found that a speculum of metal only, produced none of these rings; which made him conclude, that they did not arise from one surface only, but depended on the two surfaces of the plate of glass of which the speculum was made, and upon the thickness of the glass between them.

7
General theory of colours by Sir Isaac Newton.

From these experiments and observations, it will be easy to understand the Newtonian theory of colours. Every substance in nature seems to be transparent, provided it is made sufficiently thin. Gold, the most dense substance we know, when reduced into thin leaves, transmits a bluish-green light through it. If, therefore, we suppose any body, gold, for instance, to be divided into a vast number of plates, so thin as to be almost perfectly transparent, it is evident that all or greatest part of the rays will pass through the upper plates, and when they lose their force will be reflected from the under ones. They will then have the same number of plates to pass through which they had penetrated before; and thus, according to the number of those plates through which they are obliged to pass, the object appears of this or that colour, just as the rings of colours appeared different in the experiment of the two plates, according to their distance from one another, or the thickness of the plate of air between them.

8
Mr Delaval's expe riments i confirmation of it.

This theory is adopted by Edward Hussey Delaval, in his Experimental Inquiry into the cause of the changes of colours in opaque and coloured bodies. He endeavours to confirm it by a number of experiments on the infusions of flowers of different colours; but his strongest arguments seem to be those derived from the different tinges given to glass by metallic substances. Here he observes, that each metal gives a tinge according to its specific density: The more dense metals producing the less refrangible colours, and the lighter ones those colours which are more easily refrangible. Gold, which is the densest of all metals, imparts a red colour to glass, whenever it can be divided into particles so minute, that it is capable of being mixed with the materials of which glass is made. It seems indifferent by what means it is reduced to this state, nor can it by any means be made to produce another colour. If it is mixed in large masses without being minutely divided, it imparts no colour to the glass, but remains in its metallic form. Lead, the metal whose density is next in order to that of gold, affords a glass of the colour of the hyacinth; a gem whose distinguishing characteristic is, that it is red with an admixture of yellow, the same colour which is usually called *orange*. Glass of lead is mentioned by several authors as a composition proper, without the addition of any other ingredient, for imitating the hyacinth. Silver, next in density to lead, can only be made to communicate a yellow colour to glass. If the metal is calcined with sulphur, it readily communicates this colour. Leaf-silver laid upon red hot glass, likewise tinges it yellow. When we meet with authors who mention a blue or greenish colour communicated by silver, the cause must have been, that the silver used in such processes was mixed with copper. Mr Delaval assures us, from his own experience, that silver purified by the test retains so much copper, that, when melted several times with nitre and borax, it always imparted a green colour at the first and second melting: though afterwards no such colour was obtainable from it. The only colour produced by copper is green. It is indifferent in what manner the copper is prepared in order to tinge the glass, provided it is exposed without any other ingredient to a sufficient degree of heat. If a quantity of salts is added in the preparation, they will, by attenuating the mixture, make the glass incline to blue, the colour next in order: but this happens only when the fire is moderate; for, in a greater degree of heat, the redundant salts, even those of the most fixed nature, are expelled. It is true, that copper is mentioned by some writers as an ingredient in red glass and enamel: but the *red*, which is the colour of the metal not dissolved or mixed with the glass, remains only while the composition is exposed to such a degree of heat as is too small to melt and incorporate it; for if it be suffered to remain in the furnace a few minutes after the copper is added, the mass will turn out green instead of red. Iron, the metal next in density to copper, is apt to surfaces are more or less united. These figures will not fail to appear, if the glasses are well wiped and warmed before the friction.

"When the colours are formed, the glasses adhere with considerable force, and would always continue so without any change in the colours. In the centre of all those ovals, the longer diameter of which generally exceeds ten lines, there appears a small plate of the same figure, exactly like a plate of gold interposed between the glasses; and in the centre of it there is often a dark spot, which absorbs all the rays of light except the violet: for this colour appears very vivid through a prism.

"If the glasses are separated suddenly, either by sliding them horizontally over one another, or by the action of fire, as will be explained hereafter, the colours will appear immediately upon their being put together again, without the least friction.

"Beginning by the slightest touch, and increasing the pressure by insensible degrees, there first appears an oval plate of a faint red, and in the midst of it a spot of light green, which enlarges by the pressure, and becomes a green oval, with a red spot in the centre; and this, enlarging in its turn, discovers a green spot in its centre. Thus the red and the green succeed one another in turns, assuming different shades, and having other colours mixed with them, which will be distinguished presently.

"The greatest difference between these colours exhibited between plane surfaces and those formed by curve ones is, that in the former case pressure alone will not produce them, except in the case above mentioned. With whatever force he compressed them, his attempts to produce the colours were in vain without previous friction. But the reason of this plainly was, that with sliding one of the glasses over the other, they could not be brought to approach near enough for the purpose.

"Having made these observations with plates of glass whose sides were nearly parallel, he got two prisms with very small refracting angles; and rubbing them together, when they were joined so as to form a parallelopiped, the colours appeared with a surprising lustre at the places of contact, owing, he did not doubt, to the separation of the rays of light by the prism. In this case, differently coloured ovals appeared, but the plate of gold in them was much whiter, and only appeared yellow about its edges. The plate having a black spot in its centre, was bordered by a deep purple. He could not perceive any violet by his naked eye, but it might be perceived by the help of a lens with a weak light. It appeared in a very small quantity at the confines of the purple and the blue, and seemed to him to be only a mixture of these two colours. It was very visible in each of the coloured rings by inclining the glasses to the light of the moon. Next to the purple and violet appeared blue, orange, red tinged with purple, light green, and faint purple. The other rings appeared to the naked eye to consist of nothing but faint reds and greens; and they were so shaded that it was not easy to mark their terminations. That the order of these may be compared with Newton's, he gives a view of both in the following table:

	Order of the Colours in the Plane Glasses.	*Order of the Colours in Newt. Object Glasses.*
Order I.	Black spot	Black
	Whitish oval	Blue
	Yellow border	White
	Deep purple	Yellow
		Red
Order II.	Blue	Violet
	Orange	Blue
	Purple	Green
Order III.	Greenish blue	Yellow
	Yellow green	Red
	Purple red	Purple
		Blue
		Green
Order IV.	Green	Yellow
	Red	Red
Order V.	Faint green	Green
	Faint red	Red
Order VI.	Weak green	Greenish blue
	Light red	Red
Order VII.	Very faint green	Greenish blue
	Very faint red	Red
		Greenish blue
		Pale red

"When these coloured glasses were suspended over the flame of a candle, the colours disappeared suddenly, though the glasses still continued to adhere to one another, when they were parallel to the horizon. When they were suffered to cool, the colours returned by degrees to their former places, in the order of the preceding table.

"After this the Abbé took two plates much thicker than the former, in order to observe at his leisure the action of fire upon the matter which he supposed to produce the colours; and observed, that as they grew warm, the colours retired to the edges of the glasses, and there became narrower and narrower till they were reduced to imperceptible lines. Withdrawing the flame, they returned to their place. This experiment he continued till the glasses were bent by the violence of the heat. It was pleasant, he says, to observe these colours glide over the surface of the glass as they were pursued by the flame.

"At the first our author had no doubt but that these colours were owing to a thin plate of air between the glasses, to which Newton has ascribed them: but the remarkable difference in the circumstances attending those produced by the flat-pieces, and those produced by the object-glasses of Newton, convinced him that the air was not the cause of this appearance. The colours of the flat plates vanished at the approach of flame, but those of the object-glasses did not. He even heated the latter till that which was next the flame was cracked by the heat, before he could observe the least dilatation of the coloured rings. This difference was not owing to the plane glasses being less compressed than the convex ones; for though the former were compressed ever so much by a pair of forceps, it did not in the least hinder the effect of the flame.

"Afterwards he put both the plane glasses and the convex ones into the receiver of an air pump, suspending the former by a thread, and keeping the latter compressed suddenly, he observed upon their surface very thin vapours, which formed different colours, but presently vanished altogether.

"To try the effect of vapour, he breathed upon one of his plates of glass, and observed that the vapours which adhered to the glasses sometimes formed, before they were entirely dispersed, a surprising variety of colours. This experiment, he observes, does not always succeed at the first trial. The glass must be breathed upon several times, and care must be taken to wipe it every time with one's hand, both to take off the moisture, and also to make upon the glass a kind of furrows, which contribute very much to the variety of colours, by making inequalities in the thicknesses of the vapours. It is necessary also, that the glasses on which these experiments are made have no quicksilver upon them.

"When the particles of water which formed this vapour were too thick to exhibit these colours, he struck them several times with his pencil, in order to attenuate them; and then he saw an infinity of small coloured threads which succeeded one another with great rapidity.

"Putting a drop of water between two pieces of common glass, he observed that the compression of them produced no colour; but if, while they were compressed, the water was made to pass from one place to another, it left behind it large spots, red, yellow, green, purple, &c. and the spots assumed different colours with a surprising rapidity, and presented to the eye a most beautiful variety of shades.

"In order to determine with greater certainty whether they were vapours that caused the colours in his first observations, he first breathed upon one of his plates of glass, and then rubbed them against one another, when the colours appeared in the same order as before, but darker, and dispersed in confusion in the places occupied by the vapours: but when he made use of fire, to dissipate the watery particles, the colours resumed their lustre.

"Newton, having introduced a drop of water between his two object-glasses, observed, that in proportion as the water insinuated itself between the glasses, the colours grew fainter, and the rings were contracted: and ascribing these colours to the thickness of the plate of water, as he ascribed the former to that of the plate of air, he measured the diameters of the coloured rings made by the plate of water, and concluded that the intervals between the glasses at the similar rings of these two mediums were nearly as three to four; and thence he inferred, that in all cases, these intervals would be as the sines of the refractions of these mediums.

"The Abbé Mazeas, in order to assure himself whether, agreeable to this rule, the coloured rings of his glasses depended upon the thickness of the water only, dipped one of the edges of his coloured glasses in a vessel of water, having taken care to wipe and warm them well, before he produced his colours by friction. The water was a considerable time in rising as high as the glasses; and in proportion as it ascended, he perceived a very thin plate of water, which seemed to pass over the matter which he thought produced the colours, without mixing with it; for beyond this plate of water, he still perceived the colours in the same place and order, but deeper and darker; and holding the glasses above the flame of a candle, he saw the colours go and come several times as he moved them nearer to or farther from the flame. He then moistened both the glasses more than before; and rubbing them as usual, he always saw the same appearance; and seizing the moment when the colours had disappeared to separate the glasses, he always found that they were wet. On this account, he thought that it could not be the water on which the colour depended, but some substance much more sensible to heat. He also thought that these coloured rings could not be owing to the compression of the glasses; or that, if this circumstance did contribute any thing to them, it served rather to modify than to generate them.

15 M. du Tour's ob- servatio

"M. du Tour gave particular attention to the preceding observations of the Abbé Mazeas. He repeated the experiments with some variation of circumstances, particularly comparing them with those of Sir Isaac Newton. He is so far from supposing a plate of air to be necessary to the formation of these coloured rings, that he thinks the reason of their not appearing between the flat plates of glass is the adhering of the air to their surfaces; and that mere pressure is not sufficient to expel it; except, as the Abbé Mazeas observed, the rings had before been made in the same place; in which case, simple apposition without friction is sufficient; the air, probably, not having had time to apply itself so closely to the surface of the glass. The contact of some other substances, M. du Tour observes, is not so prejudicial in this experiment as that of air; for he found, that, if he only gave the plates a slight coating of any kind of grease, the rings would appear without friction. Also dipping them slightly in water, or wiping them with his finger, would answer the same purpose. He verified his conjectures by means of the air-pump; for, dipping two pieces of glass in water, one of which had been wiped, and the other not, the former appeared to have no bubbles adhering to it when the air was exhausted, whereas the other had.

"When one of the glasses is convex, our author observes, that the particles of air may more easily make their escape by pressure only; whereas their retreat is in a manner cut off when they are compressed between two flat surfaces. The air-pump, he found, was not able to detach these particles of air from the surfaces to which they adhere; leaving these flat plates for a considerable time in an exhausted receiver, was not sufficient to prepare them so well for the experiment as wiping them.

16 Experiments o colours reflectio

"Besides the observations on the colours of thin plates, it has been seen that Sir Isaac Newton imagined he could account for the colours exhibited by thick ones in some cases in a similar manner; particularly in those curious experiments in which he admitted a beam of light through a hole in a piece of pasteboard, and observed the rings of colours reflected back upon it by a concave glass mirror of equal thickness in all places. These experiments were resumed, and happily pursued by the duke de Chaulnes, who ascribed these colours to the inflection of light*. Chance led the duke to observe, that when the nearer surface of the glass mirror was clouded by breathing upon it,

* See (Op)tics.

evident, that the plates of which we suppose all natural bodies to be composed, must be similar to one that is perpetually varying in its thickness; for supposing the plates of which any substance is composed to be of any determinate thickness, 9 millionth parts of an inch for instance; such of the rays as are reflected from this plate will be red. But if any of them penetrate to the depth of $11\frac{1}{9}$ of these parts, they will be reflected by a violet colour, &c. and thus must alloy and obscure the red; and so of others. If we suppose the colours to be produced by inflection, it will be equally difficult to account for some particular rays being inflected and others not; seeing we observe that all of them are capable of being inflected by every substance whatever, when they pass very near it. In some cases, too, colours are produced when the light is neither refracted nor inflected, as far as we can judge; and this seems to obscure the theory of chromatics more than any thing we have yet mentioned.

As the experiments we are now about to mention are of the greatest importance, and in direct terms contradict one of Sir Isaac Newton's, we shall give a full account of them, from Priestley's History of Vision, &c. with his remarks thereon.

18 One of Sir Isaac Newton's experiments found to be erroneous.

The experiment in question is the eighth of Newton's second book of Optics: "He (Sir Isaac Newton) found, he says, that when light goes out of air through several contiguous refracting mediums, as through water and glass, and thence goes out again into air, whether the refracting surfaces be parallel or inclined to one another, that light, as often as, by contrary refractions, it is so corrected, that it emerges in lines parallel to those in which it was incident, continues ever after to be white; but if the emergent rays be inclined to the incident, the whiteness of the emerging light will, by degrees, in passing on from the place of emergence, become tinged at its edges with colours. This he tried by refracting light with prisms of glass, placed within a prismatic vessel of water.

"By theorems, deduced from this experiment, he infers, that the refraction of the rays of every sort, made out of any medium into air, are known by having the refraction of the rays of any one sort; and also, that the refraction out of one medium into another is found as often as we have the refractions out of them both into any third medium.

"On the contrary, a Swedish philosopher (M. Klingenstierna) observes *, that in this experiment, the rays of light, after passing through the water and the glass, though they come out parallel to the incident rays, will be coloured; but that the smaller the glass prism is, the nearer will the result of it approach to Newton's description.

* *Swed. Abhand.* vol. xvi. p. 300.

"This paper of M. Klingenstierna, being communicated to Mr Dollond by M. Mallet, made him entertain doubts concerning Newton's report of the result of his experiment, and determined him to have recourse to experiments of his own.

"He therefore cemented together two plates of parallel glass, at their edges, so as to form a prismatic vessel when stopped at the ends or bases; and the edge being turned downwards, he placed in it a glass prism with one of its edges upwards, and filled up the vacancy with clear water; so that the refraction of the prism was contrived to be contrary to that of the water, in order that a ray of light, transmitted through both these refracted mediums, might be effected by the difference only between the two refractions. As he found the water to refract more or less than the glass prism, he diminished or increased the angle between the glass plates, till he found the two contrary refractions to be equal, which he discovered by viewing an object through this double prism. For when it appeared neither raised nor depressed, he was satisfied that the refractions were equal, and that the emergent rays were parallel to the incident.

"Now, according to the prevailing opinion, he observes, that the object should have appeared through this double prism in its natural colour; for if the difference of refrangibility had been in all respects equal, in the two equal refractions, they would have rectified each other. But this experiment fully proved the fallacy of the received opinion, by showing the divergency of the light by the glass prism to be almost double of that by the water; for the image of the object, though not at all refracted, was yet as much infected with prismatic colours as though it had been seen through a glass wedge only whose angle was near 30 degrees.

19 Colours produced without refraction or reflection.

"This experiment is the very same with that of Sir Isaac Newton above mentioned, notwithstanding the result was so remarkably different: but Mr Dollond assures us, that he used all possible precaution and care in his process; and he kept his apparatus by him, that he might evince the truth of what he wrote, whenever he should be properly required to do it.

"He plainly saw, however, that if the refracting angle of the water-vessel could have admitted of a sufficient increase, the divergency of the coloured rays would have been greatly diminished, or entirely rectified; and that there would have been a very great refraction without colour, as he had already produced a great discolouring without refraction; but the inconveniency of so large an angle as that of the prismatic vessel must have been, to bring the light to an equal divergency with that of the glass prism, whose angle was about 60°, made it necessary to try some experiments of the same kind with smaller angles.

"Accordingly he got a wedge of plate-glass, the angle of which was only nine degrees; and, using it in the same circumstances, he increased the angle of the water-wedge, in which it was placed, till the divergency of the light by the water was equal to that by the glass; that is, till the image of the object, though considerably refracted by the excess of the refraction of the water, appeared nevertheless quite free from any colours proceeding from the different refrangibility of the light.

20 Defence of Sir Isaac

"Notwithstanding it evidently appeared, I may say to almost all philosophers, that Mr Dollond had made a real discovery of something not comprehended in the optical principles of Sir Isaac Newton, it did not appear to so sensible a man, and so good a mathematician as Mr Murdoch is universally acknowledged to be. Upon this occasion he interposed in the defence, as he imagined, of Sir Isaac Newton; maintaining, that Mr Dollond's positions, which he says, he knows not by what mishap have been deemed paradoxes in Sir

23 No light reflected by the colouring particles.

parent bodies to reflect light, being deduced from very numerous experiments, may therefore be held as a general law. It will appear the more extensive, if we consider, that, for the most part, the tinging particles of liquors or other transparent substances are extracted from opaque bodies; that the opaque bodies owe their colours to those particles, in like manner as the transparent substances do; and that by the loss of them they are deprived of their colours.

24 Apparatus for making those experiments.

For making his experiments, Mr Delaval used small phials of flint-glass, whose form was a parallelopiped, and their height, exclusive of the neck, about two inches, the base about an inch square, and the neck two inches in length. The bottom and three sides of each of those phials were covered with a black varnish; the cylindrical neck, and the anterior side, except at its edges, being left uncovered. He was careful to avoid any crevices in the varnish, that no light might be admitted except through the neck or anterior side of the phials.

In these experiments it is of importance to have the phials perfectly clean; and as many of the liquors are apt to deposit a sediment, they ought to be put into the phials only at the time the experiments are to be made. The uncovered side of the phials should not be placed opposite to the window through which the light is admitted; because in that situation the light would be reflected from the farther side of the phial; and our author observes, that smooth black substances reflect light very powerfully. But as it is a principal object in the experiment, that no light be transmitted through the liquor, this is best accomplished by placing the uncovered side of the phial in such a situation that it may form a right angle with the window.

25 The colouring matter only shows itself by transmitted light.

With these precautions, our author viewed a great number of solutions, both of coloured metallic salts and of the tinging matter of vegetables; universally observing, that the colour by reflection was black, whatever it might be when viewed by transmitted light. If these liquors, however, are spread thin upon any white ground, they appear of the same colour as when viewed by transmitted light; but on a black ground they afford no colour, unless the black body be polished; in which case the reflection of the light through it produces the same effect as transmission.

The experiments with tinged glasses were in many respects analogous to those with transparent-coloured liquors. For these he made several parcels of colourless glasses, principally using one composed of equal parts of borax and white sand. The glass was reduced to powder, and afterwards ground, together with the ingredients by which the colours were imparted. "This method (says he) of incorporating the tinging particles is greatly preferable to mixing them with the raw materials; and the glasses thus composed excel most others in hardness, being scarcely inferior in lustre to real gems."

The result of all the experiments made in this manner was, that when matter is of such thinness, and the tinge so diluted, that light can be transmitted through it, the glasses then appear vividly coloured; but when they are in larger masses, and the tinging matter is more densely diffused through them, they appear black; for these, as well as the transparent-coloured liquors, show their colour by transmission. The following experiments were made with a view to determine the proportion of tinging matter which produces colour or blackness.

1. Glass was tinged green by adding to it $\frac{1}{80}$th of its weight of copper; and that whether the latter was used in its metallic or calcined state. 26 Experiments to determine the proportion of tinging matter.

2. A blue glass was made by the addition of zaffre, a purple one by manganese, a red glass by gold, and yellow glasses by silver and calcined iron. A yellow glass resembling a topaz was likewise made by the addition of a small quantity of charcoal in powder. The same colour was likewise procured by the addition of wheat-flour, rosin, and several other inflammable matters. Small pieces of each of these glasses being ground by a lapidary, resembled gems of their different colours.

3. Having formed pieces of such glasses about two inches thick, he inclosed them in black cloth on all sides, except their farther and anterior surfaces. In this situation each of them showed a vivid colour when light was transmitted through them; but when the posterior surface was likewise covered with the cloth to prevent this transmission, no other colour than black was exhibited by any of them.

4. When plates of transparent-coloured glass, somewhat thicker than common window-glass, were made use of, they always exhibited their colours by transmitted light.

5. On intercepting the light transmitted through these coloured plates, they as constantly appeared black when placed in such a direction as to form a right angle with the window.

From these phenomena Mr Delaval deduced the following observations: 1. That the colouring particles do not reflect any light. 2. That a medium, such as Sir Isaac Newton has described, is diffused over both the anterior and farther surfaces of the plates, whereby objects are equally and regularly reflected as by a mirror. Hence, when it is said that light is reflected by the surface of any substance, it should be understood from this expression, that the reflection is effected by the medium diffused over its surface.

6. When a lighted candle is placed near one of those coloured plates, the flame is reflected by the medium which is diffused over the anterior surface. The image thus reflected entirely resembles the flame in size and colour; being scarcely diminished, and not in the least tinged by the coloured glass. 27 On the reflection of the light of a candle by coloured glasses.

7. If the plate be not so intensely coloured, or so massy, as to hinder the transmission of the light of the candle, there appears a secondary image of the flame, which is reflected by the medium contiguous to the farther surface of the glass; and as the light thus reflected passes through the coloured glass, it is tinged very vividly.

8. When

such a mixture of them as does not compose whiteness, or any of the gradations between white and black; such as are called by Sir Isaac Newton, gray, dun, or russet brown.

actly resembling the colour which had been extracted from the leaves.

3. After the colour had been totally extracted by the vinous spirit, the leaves remained apparently unaltered, either as to figure or texture; but were entirely white, or had their whiteness slightly tinged with brown.

4. Red, purple, and blue flowers, were also digested in spirit of wine, all of which yielded their colouring matter to the spirit, and became white by being deprived of it. From most of these flowers, however, the spirit acquired either no tinge at all, or only a very faint one; but when acidulated, it became red, and by the addition of an alkali appeared blue, purple, or green, according to the quantity of alkali, and the nature of the infusion. In these states, all of them, when viewed by transmitted light, or poured upon a white ground, showed their colours, but universally appeared black by reflexion.

5. Red, purple, and blue flowers, were digested in water slightly acidulated with nitrous acid. Thus, red infusions were obtained, which, by saturation with sea-salt, might be preserved for many years.

6. The same liquors were changed green, blue, or purple, by the addition of an alkali: but here the case was the same as before; all of them yielding vivid colours by transmission, but none by reflection. In making this experiment, care must be taken to add the alkali very gradually; for if too much is put in at once to the red liquor, the immediate colours between the red and the green will be wanting. To half an ounce of the red infusion it is proper to add, at once, only the smallest quantity that can be taken upon the point of a pen; repeating this addition slowly, until each of the colours be produced.

7. The flowers, after having been repeatedly macerated in acidulated water, lost their colouring matter, and became white.

8. Yellow flowers also communicated their colours to water and to spirit of wine. The infusion and tinctures of these flowers were subjected to the same experiments as had been employed in the examination of the liquors already mentioned; and appeared yellow by transmitted light, but did not reflect any colour.

9. White paper, linen, &c. may be tinged of any of these colours, by dipping them in the infusions; and the consideration of the manner in which the colours are imparted to the linen, affords much insight into the manner in which natural colours are produced. It has already been observed, that, when the colouring matter of plants is extracted from them, the solid fibrous parts, thus divested of their covering, display their natural whiteness. White linen, paper, &c. are formed of such fibrous vegetable matter; which is bleached by dissolving and detaching the heterogeneous colouring particles. When these are dyed or painted with vegetable colours, it is evident that they do not differ in their manner of acting on the rays of light from natural vegetable bodies; both yielding their colours by transmitting, through the transparent coloured matter, the light which is reflected from the white ground. This white matter frequently exists, without any considerable mixture, in plants, while they are in a state of vegetation; as cotton, white flowers, the pith, wood, seeds, roots, and other parts of several kinds of vegetables. When decayed trees, &c. have been long exposed to the atmosphere, their coloured juices are sometimes so perfectly extracted, that the fibres appear white. This white matter is not distinct from the vegetable earth to which plants are reduced by burning. Mr Delaval has rendered ashes intensely white, by carefully calcining them, and afterwards grinding with a small proportion of nitre, and exposing them to such a degree of heat as would cause the nitre deflagrate with the remaining quantity of phlogiston. Lastly, the ashes were digested with muriatic acid, in order to dissolve the ferruginous matter diffused through them, and repeatedly washing the remainder in water. Mixing ashes thus purified with borax, and applying a vitrifying heat, an opaque enamel is obtained, remarkable for its whiteness.

29 How ashes may be made intensely white.

30 White earth of plants, the only substance in them that reflects the light.

Hence it appears, that the earth which forms the substance of plants is white, and separable from that substance which gives to earth its peculiar colour; that whenever it is pure and unmixed, or diffused through colourless media, it shows its native whiteness; and is the only vegetable matter endowed with a reflective power. It may be discovered, however, by other means than that of burning: thus, roses may be whitened by exposing them to the vapour of burning sulphur: an effect which cannot be attributed to the sulphuric acid, but to the phlogiston contained in that vapour. This was proved to be the case, by exposing several kinds of red and purple flowers to the phlogistic vapour issuing from hepar sulphuris; and by this every one of them was whitened; their colour being afterwards restored by the addition of an acid either mineral or vegetable.

31 Colouring matter dissolved by carbonic acid.

"Thus (says Mr Delaval) it appears, that the colouring matter of the flowers is not discharged or removed, but only dissolved by carbonic acid; and thereby divided into particles too minute to exhibit any colour. In this state, together with the vegetable juice in which they are diffused, they form a colourless transparent covering, through which the white matter of the flowers is seen untinged. The colouring particles of plants consist principally of inflammable matter, and their solubility in carbonic acid, and union with it, are analogous to the action of other inflammable bodies upon each other. Thus, æther dissolves all essential and expressed oils, animal empyreumatic oils and resins. Sulphur, camphor, and almost all substances abounding in phlogiston, are soluble in oils, ardent spirits, or other inflammable menstrua. The manner in which the red colour of vegetable flowers is restored, appears to be explicable from known chemical laws. When acids are applied to the whitened flowers, they unite with the phlogiston which the sulphur had communicated, and disengage it from the colouring particles; which, being thus extricated, resume their original magnitude and hue. A change of the same kind is also produced by fixed alkali, which, like the acids, has a strong attraction for phlogiston, always changes the whitened flowers to a blue, purple, or green colour.

32 Colours destroyed by the light of the sun.

"In like manner, the action of the rays of light operates upon coloured bodies. Thus, dyed silk, or other substances of that kind, when exposed to the sun's is produced, to the vegetable bodies already treated of. The tinctures and infusions of cochineal and of kermes yield their colours when light is transmitted through them, but show none by reflection. On diluting fresh ox-gall with water, and examining it in the phials already mentioned, that part of it which was in the neck of the phial, and viewed by transmitted light, was yellow; but the anterior surface was black, and reflected no colour. Flesh derives its colour entirely from the blood, and when deprived of it, the fibres and vessels are perfectly white; as are likewise the membranes, sinews, and bones, when freed from their aqueous and volatile parts; in which case they are a mere earth, unalterable by fire, and capable of imparting an opaque whiteness to glass.

36
Of the colour of blood.

On examining blood diluted with water in one of the phials formerly described, it transmitted a red colour, and the anterior surface was almost, but not entirely, black; for it received a slight hue of brown from some coagulated particles that were suspended in the liquor. In order to procure blood sufficiently diluted, and at the same time equably and perfectly dissolved, he mixed as much cruor with spirit of sal ammoniac as imparted a bright colour to it. The liquor being then viewed in the phial, that part which was contained in the neck, and transmitted the light, appeared of a fine red; but the anterior part reflecting no light, was intensely black. Hence it appears, that the florid red colour of the flesh arises from the light which is reflected from the white fibrous substance, and transmitted back through the red transparent covering which the blood forms on every part of it.

Blood, when recently drawn, does not assume the appearance common to transparent coloured liquors; for these, when too massy to transmit light from their farther surfaces, always appear black; but blood, when recently drawn, always shows a fine red colour, in whatever way it be viewed. This is occasioned by a white matter diffused through the blood; and which is easily separated from the cruor, by dividing it after coagulation into a number of thin pieces, and washing in a sufficient quantity of pure water. Thus the water acquires a red colour, and ought to be changed daily. In a few days it will acquire no more tinge; and the remaining masses of the cruor are no longer red, but white.

37
Of the shells of lobsters.

In like manner, the red colour of the shells of lobsters, after boiling, is no more than a mere superficial covering spread over the white calcareous earth of which the shells are composed, and may be easily removed from the surface by scraping or filing. Before the application of heat, this superficial covering is much denser, insomuch that, in some parts of the shell, it appears quite black, being too thick to admit the passage of the light to the shell and back again; but where this transparent blue colour of the unboiled lobster is thinner, it constantly appears like a blue film. In like manner, the colours of the eggs of certain birds are entirely superficial, and may be scraped off, leaving the white calcareous earth exposed to view.

38
Of feathers.

The case is the same with feathers, which owe their colours entirely to a very thin layer of some transparent matter upon a white ground. Our author ascertained this by scraping off the superficial colours from certain feathers which were strong enough to bear the operation; and thus separated the coloured layers from the white ground on which they had been naturally spread. The lateral fibres of the feathers cannot indeed have their surfaces separated in this manner; but their texture, when viewed by a microscope, seems to indicate, that the colours are produced upon them by no other means than those already related. In the examination of some animal subjects, where the colouring matter could not be separated by chemical means, our author had recourse to mechanical division; but this can only be employed when the principal part of the white substance is unmixed with the coloured coat or covering which is spread upon its surface. All of them, however, by whatever means their colours could be separated, showed that they were produced in the same manner, namely, by the transmission of light from a white ground through a transparent coloured medium.

39
Of the colours of mineral substances.

The coloured substances of the mineral kingdom are very numerous, and belong principally to two classes, viz. earths and metals. The former, when pure, are all perfectly white, and their colours arise from carbonic or metallic mixtures. Calcareous earths, when indurated, constitute marble, and may be tinged with various colours by means of metallic solutions: all which are similar in their nature to the dyes put upon silk, cotton, or linen, and invariably proceed from the same cause, viz. the transmission of light through a very thin and transparent coloured medium. Flints are formed from siliceous earths, and owe their colour to carbone. When sufficiently heated, they are rendered white by the loss of the inflammable matter which produced their colour. When impregnated with metals, they form agates, cornelians, jasper, and coloured crystals. The coloured gems also receive their different hues from metals: and all of them may be imitated by glasses tinged with such carbonic or metallic matters as enter into the composition of the original substances.

40
Of metals.

Thus our author concludes, that the coloured earths, gems, &c. exhibit their various tints in the same manner with other substances; viz. by the transmission of light reflected from a white ground. Our author, however, proceeds farther; and asserts, that even the colours of metals themselves are produced in the same manner.

"Gold (says he) exhibits a white light, which is tinged with yellow. I have used this expression, because it appears from experiment that gold reflects a white light, and that its yellow colour is a tinge superadded to its whiteness. The experiment is thus set forth by Sir Isaac Newton. Gold in this light (that is, a beam of white light) appears of the same yellow colour as in day light, but by intercepting at the lens a due quantity of the yellow-making rays, it will appear white like silver, as I have tried; which shows that its yellowness arises from the excess of the intercepted rays, tinging that whiteness with their colour when they are let pass.

"I have already shown, by numerous experiments, in what manner coloured tinges are produced; and it uniformly appears, from all these experiments, that colours do not arise from reflection, but from transmission only. A solution of silver is pellucid and colourless. A solution of gold transmits yellow, but reflects only by the white or colourless particles. They consist of pellucid media, throughout which white or colourless opaque particles are dispersed. The latter are disposed at such distances from each other, that some of the incident rays of light are capable of passing through the intervals which intercede them, and thus are transmitted through the semipellucid mass. Some sorts of rays penetrate through such masses, while others, which differ from them in their refrangibility, are reflected by the light or colourless particles; and from thence are transmitted through the pellucid part of the medium which intervenes between the reflecting particles and the anterior surface of the mass. On the same principle our author explains the blue colour of the sky, the green colour of the sea, and other natural phenomena: and from his numerous experiments on this subject at last concludes, "that the power by which the several rays of light are transmitted through different media is inherent in the particles themselves, and therefore is not confined to the surfaces of such media. For if the transmissive force was exerted at the surface only, the thinner plates of coloured substances would act upon the rays as powerfully as thicker masses. But it appears from experiment, that in proportion as the rays pass through different thicknesses of coloured media, they exhibit colours differing not only in degree, but frequently in species also.

43 How colours are shown by transmitted light.

"The sun's light, by which bodies are illuminated, consists of all the rays of which a white light is compounded. These rays, in their entire and undivided state, are incident upon the opaque particles of semipellucid substances, and upon the colouring particles of transparent coloured substances, whenever these media are exposed to the light. When the rays accede to the opaque particles of semipellucid substances, some sorts of them are reflected back from the anterior surface of these particles: the other sorts of rays, which are not reflected back, are diverted from the direction which is opposite to the anterior surface of the opaque particles, and passing through the intervals between the particles, are transmitted through the mass.

"When the rays are incident upon the particles of transparent coloured bodies, none of them are reflected back; because the colouring particles are not endowed with any reflective power; but some of the rays are either stopped at the interior surface of the particles, or are diverted into such directions as render them incapable of passing towards the further side of the mass; and consequently such rays cannot be transmitted. The rays which are thus intercepted or dispersed, are transmitted in the same manner as those which pass through semipellucid media. Thus it is evident, that the coloured rays which are transmitted through semipellucid substances, are *inflected* by the opaque particles; and those which are transmitted through transparent-coloured substances are *inflected* by the colouring particles. From the preceding observations likewise it appears, that the particles of coloured media inflect the several sorts of rays according to the several sizes and densities of the particles; also in proportion to the inflammability of the media which owe their colour to them; and it is manifest that the transmission of coloured rays depends upon their inflection. All these observations are conformable to Sir Isaac Newton's doctrine that the rays of light are reflected, refracted, and inflected, by one and the same principle acting variously in various circumstances."

The most remarkable part of Mr Delaval's doctrine is that concerning the metals; for the better understanding of which we shall premise a short abstract of his general doctrine concerning white bodies, and the manner in which light is reflected by them. "All the earths, (he observes), which in their natural state are of a pure white, constitute transparent colourless media when vitrified with proper fluxes, or when dissolved in colourless menstrua; and the saline masses obtainable from their solutions are transparent and colourless, while they retain the water which is essential to their crystallization, and are not flawed or reduced to powder; but after their pores and interstices are opened in such a manner as to admit the air, they become then white and opaque by the entrance of that rare medium. The earthy particles which form the solid parts of bodies generally exceed the other in density; consequently these particles, when contiguous to the rare media already mentioned, must reflect the rays of light with a force proportionate to their density. The reflective power of bodies does not depend merely upon their excess of density, but upon their difference of density with respect to the surrounding media. Transparent colourless particles, whose density is greatly inferior to that of the media they come between, also powerfully reflect all sorts of rays, and thereby become white. Of this kind are the air or other rare fluids which occupy the interstices of liquors; and in general of all denser media in whose interstices such rare particles are admitted.

44 Of the manner in which light is reflected from white bodies.

Hence we may conclude, that white opaque bodies are constituted by the union or contiguity of two or more transparent colourless media differing considerably from each other in their reflective powers. Of these substances we have examples in froth, emulsions, or other imperfect combinations of pellucid liquors, milk, snow, calcined or pulverized salts, glass or crystal reduced to powder, white earths, paper, linen, and even those metals which are called white by mineralogists and chemists: for the metals just mentioned do not appear white unless their surfaces be rough; as in that case only there are interstices on their surfaces sufficient to admit the air, and thus make a reflection of a white and vivid light.

"But the polished surfaces of metallic mirrors reflect the incident rays equably and regularly, according to their several angles of incidence; so that the reflected rays do not interfere with each other, but remain separate and unmixed, and therefore distinctly exhibit their several colours. Hence it is evident, that white surfaces cannot act upon the light as mirrors; because all the rays which are reflected from them are blended in a promiscuous and disorderly manner.

45 Of the cause of opacity.

"The above mentioned phenomena give much insight into the nature and cause of opacity: as they clearly show, that even the rarest transparent colourless substances, when their surfaces are adjacent to media differing greatly from them in refractive power, may thereby acquire a perfect opacity, and may assume a resplendency and hue so similar to that of white metals, that the rarer pellucid substances cannot by the sight colour of those three. For the yellow and blue, if they are equal in quantity, will draw the intermediate green equally toward them, and keep it, as it were, in equilibrio, that it verge not more to the one than to the other. To this compound green there may be added some red and violet; and yet the green will not immediately cease, but grow less vivid; till by adding more red and violet it will become more diluted; and at last, by the prevalence of the added colours, it will be overcome, and turned into some anomalous colour.

If the sun's white, composed of all kinds of rays, be added to any homogeneous colour, that colour will not vanish, nor change its species, but be diluted; and by adding more white, it will become continually more diluted. Lastly, if red and violet be mixed, there will be generated, according to their various proportions, various purples, such as are not like, in appearance, to the colour of any homogeneous light; and of these purples, mixed with blue and yellow, other new colours may be composed.

III. *Out of three of the primary colours, red, yellow, and blue, to produce all the other prismatic colours, and all that are intermediate to them.*

Fig. 2. Provide three panes of glass (fig. 2.) of about five inches square; and divide each of them, by parallel lines, into five equal parts. Take three sheets of very thin paper; which you must paint lightly, one blue, another yellow, and the third red (D). Then paste on one of the glasses five pieces of the red paper, one of which must cover the whole glass, the second only the four lower divisions, the third the three lower, the fourth the two lowest, and the fifth the last division only. On the other glasses five pieces of the blue and yellow papers must be pasted in like manner. You must also have a box of about six inches long, and the same depth and width as the glasses; it must be black on the inside: let one end be quite open, and in the opposite end there must be a hole large enough to see the glasses completely. It must also open at the top, that the glasses may be placed in it conveniently.

When you have put any one of these glasses in the box, and the open end is turned toward the sun, you will see five distinct shades of the colour it contains. If you place the blue and yellow glasses together, in a similar direction, you will see five shades of green distinctly formed. When the blue and red glasses are placed, a bright violet will be produced: and by the red and yellow, the several shades of orange.

If, instead of placing these glasses in a similar position, you place the side AB of the yellow glass against the side BD of the blue, you will see all the various greens that are produced by nature (E); if the blue and red glasses be placed in that manner, you will have all the possible varieties of purples, violets, &c.; and, lastly, if the red and orange glasses be so placed, there will be all the intermediate colours, as the marygold, aurora, &c. Fig. 3.

IV. *By means of the three primary colours, red, yellow, and blue, together with light and shade, to produce all the gradations of the prismatic colours.*

On seven square panes of glass, paste papers that are painted with the seven prismatic colours, in the same manner as the last experiment. The colours for the orange, green, indigo, and violet, may be made by mixing the other three. Then with bistre (F,) well diluted, shade a sheet of very thin paper, by laying it light on both its sides. With pieces of this paper cover four-fifths of a glass, of the same size with the others, by laying one piece on the four lowest divisions, another on the three lowest, a third on the two lowest, and the fourth on the lowest division only, and leaving the top division quite uncovered. When one of the coloured glasses is placed in the box, together with the glass of shades, so that the side AB of the one be applied to the side BC of the other, as in fig. 3. the several gradations of colours will appear shaded in the same manner as a drapery judiciously painted with that colour.

It is on this principle that certain French artists have proceeded in their endeavours to imitate, by designs printed in colours, paintings in oil: which they do by four plates of the same size, on each of which is engraved the same design. One of these contains all the shades that are to be represented, and which are painted either black or with a dark gray. One of the three other plates is covered with blue, another with red, and the third with yellow; each of them being engraved on those parts only which are to represent that colour (G); and the engraving is either stronger or weaker, in proportion to the tone of colour that is to be represented (H).

These four plates are then passed alternately under the

(D) Water-colours must be used for this purpose: the blue may be that of Prussia, and very bright; the red, carmine; and the yellow, gamboge, mixed with a little saffron. These colours must be laid very light and even on both sides of the paper.

(E) In the first position of the glasses, the quantity of blue and yellow being equal, the same sort of green was constantly visible; but by thus inverting the glasses, the quantity of the colours being constantly unequal, a very pleasing variety of tints is produced.

(F) The bistre here used must be made of soot, not that in stone.

(G) When a red drapery is required, it is engraved on the plate assigned to that colour; and so of yellow and blue: but if one of the other colours be wanting, suppose violet, it must be engraved on those that print the red blue; and so of the rest. The plates of this kind have been hitherto engraved in the manner of mezzotinto; but these, unless they are skilfully managed, are soon effaced. Engravings in the manner of crayon will perhaps answer better.

(H) The principal difficulty in this sort of engraving arises from want of skilful management, in giving each plate that precise degree of engraving which will produce the tone of colour required. If a bright green is

VIII. *The diatonic scale of colours.*

The illustrious Newton, in the course of his investigations of the properties of light, discovered that the length of the spaces which the seven primary colours possess in the spectrum, exactly corresponds to those of chords that sound the seven notes in the diatonic scale of music: As is evident by the following experiment.

Fig. 7. On a paper in a dark chamber, let a ray of light be largely refracted into the spectrum AFTMGP (fig. 7.), and mark the precise boundaries of the several colours, as *a*, *b*, *c*, &c. Draw lines from those points perpendicular to the opposite side, and you will find that the spaces M *r f* F, by which the red is bounded; *r g e f*, by which the orange is bounded; *q p e d*, by which the yellow is bounded, &c. will be in exact proportion to the divisions of a musical chord for the notes of an octave; that is, as the intervals of these numbers $1, \frac{8}{9}, \frac{5}{6}, \frac{3}{4}, \frac{2}{3}, \frac{3}{5}, \frac{9}{16}, \frac{1}{2}$.

IX. *Colorific music.*

Father Castel, a Frenchman, in a curious book he has published on chromatics, supposes the note *ut* to answer to blue in the prismatic colours; the note *re* to yellow, and *mi* to red. The other tones he refers to the intermediate colours; from whence he constructs the following gamut of colorific music:

Ut	Blue
Ut sharp	Sea green
Re	Bright green
Re sharp	Olive green
Mi	Yellow
Fa	Aurora
Fa sharp	Orange
Sol	Red
Sol sharp	Crimson
La	Violet
La sharp	Blue Violet
Si	Sky blue
Ut	Blue

This gamut, according to this plan, is to be continued in the same manner for the following octave; except that the colours are to be more vivid.

He supposes that these colours, by striking the eye in the same succession as the sounds (to which he makes them analogous) do the ear, and in the same order of time, they will produce correspondent sensations of pleasure in the mind. It is on these general principles, which F. Castel has elucidated in his treatise, that he has endeavoured, though with little success, to establish his ocular harpsichord.

The construction of this instrument, as here explained, will show that the effects produced by colours by no means answer those of sounds, and that the principal relation there is between them consists in the duration of the time that they respectively affect the senses.

Fig. 8. Between two circles of pasteboard, of ten inches diameter, AB and CD, (fig. 8.), inclose a hollow pasteboard cylinder E, 18 inches long. Divide this cylinder into spaces half an inch wide, by a spiral line that runs round it from the top to the bottom, and divide its surface into six equal parts by parallel lines drawn between its two extremities: as is expressed in the figure.

Let the circle AB, at top, be open, and let that at bottom, CD, be closed, and supported by an axis or screw, of half an inch diameter, which must turn freely in a nut placed at the bottom of a box we shall presently describe. To the axis just mentioned adjust a wooden wheel G, of two inches and a half in diameter, and that has 12 or 15 teeth, which take the endless screw H. Let this cylinder be inclosed in a box ILMN (fig. 9.) whose base is square, and at whose bottom there is a nut, in which the axis F turns. Observe that the endless screw H should come out of the box, that it may receive the handle O, by which the cylinder is to be turned.

This box being closed all round, place over it a tin covering A, which will be perforated in different parts; from this cover there must hang three or four lights, so placed that they may strongly illumine the inside of the cylinder. In one side of this box (which should be covered with pasteboard) cut eight apertures, *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, (fig. 9.) of half an inch wide, and Fig. 9.
$\frac{1}{3}$ of an inch high; they must be directly over each other, and the distance between them must be exactly two inches. It is by these openings, which here correspond to the musical notes, that the various colours analogous to them are to appear; and which being placed on the pasteboard cylinder, as we have shown, are reflected by means of the lights placed within it.

It is easy to conceive, that when the handle O is turned, the cylinder in consequence rising half an inch, if it be turned five times round, it will successively show, at the openings made in the side of the box, all those that are in the cylinder itself, and which are ranged according to the direction of the inclined lines drawn on it. It is therefore according to the duration of the notes which are to be expressed, that the apertures on the cylinder are to be cut. Observe, that the space between two of the parallel lines drawn vertically on the cylinder, is equal to one measure of time; therefore, for every turn of the cylinder, there are six measures, and thirty measures for the air that is to be played by this instrument.

The several apertures being made in the side of the cylinder, in conformity to the notes of the tune that is to be expressed, they are to be covered with double pieces of very thin paper, painted on both sides with the colours that are to represent the musical notes.

This experiment might be executed in a different manner, and with much greater extent; but as the entertainment would not equal the trouble and expence, we have thought it sufficient to give the above, by which the reader will be enabled to judge how far the analogy supposed by F. Castel really exists. See the article CHROMATICS in the SUPPLEMENT.

Chronic, Chronicle.

CHRONIC, or CHRONICAL, among physicians, an appellation given to diseases that continue a long time; in contradistinction to those that soon terminate, and are called *acute*.

CHRONICLE, in matters of literature, a species or kind of history disposed according to the order of time, and agreeing in most respects with annals. See ANNALS.

Parian CHRONICLE. See *ARUNDELIAN Marbles*. Since that article was printed, in which an abstract was given of Mr Robertson's doubts and observations respecting the authenticity of the Parian Chronicle, one or two publications have appeared in answer, but none of them calculated to remove the objections, or materially to affect the arguments that had been stated with so much learning and ingenuity against it. The following strictures, however, with which the Monthly Reviewers have concluded their critique of Mr Robertson's performance, seem to merit consideration.

Monthly Review. Jan. 1789.

On Objection I. *That the characters have no certain or unequivocal marks of antiquity*, the Reviewers remark, that this seems rather to be an answer to a defender of the inscription, than an objection. If a zealous partizan of the marble should appeal to its characters and orthography, as decisive proofs of its being genuine, it would be proper enough to answer, that these circumstances afford no certain criterion of authenticity. But in this word *certain* sculks an unlucky ambiguity. If it means demonstrative, it must be allowed that no inscription can be proved to be certainly genuine from these appearances; but if it means no more than highly probable, many inscriptions possess sufficient internal evidence to give their claims this degree of certainty. The true question is, Has not the Parian Chronicle every mark of antiquity that can be expected in a monument claiming the age of 2000 years? The letters Γ and Ξ are, by Mr R.'s own confession, such as occur in genuine inscriptions; and to say in answer, that an impostor might copy the forms of these letters from other inscriptions, is already to suppose the inscription forged, before it is rendered probable by argument. The learned author of the Dissertation seems to betray some doubt of his own conclusion: for he adds, p. 56. "that the antiquity of an inscription can never be proved by the mere form of the letters, because the most ancient characters are as easily counterfeited as the modern." But this objection is equally applicable to all other ancient inscriptions; and is not to the purpose, if the present inscription has any peculiar marks of imposture in its characters and orthography. "The characters do not resemble the Sigean, the Nemean, or the Delian inscriptions." Mr R. answers this objection himself, by adding, "which are supposed to be of a more ancient date." The opposite reason to this will be a sufficient answer to the other objection, "that they do not resemble the Farnesian pillars or the Alexandrian MS." If "they differ in many respects from the Marmor Sandvicense," they may be presumed to agree in many. "They seem to resemble more than any other, the alphabet taken by Montfauçon from the marmor Cyzicenum." Thus it appears that the Parian Chronicle most nearly resembles the two inscriptions, to whose age it most nearly approaches.

When Mr R. adds, that the letters "are such as an ordinary stone-cutter would probably make, if he were employed to engrave a Greek inscription, according to the alphabet now in use," he must be understood *cum grano salis*. The engraver of a fac-simile generally omits some nice and minute touches in taking his copy; but, even with this abatement, we dare appeal to any adept in Greek calligraphy, whether the specimen facing p. 56. will justify our author's observation? "The small letters (Ο, Θ, Ω,) intermixed among the larger, have an air of affectation and artifice." Then has the greater part of ancient inscriptions an air of affectation and artifice, For the Ο is perpetually engraved in this diminutive size; and Ω being of a kindred sound, and Θ of a kindred shape, how can we wonder that all three should be represented of the same magnitude? In the inscription which immediately follows the marble in Dr Chandler's edition, No. xxiv. these very three letters are never so large as the rest, and often much smaller; of which there are instances in the three first lines. See also two medals in the second part of Dorville's Sicula, Tab. xvi. Numb. 7. 9.

"From the archaisms, such as *εγ Λυκαιρειας εγ Κυβελους, εμ Παρωι*, &c. &c. no conclusion can be drawn in favour of the authenticity of the inscription." Yet surely every thing common to it with other inscriptions, confessedly genuine, creates a reasonable presumption in its favour. "But what reason could there be for these archaisms in the Parian Chronicle? We do not usually find them in Greek writers of the same age, or even of a more early date." The reason is, according to our opinion, that such archaisms were then in use: this we know from other inscriptions, in which such archaisms (or, as our author afterwards calls them, barbarisms) are frequent. Nothing can be inferred from the Greek writers, unless we had their autographs. The present system of orthography in our printed Greek books is out of the question. Again, "The inscription sometimes adopts and sometimes neglects these archaisms, as in lines 4, 12, 27, 52, 63, 67." This inconsistency either is no valid objection, or if it be valid, will demolish not only almost every other inscription, but almost every writing whatsoever. For example, in the inscription just quoted, No. xxiv. we find τοΝ *βασιλεα*, l. 20. and *στωΜ, κειμενει*, 24. A little farther, N° xxvi. l. 31. we have εΓ *Μαγνησιας*, 57. 73. 81. εΚ *Μαγνησιας*, and 106, 108. εΚΓ *Μαγνησιας*. The Corcyrean inscription (Montfauçon, Diar. Ital. p. 420.) promiscuously uses *εΚδανειζομαι* and *εΓδανειζομαι*. In English, who is surprised to find *has* and *hath*, *a hand* and *an hand*, *a useful* and *an useful*, in the works of the same author? We could produce instances of this inaccuracy from the same page, nay from the same sentence.

"The authenticity of those inscriptions, in which these archaisms appear, must be established, before they can be produced in opposition to the present argument." This is, we cannot help thinking, rather too severe a restriction. If no inscription may be quoted before it be proved genuine, the learned author of the Dissertation need not be afraid of being confuted; for nobody will engage with him on such conditions. Perhaps the reverse of the rule will be thought more equitable; that every inscription be allowed to be genuine, till its authenticity be rendered doubtful by

Chronicle.

Chronicle.

by probable arguments. We will conclude this head with two short observations. In Selden's copy, l. 26. was written ΠΟΗΣΙΝ, which the latter editions have altered to ΠΟΙΗΣΙΝ, but without reason, the other being the more ancient way of writing, common in MSS. and sometimes found on inscriptions. (See G. Koen's Notes on *Gregorius de Dialectis*, p. 30.) In l. 83. the marble has Καλλιου, for which Palmer wished to substitute Καλλιου. Dr Taylor refutes him from the *Marmor Sandvicense*, observing at the same time, that this orthography occurs in no other place whatever, except in these two monuments. Is it likely that two engravers should by chance coincide in the same mistake, or that the forger of the Parian Chronicle (if it be forged) should have seen the *Marmor Sandvicense*, and taken notice of this peculiarity with the intention of afterwards employing it in the fabrication of an imposture?

The reviewers next proceed to consider, but more briefly, the other objections.

II. *It is not probable that the Chronicle was engraved for private use.*—1. *Because it was such an expence, as few learned Greeks were able to afford* If only a *few* were able to afford it, some one of those few might be willing to incur it. But let Mr R. consider how likely it is that a modern, and probably a needy Greek, should be more able to afford it in the last century, than a learned Greek 2000 years ago! 2. *A manuscript is more readily circulated.* Do men never prefer cumbrous splendor to cheapness and convenience? And if this composition, instead of being engraved on marble, had been committed to parchment, would it have had a better chance of coming down to the present age? Such a flying sheet would soon be lost; or, if a copy had, by miracle, been preserved to us, the objections to its being genuine would be more plausible than any that have been urged against the inscription. What Mr R. says about the errors to which an inscription is liable, &c. will only prove that chronological inscriptions ought not to be engraved; but not that they never were. We allow that the *common* method of writing in the reign of Ptolemy Philadelphus was NOT on STONES. But it was common enough to occur to the mind of any person who wished to leave behind him a memorial at once of his learning and magnificence.

III. This objection, *that the marble does not appear to be engraved by public authority*, we shall readily admit, though Bentley (Diss. on Phalaris, p. 251.) leans to the contrary opinion. In explaining this objection, the learned dissertator observes, that though the expression, αρχοντος εν Παρῳ, would lead us to suppose that the inscription related to Paros, not a single circumstance in the history of that island is mentioned. But this expression only shows that the author was an inhabitant of Paros, and intended to give his readers a clue, or *parapegma*, by the aid of which they might adjust the general chronology of Greece to the dates of their own history. "It is as absurd as would be a marble in Jamaica containing the revolutions of England." We see no absurdity in supposing a book to be written in Jamaica containing the revolutions of England. The natives of Paros were not uninterested in events relating to the general history of Greece, particularly of Athens; and how can we tell whether the author were an *inquilinus*, or a native of the island; whether he thought it a place beneath his care; or whether he had devoted a separate inscription to the chronology of Paros?

IV. *It has been frequently observed, that the earlier periods of the Grecian history are involved in darkness and confusion.* Granted. It follows, then, that "an author who should attempt to settle the dates of the earlier periods would frequently contradict preceding, and be contradicted by subsequent, writers; that he would naturally fall into mistakes; and at best could only hope to adopt the most probable system. But the difficulty of the task, or the impossibility of success, are not sufficient to prove that no man has been rash or mad enough to make the attempt." On the contrary, we know that many have made it. What a number of discordant opinions has Mr R. himself given us from the ancients concerning the age of Homer? This consideration will in part obviate another objection, that the Parian Chronicle does not agree with any ancient author. For if the ancients contradict one another, how could it follow more than one of them? and why might not the author, without any imputation of ignorance or rashness, sometimes depart from them all? If indeed he disagrees with them when they are unanimous, it might furnish matter for suspicion: though even this would be far from a decisive argument, unless the ancients were so extremely unlike the moderns, as never to be fond of singular and paradoxical positions.

V. *This Chronicle is not once mentioned by any writer of antiquity.* How many of those inscriptions, which are preserved to the present day, are mentioned by classical authors? Verrius Flaccus composed a Roman kalendar, which, as a monument of his learning and industry, was engraved on marble, and fixed in the most public part of Preneste. Fragments of this very kalendar were lately dug up at Preneste, and have been published by a learned Italian. Now if the passage of Suetonius, which informs us of this circumstance, had been lost, would the silence of the Latin writers prove that the fragments were not genuine remains of antiquity? It may be said that the cases are not parallel; for not a single author mentions the Parian Chronicle, whereas Suetonius does mention Verrius's Roman kalendar. To this we answer, It is dangerous to deny the authenticity of any monument on the slender probability of its being casually mentioned by a single author. We shall also observe, that this fact of the Hemicyclium of Verrius will answer some part of the Dissertator's second objection: "The Parian Chronicle is not an inscription that might have been concealed in a private library." Why not? it is of no extraordinary bulk; and might formerly have been concealed in a private library, or in a private room, with as much ease as many inscriptions are now concealed in very narrow spaces. But unless this monument were placed in some conspicuous part of the island, and obtruded itself on the notice of every traveller, the wonder will in great measure cease why it is never quoted by the ancients. Of the nine authors named in p. 109, had any one ever visited Paros? If Pausanias had travelled thither, and published his description of the place, we might perhaps expect to find some mention of this marble in so curious and inquisitive a writer. But though the inscription existed, and were famous at Paros, there seems no necessity for any

Chronicle. them from Atheneüs: yet Ælian never mentions Atheneüs in his Various History. So that whether Ælian copied from the marble, or only drew from a common source, he might, and very probably would, conceal his authority.

VIII. *The history of the discovery of the Marbles is obscure and unsatisfactory.*

In p. 169, it is said to be "related with suspicious circumstances, and without any of those clear and unequivocal evidences which always discriminate truth from falsehood." The question is then finally decided. If the inscription has not any of those evidences which truth always possesses, and which falsehood always wants, it is most certainly forged. The learned dissertator seems for a moment to have forgotten the modest character of a *doubter*, and to personate the dogmatist. But waving this, we shall add, that, as far as we can see, no appearance of fraud is discoverable in any part of the transaction. The history of many inscriptions is related in a manner equally unsatisfactory; and if it could be clearly proved that the marble was dug up at Paros, what could be easier for a critic, who is determined at any rate to object, than to say, that it was buried there in order to be afterward dug up? If the person who brought this treasure to light had been charged on the spot with forging it, or concurring in the forgery, and had then refused to produce the external evidences of its authenticity, we should have a right to question, or perhaps to deny, that it was genuine. But no such objection having been made or hinted, at the original time of its discovery, it is unreasonable to require such testimony as it is now impossible to obtain. "There is nothing said of it in Sir T. Roe's negotiations." What is the inference? That Sir Thomas knew nothing of it, or believed it to be spurious, or forged it, or was privy to the forgery? Surely nothing of this kind can be pretended. But let our author account for the circumstance if he can. To us it seems of no consequence on either side. "Pieresc made no effort to recover this precious relic; and from this composure he seems to have entertained some secret suspicions of its authenticity." Pieresc would have had no chance of recovering it after it was in the possession of Lord Arundel's agents. He was either a real or a pretended patron of letters; and it became him to affect to be pleased that the inscription had come into England, and was illustrated by his learned friend Selden. John F. Gronovius had, with great labour and expence, collated Anna Comnena's Alexiades, and intended to publish them. While he was waiting for some other collations, they were intercepted, and the work was published by another. As soon as Gronovius heard this unpleasant news, he answered, that learned men were engaged in a common cause; that if one prevented another in any publication, he ought rather to be thanked for lightening the burden, than blamed for interfering. But who would conclude from this answer, that Gronovius thought the Alexiades spurious, or not worthy of any regard?

Mr R. calculates, that the venders of the marble received 200 pieces. But here again we are left in the dark, unless we knew the precise value of these pieces. Perhaps they might be equal to an hundred of our pounds, perhaps only to fifty. Besides, as they at first bargained with Samson, Pieresc's supposed Jew agent, for fifty pieces only, they could not have forged the inscription with the clear prospect of receiving more; neither does it appear that they were paid by Samson. It is fully as reasonable to suppose fraud on the one side as on the other; and if Samson, after having the marble in his possession, refused or delayed to pay the sum stipulated, he might, in consequence of such refusal or delay, be thrown into prison, and might, in revenge, damage the marble before the owners could recover it. We own this account of ours to be a romance; but it is lawful to combat romance with romance.

IX. *The world has been frequently imposed upon by spurious books and inscriptions; and therefore we should be extremely cautious with regard to what we receive under the venerable name of antiquity.*

Much truth is observable in this remark. But the danger lies in applying such general apophthegms to particular cases. In the first place, it must be observed, that no forged books will exactly suit Mr R.'s purpose, but such as pretend to be the author's own hand-writing; nor any inscriptions, but such as are still extant on the original materials, or such as were known to be extant at the time of their pretended discovery. Let the argument be bounded by these limits, and the number of forgeries will be very much reduced. We are not in possession of Cyriacus Anconitanus's book; but if we were governed by authority, we should think that the testimony of Reinesius in his favour greatly overbalances all that Augustinus has said to his prejudice. The opinion of Reinesius is of the more weight, because he suspects Ursinus of publishing counterfeit monuments. We likewise find the most eminent critics of the present age quoting Cyriacus without suspicion (Vid. Ruhnken. in Timæi Lex. Plat. p. 10. apud Koen, ad Gregor. p. 140.). The doctrine advanced in the citation from Hardouin is exactly conformable to that writer's usual paradoxes. He wanted to destroy the credit of all the Greek and Latin writers. But inscriptions hung like a millstone about the neck of his project. He therefore resolved to make sure work, and to deny the genuineness of as many as he saw convenient: to effect which purpose, he intrenches himself in a general accusation. If the author of the dissertation had quoted a few more paragraphs from Hardouin, in which he endeavours, after his manner, to show the forgery of some inscriptions, he would at once have administered the poison and the antidote. But to the reveries of that learned madman, respecting Greek supposititious compositions of this nature, we shall content ourselves with opposing the sentiments of a modern critic, whose judgment on the subject of spurious inscriptions will not be disputed. Maffei, in the introduction to the third book, c. 1. p. 51. of his admirable, though unfinished, work, *de Arte Critica Lapidaria*, uses these words: *Inscriptionum Græce loquentium commentitias, si cum Latinis comparemus, deprehendi paucas; neque enim ullum omnino est, in tanta debacchantium falsariorum libidine, monumenti genus, in quod ii sibi minus licere putaverint. Argumento est, paucissimas usque in hanc diem ab eruditis viris, et in hoc literarum genere plurimum versatis rejectas esse, falsique damnatas.*

Books of CHRONICLES, a canonical writing of the Old

Chronicles. Old Testament. It is uncertain which were written first, *The Books of Kings*, or *The Chronicles*, since they each refer to the other. However it be, the latter is often more full and comprehensive than the former. Whence the Greek interpreters call these two books Παραλειπομενα, *Supplements*, *Additions*, or things omitted, because they contain some circumstances which are omitted in the other historical books. The Jews make but one book of the Chronicles, under the title of *Dibre-Haiamim*, i. e. *Journals* or *Annals*. Ezra is generally believed to be the author of these books. It is certain they were written after the end of the Babylonish captivity and the first year of the reign of Cyrus, of whom mention is made in the last chapter of the second book.

The *Chronicles*, or *Paraleipomena*, are an abridgement of all the sacred history, from the beginning of the Jewish nation to their first return from the captivity, taken out of those books of the Bible which we still have, and out of other annals which the author had then by him. The design of the writer was to give the Jews a series of their history. The first book relates to the rise and propagation of the people of Israel from Adam, and gives a punctual and exact account of the reign of David. The second book sets down the progress and end of the kingdom of Judah, to the very year of their return from the Babylonish captivity. Chronogram, Chronology.

CHRONOGRAM, a species of false wit, consisting in this, that a certain date or epocha is expressed by numeral letters of one or more verses; such is that which makes the motto of a medal struck by Gustavus Adolphus in 1632:

ChrIstVs DVX; ergo trIVMphVs.

CHRONOLOGY,

TREATS of time, the method of measuring its parts, and adapting these, when distinguished by proper marks and characters, to past transactions, for the illustration of history. This science therefore consists of two parts. The first treats of the proper measurement of time, and the adjustment of its several divisions; the second, of fixing the dates of the various events recorded in history, and ranging them according to the several divisions of time, in the order in which they happened.

1 How divided.

2 Chronology unknown to the ancients.

Chronology, comparatively speaking, is but of modern date. The ancient poets appear to have been entirely unacquainted with it; and Homer, the most celebrated of them all, mentions nothing like a formal kalendar in any part of his writings. In the most early periods, the only measurement of time was by the seasons, the revolutions of the sun and moon; and many ages must have elapsed before the mode of computation by dating events came into general use. Several centuries intervened between the era of the Olympic games and the first historians; and several more between these and the first authors of chronology. When time first began to be reckoned, we find its measures very indeterminate. The succession of Juno's priestesses at Argos served Hellanicus for the regulation of his narrative; while Ephorus reckoned his matters by generations. Even in the histories of Herodotus and Thucydides, we find no regular dates for the events recorded: nor was there any attempt to establish a fixed era, until the time of Ptolemy Philadelphus, who attempted it by comparing and correcting the dates of the Olympiads, the kings of Sparta, and the succession of the priestesses of Juno at Argos. Eratosthenes and Apollodorus digested the events recorded by them, according to the succession of the Olympiads and of the Spartan kings.

3 Inaccurate methods of computing time at first made use of.

The uncertainty of the measures of time in the most early periods renders the histories of those times equally uncertain; and even after the invention of dates and eras, we find the ancient historians very inattentive to them, and inaccurate in their computations. Frequently their eras and years were reckoned differently without their being sensible of it, or at least without giving the reader any information concerning it; a circumstance which has rendered the fragments of their works now remaining of very little use to posterity. The Chaldean and Egyptian writers are generally acknowledged to be fabulous; and Strabo acquaints us, that Diodorus Siculus, and the other early historians of Greece, were ill informed and credulous. Hence the disagreement among the ancient historians, and the extreme confusion and contradiction we meet with on comparing their works. Hellanicus and Acusilaus disagreed about their genealogies; the latter rejected the traditions of Hesiod. Timæus accused Ephorus of falsehood, and the rest of the world accused Timæus. The most fabulous legends were imposed on the world by Herodotus; and even Thucydides and Diodorus, generally accounted able historians, have been convicted of error. The chronology of the Latins is still more uncertain. The records of the Romans were destroyed by the Gauls; and Fabius Pictor, the most ancient of their historians, was obliged to borrow the greatest part of his information from the Greeks. In other European nations the chronology is still more imperfect, and of a later date; and even in modern times, a considerable degree of confusion and inaccuracy has arisen from want of attention in the historians to ascertain the dates and epochs with precision.

4 Ancient historians not to be credited.

From these observations it is obvious how necessary a proper system of chronology must be for the right understanding of history, and likewise how very difficult it must be to establish such a system. In this, however, several learned men have excelled, particularly Julius Africanus, Eusebius of Cæsarea, George Cyncelle, John of Antioch, Dennis, Petau, Cluviar, Calvisius, Usher, Simson, Marsham, Blair, and Playfair. It is founded, 1. On astronomical observations, particularly of the eclipses of the sun and moon, combined with the calculations of the eras and years of different nations. 2. The testimonies of credible authors. 3. Those epochs in history which are so well attested and determined, that they have never been controverted.

5 Utility of chronology, list of chronologers, &c.

verted. 4. Ancient medals, coins, monuments, and inscriptions. None of these, however, can be sufficiently intelligible without an explanation of the first part, which, we have already observed, considers the divisions of time, and of which therefore we shall treat in the first place.

6
Of the division of time into days.

The most obvious division of time is derived from the apparent revolutions of the celestial bodies, particularly of the sun, which by the vicissitudes of day and night becomes evident to the most barbarous and ignorant nations. In strict propriety of speech, the word *day* signifies only that portion of time during which the sun diffuses light on any part of the earth; but in the most comprehensible sense, it includes the night also, and is called by chronologers a *civil* day; by astronomers a *natural*, and sometimes an *artificial* day.

7
Civil, solar, &c. days defined.

By a civil day is meant the interval betwixt the sun's departure from any given point in the heavens and next return to the same, with as much more as answers to its diurnal motion eastward, which is at the rate of 59 minutes and 8 seconds of a degree, or 3 minutes and 57 seconds of time. It is also called a *solar* day, and is longer than a *sidereal* one, insomuch that, if the former be divided into 24 equal parts or hours, the latter will consist only of 23 hours 56 minutes. The apparent inequality of the sun's motion, likewise, arising from the obliquity of the ecliptic, produces another inequality in the length of the days: and hence the difference betwixt real and apparent time, so that the apparent motion of the sun cannot always be a true measure of duration. These inequalities, however, are capable of being reduced to a general standard, which furnishes an exact measure throughout the year; whence arises the difference between mean and apparent time, as is explained under the article ASTRONOMY.

8
Different ways of computing the beginning of the day.

There have been very considerable differences among nations with regard to the beginning and ending of their days. The beginning of the day was counted from sunrise by the Babylonians, Syrians, Persians, and Indians. The civil day of the Jews was begun from sunrise, and their sacred one from sunset; the latter mode of computation being followed by the Athenians, Arabs, ancient Gauls and other European nations. According to some, the Egyptians began their day at sunset, while others are of opinion that they computed from noon or from sunrise; and Pliny informs us that they computed their civil day from one midnight to another. It is probable, however, that they had different modes of computation in different provinces or cities. The Ausonians, the most ancient inhabitants of Italy, computed the day from midnight; and the astronomers of Cathay and Oighur in the East Indies reckoned in the same manner. This mode of computation was adopted by Hipparchus, Copernicus, and other astronomers, and is now in common use among ourselves. The *astronomical* day, however, as it is called, on account of its being used in astronomical calculation, commences at noon, and ends at the same time the following day. The Mahometans reckon from one twilight to another.

9
Strange method computation in Italy.

In Italy, the civil day commences at some indeterminate point after sunset; whence the time of noon varies with the season of the year. At the summer solstice, the clock strikes 16 at noon, and 19 at the time of the winter solstice. Thus also the length of each day differs by several minutes from that immediately preceding or following it. This variation requires a considerable difficulty in adjusting their time by clocks. It is accomplished, however, by a sudden movement which corrects the difference when it amounts to a quarter of an hour; and this it does sometimes at the end of eight days, sometimes at the end of 15, and sometimes at the end of 40. Information of all this is given by a printed kalendar, which announces, that from the 16th of February, for instance, to the 24th, it will be noon at a quarter past 18; from the 24th of February to the 6th of March, it will be noon at 18 o'clock precisely; from the first of June to the 13th of July, the hour of noon will be at 16 o'clock; on the 13th of July it will be at half an hour after 16; and so on throughout the different months of the year. This absurd method of measuring the day continues, notwithstanding several attempts to suppress it, throughout the whole of Italy, a few provinces only excepted.

10
Various subdivisions of the day.

The subdivisions of the day have not been less various than the computations of the day itself. The most obvious division, and which could at no time, nor in no age, be mistaken, was that of morning and evening. In process of time the two intermediate points of noon and midnight were determined; and this division into quarters was in use long before the invention of hours.

From this subdivision probably arose the method used by the Jews and Romans of dividing the day and night into four vigils or watches. The first began at sunrising, or six in the morning; the second at nine; the third at twelve; and the fourth at three in the afternoon. In like manner the night was divided into four parts; the first beginning at six in the evening, the second at nine, the third at twelve, and the fourth at three in the morning. The first of these divisions was called by the Jews the *third* hour of the day; the second the *sixth*; the third the *ninth*; and the fourth the *twelfth*, and sometimes the *eleventh*. Another division in use, not only among the nations above mentioned, but the Greeks also, was that which reckoned the first quarter from sunset to midnight; the second from midnight to sunrise; the third, or morning watch, from morning to noon; and the fourth from noon to sunset.

11
Invention of hours uncertain.

It is uncertain at what time the more minute subdivision of the day into hours first commenced. It does not appear from the writings of Moses that he was acquainted with it, as he mentions only the morning, mid-day, evening, and sunset. Hence we may conclude, that the Egyptians at that time knew nothing of it, as Moses was well skilled in their learning. According to Herodotus, the Greeks received the knowledge of the twelve hours of the day from the Babylonians. It is probable, however, that the division was actually known and in use before the name *hour* was applied to it; as Censorinus informs us that the term was not made use of in Rome for 300 years after its foundation; nor was it known at the time the twelve tables were constructed.

The eastern nations divide the day and night in a very singular manner; the origin of which is not easily discovered.

of the pendulum; but at sea, where a pendulum cannot be used, the inaccuracy is of consequence much greater; nor was it thought possible to correct the errors arising from these causes in any tolerable degree, until the late invention of Mr Harrison's time-piece, which may be considered as making perhaps as near an approach to perfection as possible.

Having thus given an account of the more minute divisions of time, with the methods of measuring them, we must now proceed to the larger; which more properly belong to chronology, and which must be kept on record, as no instrument can be made to point them out. Of these the division into weeks of seven days is one of the most ancient, and probably took place from the creation of the world. Some, indeed are of opinion, that the week was invented some time after for the more convenient notation of time; but whatever may be in this, we are certain that it is of the highest antiquity, and even the most rude and barbarous nations have made use of it. It is singular indeed that the Greeks, notwithstanding their learning, should have been ignorant of this division; and M. Goguet informs us, that they were almost the only nation who were so. By them the month of 30 days was divided into three times 10, and the days of it named accordingly. Thus the 15th day of the month was called the *second fifth*, or fifth of the second tenth; the 24th was called the *third fourth*, or the fourth day of the third tenth. This method was in use in the days of Hesiod, and it was not until several ages had elapsed, that the use of weeks was received into Greece from the Egyptians. The inhabitants of Cathay, in the northern part of China, were likewise unacquainted with the week of seven days, but divided the year into six parts of 60 days each. They had also a cycle of 15 days, which they used as a week. The week was likewise unknown to the ancient Persians and to the Mexicans; the former having a different name for every day of the month, and the latter making use of a cycle of 13 days. By almost all other nations the week of seven days was adopted.

16 Of weeks.

17 Of holidays.

It is remarkable, that one day in the week has always been accounted as sacred by every nation. Thus Saturday was consecrated to pious purposes among the Jews, Friday by the Turks, Tuesday by the Africans of Guinea, and Sunday by the Christians. Hence also the origin of *Feriæ* or holidays frequently made use of in Systems of Chronology; and which arose from the following circumstance. In the church of Rome the old ecclesiastical year began with Easter week; all the days of which were called *Feriæ* or *Feriati*, that is, holy or sacred days; and in process of time the days of other weeks came to be distinguished by the same appellation, for the two following reasons, 1. Because every day ought to be holy in the estimation of a Christian. 2. Because all days are holy to ecclesiastics, whose time ought to be entirely devoted to religious worship.—The term *week* is sometimes used to signify seven years, not only in the prophetical writings, but likewise by profane authors: thus Varro, in his book inscribed *Hebdomades*, informs us, that he had then entered the 12th week of his years.

18 Of months.

The next division of time superior to weeks, is that of *months*. This appears to have been, if not coeval with the creation, at least in use before the flood. As this division is naturally pointed out by the revolution of the moon, the months of all nations were originally lunar; until after some considerable advances had been made in science, the revolutions of that luminary were compared with the sun, and thus the limits of the month fixed with greater accuracy. The division of the year into 12 months, as being founded on the number of full revolutions of the moon in that time, has also been very general; though Sir John Chardin informs us, that the Persians divided the year into 24 months; and the Mexicans into 18 months of 20 days each. The months generally contained 30 days, or 29 and 30 days alternately; though this rule was far from being without exception. The months of the Latins consisted of 16, 18, 22, or 36 days; and Romulus gave his people a year of 10 months and 304 days. The Kamtschatkadales divide the year into 10 months; reckoning the time proper for labour to be nine months, and the winter season, when they are obliged to remain inactive, only as one month.

It has been a very ancient custom to give names to the different months of the year, though this appears to have been more modern than the departure of the Israelites out of Egypt, as they would otherwise undoubtedly have carried it with them; but for a considerable time after their settlement in Canaan, they distinguished the months only by the names of first, second, &c. After their return from the Babylonish captivity, they adopted the names given to the months by the Chaldeans. Other nations adopted various names, and arranged the months themselves according to their fancy. From this last circumstance arises the variety in the dates of the months; for as the year has been reckoned from different signs in the ecliptic, neither the number nor the quantity of months have been the same, and their situation has likewise been altered by the intercalations necessary to be made.

These intercalations became necessary on account of the excess of the solar above the lunar year; and the months composed of intercalary days are likewise called *embolismal*. These embolismal months are either *natural* or *civil*. By the former the solar and lunar years are adjusted to one another; and the latter arises from the defect of the civil year itself. The *adar* of the Jews, which always consists of 30 days, is an example of the natural embolismal month.

The Romans had a method of dividing their months into kalends, nones, and ides. The first was derived from an old word *calo*, "to call;" because, at every new moon, one of the lower class of priests assembled the people, and called over, or announced, as many days as intervened betwixt that and the nones, in order to notify the difference of time and the return of festivals. The 2d, 3d, 4th, 5th, 6th, and 7th of March, May, July, and October, were the nones of these months; but in the other months were the 2d, 3d, 4th, and 5th days only. Thus the 5th of January was its nones; the 4th was *pridie nonarum*; the 3d, *tertio nonarum*, &c. The ides contained eight days in every month, and were nine days distant from the nones. Thus the 15th day of the four months already mentioned was the tions of this were ill founded. By reason of the inequality above mentioned, the heliacal rising of Sirius gradually advanced nearly at the rate of one day in four years; so that in 1461 years it completed a revolution, by arising on every succeeding day of the year, and returning to the point originally fixed for the beginning of the year. This period, equal to 1460

23 **Of the time when it commenced.**

Julian years, was termed the *great Egyptian year*, or *canicular cycle*. From the accounts we have of the time that the canicular cycle was renewed, the time of its original commencement may be gathered with tolerable certainty. This happened, according to Censorinus, in the 138th year of the Christian era. Reckoning backward therefore from this time for 1460 years, we come to the year B. C. 1322, when the sun was in Cancer, about 14 or 15 days after the summer solstice, which happened on July 5th. The Egyptians used no intercalation till the time of Augustus, when the corrected Julian year was received at Alexandria by his order; but even this order was obeyed only by the Greeks and Romans who resided in that city; the superstitious natives refusing to make any addition to the length of a year which had been so long established among them.

24 **Uncertainty of the time when the true solar year was discovered.**

We are not informed at what precise period the true year was observed to consist of nearly six hours more than the 365 days. Though the priests of Thebes claim the merit of the discovery, Herodotus makes no mention of it; neither did Thales, who introduced the year of 365 days into Greece, ever use any intercalation. Plato and Eudoxus are said to have obtained it as a secret from the Egyptians about 80 years after Herodotus, and to have carried it into Greece; which showed, that the knowledge of this form of the year was at that time recent, and only known to a few learned men.

25 **Years of the Jews, &c.**

The year of the ancient Jews was lunisolar; and we are informed by tradition, that Abraham preserved in his family, and transmitted to posterity, the Chaldean form of the year, consisting of 360 days; which remained the same without any correction until the date of the Era of Nabonassar. The solar year was adopted among them after their return from the Babylonish captivity; but when subjected to the successors of Alexander in Syria, they were obliged to admit the lunar year into their kalendar. In order to adjust this year to the course of the sun, they added at certain periods a month to Adar, formerly mentioned, and called it *Ve Adar*. They composed also a cycle of 19 years, in seven of which they inserted the intercalary month. This correction was intended to regulate the months in such a manner, as to bring the 15th of Nisan to the equinoctial point; and likewise the courses of the seasons and feasts in such a manner, that the corn might be ripe at the passover, as the law required.

26 **Reformation of the kalendar by Julius Cæsar and Pope Gregory.**

We shall not take up the reader's time with any further account of the years made use of by different nations, all of which are resolved at last into the lunisolar; it will be sufficient to mention the improvements in the kalendar made by the two great reformers of it, Julius Cæsar, and Pope Gregory XIII. The institution of the Roman year by Romulus has been already taken notice of; but as this was evidently very imperfect, Numa, on his advancement to the throne, undertook to reform it. With a design to make a complete lunar year of it, he added 50 days to the 304 of Romulus; and from every one of his months, which consisted of 31 and 30 days, he borrowed one day. Of these additional days he composed two months; calling the one January, and the other February. Various other corrections and adjustments were made; but when Julius Cæsar obtained the sovereignty of Rome, he found that the months had considerably receded from the seasons to which Numa had adjusted them. To bring them forward to their places, he formed a year of 15 months, or 445 days; which, on account of its length, and the design with which it was formed, has been called the *year of confusion*. It terminated on the first of January 45 B. C. and from this period the civil year and months were regulated by the course of the sun. The year of Numa being ten days shorter than the solar year, two days were added by Julius to every one of the months of January, August, and December; and one to April, June, September, and November. He ordained likewise, that an intercalary day should be added every fourth year to the month of February, by reckoning the 24th day, or sixth of the kalends of March, twice over. Hence this year was styled *bissextile*, and also *leap year*, from its leaping a day more than a common year.

The Julian year has been used by modern chronologers, as being a measure of time extremely simple and sufficiently accurate. It is still, however, somewhat imperfect, for as the true solar year consists of 365d. 5h. 48′ 45$\frac{1}{2}$″, it appears that in 131 years after the Julian correction, the sun must have arrived one day too soon at the equinoctial point. During Cæsar's reign the vernal equinox had been observed by Sosigenes on the 25th of March; but by the time of the Nicene council it had gone backward to the 21st. The cause of the error was not then known; but in 1582, when the equinox happened on the 11th of March, it was thought proper to give the kalendar its last correction. Pope Gregory XIII. having invited to Rome a considerable number of mathematicians and astronomers, employed ten years in the examination of their several formulæ, and at last gave the preference to that of Alosia and Antoninus Lelius, who were brothers. Ten days were now cut off in the month of October, and the 4th of that month was reckoned the 15th. To prevent the seasons from receding in time to come, he ordained that one day should be added every fourth or bissextile year as before; and that the 1600th year of the Christian era, and every fourth century thereafter, should be a bissextile or leap year. One day therefore is to be intercalated in the years 2000, 2400, 2800, &c. but in the other centuries, as 1700, 1800, 1900, 2100, &c. it is to be suppressed, and these are to be reckoned as common years. Even this correction, however, is not absolutely exact; but the error must be very inconsiderable, and scarce amounting to a day and a half in 5000 years.

27 **Commencement of the year.**

The commencement of the year has been determined by the date of some memorable event or occurrence, such as the creation of the world, the universal deluge, a conjunction of planets, the incarnation of our Saviour, &c. and of course has been referred to different points in the ecliptic. The Chaldean and the this table will sometimes vary a day from the truth in leap-years after February. And it is impossible to have one more correct, unless we extend it to four times 19 or 76 years; in which there are 19 leap-years without a remainder. But even then, to have it of perpetual use, it must be adapted to the old style; because, in every centennial year not divisible by 4, the regular course of leap-years is interrupted in the new; as was the case in the year 1800.

33 Dionysian period, or cycle of Easter.

2. The *cycle of Easter*, also called the *Dionysian period*, is a revolution of 532 years, found by multiplying the solar cycle 28 by the lunar cycle 19. If the new moons did not anticipate upon this cycle, Easter-day would always be the Sunday next after the first full moon which follows the 21st of March. But, on account of the above anticipation, to which no proper regard was had before the late alteration of the style, the ecclesiastic Easter has several times been a week different from the true Easter within this last century; which inconvenience is now remedied by making the table, which used to find Easter for ever, in the Common Prayer Book, of no longer use than the lunar difference from the new style will admit of.

34 Dominical letter.

The earliest Easter possible is the 22d of March, the latest the 25th of April. Within these limits are 35 days, and the number belonging to each of them is called the *number of direction;* because thereby the time of Easter is found for any given year.

The first seven letters of the alphabet are commonly placed in the annual almanacks, to show on what days of the week the days of the months fall throughout the year. And because one of these seven letters must necessarily stand against Sunday, it is printed in a capital form, and called the *dominical letter;* the other six being inserted in small characters, to denote the other six days of the week. Now, since a common Julian year contains 365 days, if this number be divided by 7 (the number of days in a week) there will remain one day. If there had been no remainder, it is plain the year would constantly begin on the same day of the week; but since one remains, it is plain that the year must begin and end on the same day of the week; and therefore the next year will begin on the day following. Hence, when January begins on Sunday, A is the dominical or Sunday letter for that year: Then, because the next year begins on Monday, the Sunday will fall on the seventh day, to which is annexed the seventh letter G, which therefore will be the dominical letter for all that year: and as the third year will begin on Tuesday, the Sunday will fall on the sixth day; therefore F will be the Sunday letter for that year. Whence it is evident, that the Sunday letters will go annually in a retrograde order thus, G, F, E, D, C, B, A. And, in the course of seven years, if they were all common ones, the same days of the week and dominical letters would return to the same days of the months. But because there are 366 days in a leap-year, if this number be divided by 7, there will remain two days over and above the 52 weeks of which the year consists. And therefore, if the leap-year begins on Sunday, it will end on Monday: and the next year will begin on Tuesday, the first Sunday whereof must fall on the sixth of January, to which is annexed the letter F, and not G, as in common years. By this means, the leap-year returning every fourth year, the order of the dominical letters is interrupted; and the series cannot return to its first state till after four times seven, or 28 years; and then the same days of the months return in order to the same days of the week as before.

TABLE I.

Days.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9		9	17	17	6				11		19
2		17			6	14	14	3	11		19	
3	17	6	17	6			3	11		19	8	8
4	6		6	14	14	3			19	8		16
5		14			3	11	11	19	8		16	
6	14	3	14	3			19			16	5	5
7	3		3	11	11	19		8	16			13
8		11			19	8	8	16	5	5	13	
9	11	19	11	19						13		2
10			19	8	8	16	16	5	13		2	10
11	19	8					5	13	2	2	10	
12	8	16	8	16	16	5				10		18
13					5	13	13	2	10		18	7
14	16	5	16	5			2	10	18	18	7	
15	5			13	13	2				7		15
16		13			2	10	10	18	7		15	
17	13	2	13	2			18	7		15	4	4
18	2		2	10	10	18			15			12
19		10			18	7	7	15	4	4	12	
20	10	18	10	18			15			12	1	1
21	18		18	7	7	15		4	12			9
22		7			15	4	4	12	1	1	9	
23	7	15	7	15			12			9	17	17
24			15	4	4	12		1	9			6
25	15	4			12		1	9	17	17	6	
26	4		4	12		1				6		15
27		12		1	1	9	9	17	6		14	
28	12	1	12		9		17	6	14	14	3	3
29	1		1	9		17				3		11
30					17	6	6	14	3		11	
31	9		9				14	3		11		19

TABLE

TABLE II.

Table, *showing the Golden Number (which is the same both in the Old and New Style) from the Christian Era, to A. D.* 400.

Hundreds of Years.			Years less than a hundred.																		
			0 19 38 57 76 95	1 20 39 58 77 96	2 21 40 59 78 97	3 22 41 60 79 98	4 23 42 61 80 99	5 24 43 62 81	6 25 44 63 82	7 26 45 64 83	8 27 46 65 84	9 28 47 66 85	10 29 48 67 86	11 30 49 68 87	12 31 50 69 88	13 32 51 70 89	14 33 52 71 90	15 34 53 72 91	16 35 54 73 92	17 36 55 74 93	18 37 56 75 94
0	1900	3800	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
100	2000	3900	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5
200	2100	4000	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10
300	2200	&c.	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
400	2300	—	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1
500	2400	—	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6
600	2500	—	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11
700	2600	—	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
800	2700	—	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2
900	2800	—	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7
1000	2900	—	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12
1100	3000	—	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1200	3100	—	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3
1300	3200	—	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8
1400	3300	—	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13
1500	3400	—	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1600	3500	—	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	1	2	3	4
1700	3600	—	10	11	12	13	14	15	16	17	18	19	1	2	3	4	5	6	7	8	9
1800	3700	—	15	16	17	18	19	1	2	3	4	5	6	7	8	9	10	11	12	13	14

35 *Julian period.* From the multiplication of the solar cycle of 28 years into the lunar cycle of 19 years, and the Roman indiction of 15 years, arises the great Julian period, consisting of 7980 years, which had its beginning 764 years before Strauchius's supposed year of the creation (for no later could all the three cycles begin together), and it is not yet completed: And therefore it includes all other cycles, periods, and eras. There is but one year in the whole period that has the same numbers for the three cycles of which it is made up: And therefore, if historians had remarked in their writings the cycles of each year, there had been no dispute about the time of any action recorded by them.

36 *To find the year of the Julian period.* The Dionysian or vulgar era of Christ's birth was about the end of the year of the Julian period 4713; and consequently the first year of his age, according to that account, was the 4714th year of the said period. Therefore, if to the current year of Christ we add 4713, the sum will be found to be the Julian period. So the year 1789 will be found to be the 6502d year of that period. Or, to find the year of the Julian period answering to any given year before the first year of Christ, subtract the number of that given year from 4714, and the remainder will be the year of the Julian period. Thus, the year 585 before the first year of Christ (which was the 584th before his birth) was the 4129th year of the said period. Lastly, to find the cycles of the sun, moon, and indiction for any given year of this period, divide the given year by 28, 19, and 15; the three remainders will be the cycles sought, and the quotients the number of cycles run since the beginning of the period. So in the above 4714th year of the Julian period, the cycle of the sun was 10, the cycle of the moon 2, and the cycle of indiction 4; the solar cycle having run through 168 courses, the lunar 248, and the indiction 314.

37 *Year of Christ's birth when settled.* The vulgar era of Christ's birth was never settled till the year 527, when Dionysius Exiguus, a Roman abbot, fixed it to the end of the 4713th year of the Julian period, which was four years too late; for our Saviour was born before the death of Herod, who sought to kill him as soon as he heard of his birth. And according to the testimony of Josephus (*B.* xvii. *ch.* 8.), there was an eclipse of the moon in the time of Herod's last illness; which eclipse appears by our astronomical tables to have been in the year of the Julian period 4710, March 13. at three hours past midnight, at Jerusalem. Now, as our Saviour must have been born some months before Herod's death, since in the interval he was carried into Egypt, the latest time in which we can fix the

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the true era of his birth is about the end of the 4709th year of the Julian period.

38 Eras or Epochs.

As there are certain fixed points in the heavens from which astronomers begin their computations, so there are certain points of time from which historians begin to reckon; and these points or roots of time are called *eras* or *epochs*. The most remarkable eras are, those of the Creation, the Greek Olympiads, the building of Rome, the era of Nabonassar, the death of Alexander, the birth of Christ, the Arabian Hegira, and the Persian Jesdegird: All which, together with several others of less note, have their beginnings fixed by chronologers to the years of the Julian period, to the age of the world at those times, and to the years before and after the year of Christ's birth.

39 Historic chronology.

Having thus treated as fully as our limits will admit, of the various divisions of time, we must now consider the second part of chronology, viz. that which more immediately relates to history, and which has already been observed to have the four following foundations: 1. Astronomical observations, particularly of eclipses. 2. The testimonies of credible authors. 3. Epochs in history universally allowed to be true. 4. Ancient medals, coins, monuments, and inscriptions. We shall consider these four principal parts in the order they here stand.

40 Of eclipses of the sun and moon.

I. It is with great reason that the eclipses of the sun and moon, and the aspects of the other planets, have been called public and celestial characters of the times, as their calculations afford chronologers infallible proofs of the precise epochs in which a great number of the most signal events in history have occurred. So that in chronological matters we cannot make any great progress, if we are ignorant of the use of astronomic tables, and the calculation of eclipses. The ancients regarded the latter as prognostics of the fall of empires, of the loss of battles, of the death of monarchs, &c. And it is to this superstition, to this wretched ignorance, that we happily owe the vast labour that historians have taken to record so great a number of them. The most able chronologers have collected them with still greater labour. Calvisius, for example, founds his chronology on 144 eclipses of the sun, and 127 of the moon, that he says he had calculated. The grand conjunction of the two superior planets, Saturn and Jupiter, which, according to Kepler, occurs once in 800 years in the same point of the zodiac, and which has happened only eight times since the creation (the last time in the month of December 1603), may also furnish chronology with incontestable proofs. The same may be said of the transit of Venus over the sun, which has been observed in our days, and all the other uncommon positions of the planets. But among these celestial and natural characters of times, there are also some that are named *civil* or *artificial*, and which, nevertheless, depend on astronomic calculation.

Such are the solar and lunar cycles; the Roman indiction; the feast of Easter; the bissextile year; the jubilees; the sabbatic-years; the combats and Olympic games of the Greeks, and Hegira of the Mahometans, &c. And to these may be added the periods, eras, epochs, and years of different nations, ancient and modern. We shall only remark on this occasion, that the period or era of the Jews commences with the creation of the world; that of the ancient Romans with the foundation of the city of Rome; that of the Greeks at the establishment of the Olympic games; that of Nabonassar, with the advancement of the first king of Babylon to the throne; the Yezdegerdic years, with the last king of the Persians of that name; the Hegira of the Turks, with the flight of Mahomet from Mecca to Medina, &c. The year of the birth of Christ was the 4713th year of the Julian period, according to the common method of reckoning. Astronomical chronology teaches us to calculate the precise year of the Julian period in which each of these epochs happened.

41 Of the testimony of authors.

II. The testimony of authors is the second principal part of historic chronology. Though no man whatever has a right to pretend to infallibility, or to be regarded as a sacred oracle, it would, however, be making a very unjust judgment of mankind, to treat them all as dupes or impostors; and it would be an injury offered to public integrity, were we to doubt the veracity of authors universally esteemed, and of facts that are in themselves highly worthy of belief. It would be even a kind of infatuation to doubt that there have been such cities as Athens, Sparta, Rome, Carthage, &c. or that Xerxes reigned in Persia and Augustus in Rome: whether Hannibal ever was in Italy; or that the emperor Constantine built Constantinople, &c. The unanimous testimony of the most respectable historians will not admit any doubt of these matters. When an historian is allowed to be completely able to judge of an event, and to have no intent of deceiving by his relation, his testimony is unexceptionable. But to avoid the danger of adopting error for truth, and to be satisfied of a fact that appears doubtful in history, we may make use of the four following rules, as they are founded in reason.

1. We ought to pay a particular regard to the testimonies of those who wrote at the same time the events happened, and who have not been contradicted by any cotemporary author of known authority. Who can doubt, for example, of the truth of the facts related by Admiral Anson, in the history of his voyage round the world? The admiral saw all the facts there mentioned with his own eyes, and published his book when two hundred companions of his voyage were still living in London, and could have contradicted him immediately, if he had given any false or exaggerated relations.

2. After the cotemporary authors, we should give more credit to those who lived near the time the events happened than those who lived at a distance.

3. Those doubtful histories, which are related by authors that are but little known, can have no weight, if they are at variance with reason, or established tradition.

4. We must distrust the truth of a history that is related by modern authors, when they do not agree among themselves in several circumstances, nor with ancient historians, who are to be regarded as original sources. We should especially doubt the truth of those brilliant portraits, that are drawn at pleasure by such as never knew the persons they are intended for, and even made several centuries after their decease.

The

the world. Numberless books have been lost, and those which have come down to us are mutilated or altered by transcribers. The Greeks began to write very late. Herodotus, their first historian, was of a credulous disposition, and believed all the fables that were related by the Egyptian priests. The Greeks were in general vain, partial, and held no nation in esteem but their own. The Romans were still more infatuated with notions of their own merit and grandeur: their historians were altogether as unjust as was their senate, toward other nations that were frequently far more respectable. 5. The eras, the years, the periods, and epochs, were not the same in each nation; and they, moreover, began at different seasons of the year. All this has thrown so much obscurity over chronology, that it appears to be beyond all human capacity totally to disperse it.

Christianity itself had subsisted near 1200 years, before they knew precisely how many years had passed since the birth of our Saviour. They saw clearly that the vulgar era was defective, but it was a long time before they could comprehend that it required four whole years to make up the true period. Abbé Denis the Little, who in the year 532 was the first among the Christians to form the era of that grand epoch, and to count the years from that time, in order to make their chronology altogether Christian, erred in his calculation, and led all Europe into his error. They count 132 contrary opinions of different authors concerning the year in which the Messiah appeared on the earth. M. Vallemont names 64 of them, and all celebrated writers. Among all these authors, however, there is none that reckon more than 7000, nor less than 3700 years. But even this difference is enormous. The most moderate fix the birth of Christ in the 4000th year of the world. The reasons, however, on which they found their opinion, appear to be sufficiently arbitrary.

Be these matters, however, as they may, the wisdom of Providence has so disposed all things, that there remain sufficient lights to enable us nearly to connect the series of events: for in the first 3000 years of the world, where profane history is defective, we have the chronology of the Bible to direct us; and after that period, where we find more obscurity in the chronology of the Holy Scriptures, we have, on the other hand, greater lights from profane authors. It is at this period that begins the time which Varro calls *historic*; as, since the time of the Olympiads, the truth of such events as have happened shines clear in history. Chronology, therefore, draws its principal lights from history; and, in return, serves it as a guide. Referring the reader, therefore, to the article HISTORY, and the *Chart* thereto annexed, we shall conclude the present article with

A CHRONOLOGICAL TABLE *of Remarkable Events, Discoveries, and Inventions, from the Creation to the year* 1820.

Bef. Christ.

4008 The Creation of the world and Adam and Eve.

4007 The birth of Cain, the first who was born of a woman.

3017 Enoch, for his piety, is translated to heaven.

2352 The old world is destroyed by a deluge which continued 377 days.

2247 The tower of Babel is built about this time by Noah's posterity, upon which God miraculously confounds their language, and thus disperses them into different nations.

2237 About this time, Noah is, with great probability, supposed to have parted from his rebellious offspring, and to have led a colony of some of the more tractable into the east, and there either he or one of his successors to have founded the Chinese monarchy.

2234 The celestial observations are begun at Babylon, the city which first gave birth to learning and the sciences.

2188 Misraim, the son of Ham, founds the kingdom of Egypt, which lasted 1663 years, down to the conquest of Cambyses, in 525 before Christ.

2059 Ninus, the son of Belus, founds the kingdom of Assyria, which lasted above 1000 years, and out of its ruins were formed the Assyrians of Babylon, those of Nineveh, and the kingdom of the Medes.

1985 The covenant of God made with Abram, when he leaves Haran, to go into Canaan, which begins the 430 years of sojourning.

1961 The cities of Sodom and Gomorrah are destroyed for their wickedness by fire from heaven.

1856 The kingdom of Argos, in Greece, begins under Inachus.

1822 Memnon, the Egyptian, invents the letters.

1715 Prometheus first struck fire from flints.

1635 Joseph dies in Egypt.

1574 Aaron born in Egypt; 1490, appointed by God first high priest of the Israelites.

1571 Moses, brother to Aaron, born in Egypt, and adopted by Pharaoh's daughter, who educates him in all the learning of the Egyptians.

1556 Cecrops brings a colony of Saites from Egypt into Attica, and begins the kingdom of Athens in Greece.

1555 Moses performs a number of miracles in Egypt, and departs from that kingdom, together with 600,000 Israelites, besides children, which completed the 430 years of sojourning. They miraculously pass through the Red sea, and come to the desert of Sinai, where Moses receives from God, and delivers to the people, the Ten Commandments, and the other laws, and sets up the Tabernacle, and in it the ark of the covenant.

1546 Scamander comes from Crete into Phrygia, and begins the kingdom of Troy.

1515 The Israelites, after sojourning in the Wilderness forty years, are led under Joshua into the land of Canaan, where they fix themselves, after having subdued the natives; and the period of the sabbatical year commences.

1503 The deluge of Deucalion.

1496 The council of Amphictyons established at Thermopylæ.

1493 Cadmus carried the Phenician letters into Greece, and built the citadel of Thebes.

1490 Sparta built by Lacedæmon.

Before Christ.

ing taken by Cyrus, who, in 536, gives an edict for the return of the Jews.

534 The foundation of the temple laid by the Jews.

526 Learning is greatly encouraged at Athens, and a public library first founded.

520 The second edict to rebuild Jerusalem.

515 The second temple at Jerusalem is finished under Darius.

510 Hippias banished from Athens.

509 Tarquin, the seventh and last king of the Romans, is expelled, and Rome is governed by two consuls, and other republican magistrates, till the battle of Pharsalia, being a space of 461 years.

508 The first alliance between the Romans and Carthaginians.

507 The second census at Rome, 130,000 citizens.

504 Sardis taken and burnt by the Athenians, which gave occasion to the Persian invasion of Greece.

498 The first dictator appointed at Rome.

497 The Saturnalia instituted at Rome.

The number of citizens 150,700.

493 Tribunes created at Rome; or, in 488.

490 The battle of Marathon, September 28.

486 Æschylus, the Greek poet, first gains the prize of tragedy.

483 Questors created at Rome.

481 Xerxes, king of Persia, begins his expedition against Greece.

480 The defence of Thermopylæ by Leonidas, and the sea-fight at Salamis.

476 The number of Roman citizens reduced to 103,000.

469 The third Messenian war.

466 The number of Roman citizens increased to 124,214.

458 Ezra is sent from Babylon to Jerusalem, with the captive Jews and the vessels of gold and silver, &c. being seventy weeks of years, or 490 years, before the crucifixion of our Saviour.

456 The Ludi Seculares first celebrated at Rome.

454 The Romans sent to Athens for Solon's laws.

451 The Decemvirs created at Rome, and the laws of the twelve tables compiled and ratified.

449 The Decemvirs banished.

445 Military tribunes, with consular power, created at Rome.

443 Censors created at Rome.

441 The battering ram invented by Artemones.

437 The Metonic cycle began July 15th.

431 The Peloponnesian war begun, and lasted 27 years.

430 The history of the Old Testament finishes about this time.

A plague over all the known world.

Malachi the last of the prophets.

405 The Athenians entirely defeated by Lysander, which occasions the loss of the city, and ruin of the Athenian power.

401 The retreat of the 10,000 Greeks under Xenophon. The 30 tyrants expelled from Athens, and democratic government restored.

400 Socrates, the founder of moral philosophy among the Greeks, believes the immortality of the soul, a state of rewards and punishments; for which and other sublime doctrines, he is put to death by the Athenians, who soon after repent, and erect to his memory a statue of brass.

Before Christ.

399 The feast of Lectisternium instituted. Catapultæ invented by Dionysius.

394 The Corinthian war begun.

390 Rome burnt by the Gauls.

387 The peace of Antalcidas between the Greeks and Persians.

The number of Roman citizens amounted to 152,583.

384 Dionysius begins the Punic war.

379 The Bœotian war commences.

377 A general conspiracy of the Greek states against the Lacedemonians.

373 A great earthquake in Peloponnesus.

371 The Lacedemonians defeated by Epaminondas at Leuctra.

367 Prætors established in Rome. The Licinian law passed.

363 Epaminondas killed at the battle of Mantinea.

359 The obliquity of the ecliptic observed to be 23° 49′ 10″.

358 The Social war began.

357 Dionysius expelled from Syracuse.

A transit of the moon over Mars observed.

356 The Sacred war begun in Greece.

Birth of Alexander the Great.

345 Dionysius II. expelled from Syracuse.

Commencement of the Syracusan era.

338 Philip of Macedon gains the battle of Chæronæa, and thus attains to the sovereignty of Greece.

335 Thebes taken and rased by Alexander the Great.

334 The Persians defeated at Granicus, May 22.

333 They are again defeated at Issus in Cilicia, October.

332 Alexander takes Tyre, and marches to Jerusalem.

331 Alexandria built.

Darius entirely defeated at Arbela.

330 Alexander takes Babylon, and the principal cities of the Persian empire.

The Calippic period commences.

328 Alexander passes Mount Caucasus, and marches into India.

327 He defeats Porus, an Indian prince, and founds several cities.

326 The famous sedition of Corcyra.

324 Alexander the Great dies at Babylon.

323 His family exterminated, and his dominions parted by his officers.

315 Rhodes almost destroyed by an inundation.

311 The Appian way, aqueducts, &c. constructed at Rome.

308 The cities of Greece recovered their liberties for a short time

307 Antioch, Seleucia, Laodicea, and other cities, founded by Seleucus.

301 Antigonus defeated and killed at Ipsus.

299 The first barbers came from Sicily to Rome.

294 The number of effective men in Rome amounts to 270,000.

293 The first sun-dial erected at Rome by Papirius Cursor.

Before Christ.

285 Dionysius of Alexandria began his astronomical era on Monday June 26. being the first who found the exact solar year to consist of 365 days, 5 hours, and 49 minutes.
The watch tower of Pharos at Alexandria built.
Ptolemy Philadelphus, king of Egypt, employs 72 interpreters to translate the Old Testament into the Greek language, which is called the *Septuagint*.
284 The foundation of the Achæan republic laid.
283 The college and library founded at Alexandria.
282 The Tarentine war begins.
280 Pyrrhus invades Italy.
279 A census at Rome. The number of citizens 278,222.
269 The first coining of silver at Rome.
265 The number of Roman citizens augmented to 292,224.
264 The first Punic war begins, and continues 23 years. The chronology of the Arundelian marbles composed.
262 A transit of Mercury over the bull's horn; the planet being in 23° of ♉, and the sun in 29° 30′ ♈.
260 Provincial questors established at Rome.
The Romans first concern themselves in naval affairs, and defeat the Carthaginians at sea.
255 Regulus, the Roman consul, defeated and taken prisoner by the Carthaginians under Xantippus.
252 A census at Rome. The number of citizens 297,897.
247 Another census. The number of citizens 251,212.
246 The records of China destroyed.
241 Conclusion of the first Punic war.
240 Comedies first acted at Rome.
237 Hamilcar, the Carthaginian, causes his son Hannibal, at nine years old, to swear eternal enmity to the Romans.
236 The Tartars expelled from China.
235 Rome at peace with other nations. The temple of Janus shut.
231 Corsica and Sardinia subdued by the Romans.
The first divorce at Rome.
230 The obliquity of the ecliptic observed by Eratosthenes to be 23° 51′ 20″.
224 The Colossus at Rhodes overturned by an earthquake.
219 The art of surgery introduced at Rome.
218 Commencement of the second Punic war.
Hannibal passes the Alps, and invades Italy.
216 The Romans defeated at Cannæ, May 21st.
214 Syracuse besieged by Marcellus.
209 A census at Rome. The number of citizens 227,107.
208 Asdrubal invades Italy; but is defeated and killed.
206 Gold first coined at Rome.
202 Hannibal defeated by Scipio at Zama.
201 Conclusion of the second Punic war.
194 Sparta and Hither Spain subdued by the Romans.
192 A census at Rome. The number of citizens 243,704.
191 Antiochus defeated by the Romans at Thermopylæ.
190 The first Roman army enters Asia, and from the spoils of Antiochus brings the Asiatic luxury first to Rome.
188 The Spartans obliged to renounce the institutions of Lycurgus.
179 A census at Rome. The number of citizens 273,244.
173 The Jewish high-priesthood sold by Antiochus Epiphanes.
170 Paper invented in China.
The temple of Jerusalem plundered by Antiochus.
169 A census at Rome. The number of citizens 212,805.
168 Macedon reduced to the form of a Roman province.
The first library erected at Rome.
165 The temple of Jerusalem purified by Judas Maccabeus.
164 A census at Rome. The number of citizens 327,032.
162 Hipparchus began his astronomical observations at Rhodes.
161 Philosophers and rhetoricians banished from Rome.
150 The third Punic war commenced.
146 Corinth destroyed.
Carthage, the rival to Rome, is rased to the ground by the Romans.
A remarkable comet appeared in Greece.
143 Hipparchus began his new cycle of the moon, consisting of 111,035 days.
141 The Numantine war commenced.
135 The history of the Apocrypha ends.
133 Numantia destroyed by Scipio.
124 A census at Rome. The number of citizens 390,736.
105 The Cimbri and Teutones defeated the Romans.
102 The Teutones and Ambrones defeated by Marius.
88 Rome besieged by the chiefs of the Marian faction.
82 Sylla created perpetual dictator at Rome.
69 A census at Rome. The number of citizens 450,000.
66 Catiline's conspiracy.
55 Julius Cæsar makes his first expedition into Britain.
Crassus defeated and killed by the Parthians.
51 Gaul reduced to a Roman province.
50 A census at Rome. The number of citizens 320,000.
48 The battle of Pharsalia, between Cæsar and Pompey, in which the latter is defeated.
The Alexandrian library, consisting of 400,000 valuable books, burnt by accident.
45 The war of Africa, in which Cato kills himself.
The solar year introduced by Cæsar.
44 Cæsar, the greatest of the Roman conquerors, after having fought 50 pitched battles, and slain 1,192,000 men, is killed in the senate-house by conspirators.
42 The republicans defeated at Philippi.
31 The battle of Actium fought, in which Mark Antony

Before Christ.

Antony and Cleopatra are totally defeated by Octavius, nephew to Julius Cæsar.

30 Alexandria, in Egypt, is taken by Octavius, upon which Antony and Cleopatra put themselves to death, and Egypt is reduced to a Roman province.

29 A census at Rome. The number of citizens 4,101,017.

27 Octavius, by a decree of the senate, obtains the title of Augustus Cæsar, and an absolute exemption from the laws, and is properly the first Roman emperor.

The Pantheon at Rome built.

19 Rome at the height of its glory.

The temple of Jerusalem rebuilt by Herod.

Agrippa constructed the magnificent aqueducts at Rome.

8 A census at Rome. The number of citizens 4,233,000.

5 The temple of Janus is shut by Augustus, as an emblem of universal peace; and

JESUS CHRIST is born, on Monday, December 25.

After Christ.

1 The vulgar Christian era commenced from January 1. the Saviour of the world being then five years of age.

8 Jesus Christ disputes with the doctors in the temple.

14 A census at Rome, 4,370,000 citizens.

16 Mathematicians and magicians expelled from Rome.

17 Twelve cities in Asia destroyed by an earthquake.

27 Pilate made governor of Judea.

29 Jesus baptized in Jordan by John.

33 He is crucified at Jerusalem.

35 St Paul converted.

39 St Matthew writes his gospel.

Pontius Pilate kills himself.

A conjunction of Saturn, Jupiter, and Mars.

40 The name of Christians first given at Antioch to the followers of Christ.

43 Claudius Cæsar's expedition into Britain.

44 St Mark writes his gospel.

50 London is founded by the Romans; 368, surrounded by ditto with a wall, some parts of which are still observable.

51 Caractacus, the British king, is carried in chains to Rome.

52 The council of the Apostles at Jerusalem.

55 St Luke writes his gospel.

56 Rotterdam built.

59 The emperor Nero puts his mother and brothers to death.

——— persecutes the Druids in Britain.

60 Christianity introduced into Britain.

61 Boadicea, the British queen, defeats the Romans; but is conquered soon after by Suetonius, governor of Britain.

62 St Paul is sent in bonds to Rome—writes his epistles between 51 and 66.

63 The Acts of the Apostles written.

A great earthquake in Asia.

64 Rome set on fire, and burned for six days; upon which began (under Nero) the first persecution against the Christians.

After Christ

65 Many prodigies seen about Jerusalem.

66 St Peter and St Paul put to death.

70 While the factious Jews are destroying one another with mutual fury, Titus the Roman general takes Jerusalem, which is rased to the ground, and the plough made to pass over it.

73 The philosophers banished from Rome by Vespasian.

79 The cities of Pompeii and Herculaneum destroyed by an eruption of Vesuvius.

80 The Capitol and Pantheon at Rome destroyed by fire.

83 The philosophers expelled Rome by Domitian.

85 Julius Agricola, governor of South Britain, to protect the civilized Britons from the incursions of the Caledonians, builds a line of forts between the rivers Forth and Clyde; defeats the Caledonians under Galgacus on the Grampian hills; and first sails round Britain, which he discovers to be an island.

86 The Capitoline games instituted by Domitian.

88 The Secular games celebrated at Rome.

93 The empire of the Huns in Tartary destroyed by the Chinese.

The Evangelist John banished to Patmos.

94 The second persecution of the Christians, under Domitian.

96 St John the Evangelist wrote his Revelation—his Gospel in 97.

103 Dacia reduced to a Roman province.

105 A great earthquake in Asia and Greece.

107 The third persecution of the Christians, under Trajan.

114 Armenia reduced to a Roman province.

A great earthquake in China.

115 Assyria subdued by Trajan.

An insurrection of the Jews, who murder 200,000 Greeks and Romans.

A violent earthquake at Antioch.

120 Nicomedia and other cities swallowed up by an earthquake.

121 The Caledonians reconquer from the Romans all the southern parts of Scotland; upon which the emperor Adrian builds a wall between Newcastle and Carlisle; but this also proving ineffectual, Lollius Urbicus, the Roman general, about the year 134, repairs Agricola's forts, which he joins by a wall four yards thick.

130 Jerusalem rebuilt by Adrian.

132 The second Jewish war commenced.

135 The second Jewish war ends, when they were all banished Judea.

139 Justin writes his first apology for the Christians.

141 A number of heresies appear about this time.

146 The worship of Serapis introduced at Rome.

152 The emperor Antoninus Pius stops the persecution against the Christians.

An inundation of the Tiber, and an earthquake at Rhodes.

163 The fourth persecution of the Christians, under Marcus Aurelius Antoninus.

166 The Romans sent ambassadors to China.

After Christ.

168 A plague over the whole world.
188 The Capitol at Rome destroyed by lightning.
191 A great part of Rome destroyed by fire.
203 The fifth persecution of the Christians, under Severus.
205 An earthquake in Wales.
209 Severus's wall in Britain built.
218 Two comets appeared at Rome. The course of the most remarkable from east to west.
222 About this time the Roman empire begins to decline. The barbarians begin their irruptions, and the Goths have annual tribute not to molest the empire.
225 Mathematicians allowed to teach publicly at Rome.
236 The sixth persecution of the Christians under Maximin.
241 The Franks first mentioned in history.
250 The seventh persecution, under Decius.
252 A dreadful pestilence broke out in Ethiopia, and spread over the whole world.
The eighth persecution, under Gallus.
253 Europe ravaged by the Scythians and Goths.
258 The ninth persecution, under Valerian.
260 Valerian is taken prisoner by Sapor king of Persia, and flayed alive.
The Scythians ravaged the Roman empire.
The temple of Diana at Ephesus burnt.
261 A great plague throughout the Roman empire.
262 Earthquakes in Europe, Asia, and Africa, and three days of darkness.
273 The Romans took Palmyra.
274 Silk first brought from India; the manufactory of it introduced into Europe by some monks, 551; first worn by the clergy in England, 1534.
276 Wine first made in Britain.
277 The Franks settled in Gaul.
284 The Dioclesian era commenced August 29th, or September 17th.
287 Carausius proclaimed emperor of Britain.
289 A great comet visible in Mesopotamia for 29 days.
291 Two emperors and two Cæsars march to defend the four quarters of the empire.
297 Alexandria destroyed by Dioclesian.
303 The tenth persecution under Dioclesian.
306 Constantine the Great begins his reign.
308 Cardinals first appointed.
312 Pestilence all over the East.
Cycle of indiction began.
313 The tenth persecution ends by an edict of Constantine, who favours the Christians, and gives full liberty to their religion.
314 Three bishops, or fathers, are sent from Britain to assist at the council of Arles.
315 Crucifixion abolished.
321 Observation of Sunday enjoined.
323 The first general council at Nice, when 318 fathers attended, against Arius, the founder of Arianism, where was composed the famous Nicene Creed, which we attribute to them.
328 Constantine removes the seat of empire from Rome to Byzantium, which is thereafter called Constantinople.
330 A dreadful persecution of the Christians in Persia, which lasts 40 years.
333 Constantine orders all the heathen temples to be destroyed.
334 Three hundred thousand Sarmatians revolted from their masters.
341 The gospel propagated in Ethiopia by Frumentius.
344 Neocæsarea ruined by an earthquake.
351 The heathens first called Pagans.
358 A hundred and fifty cities in Asia and Greece overturned by an earthquake.
360 The first monastery founded near Poictiers in France, by Martin.
363 The Roman emperor Julian, surnamed the Apostate, endeavours in vain to rebuild the temple of Jerusalem.
364 The Roman empire is divided into the Eastern (Constantinople the capital) and Western (of which Rome continued to be the capital), each being now under the government of different emperors.
373 The Bible translated into the Gothic language.
376 The Goths settled in Thrace.
379 The cycle of Theophilus commenced.
390 A fiery column seen in the air for 30 days.
400 Bells invented by Bishop Paulinus of Campania.
401 Europe overrun by the Goths, under Alaric.
404 Another irruption of the Goths.
The kingdom of Caledonia, or Scotland, revives under Fergus.
406 Third irruption of the Goths.
The Vandals, Alans, and Suevi, spread into France and Spain, by a concession of Honorius, emperor of the West.
408 The Christian religion propagated in Persia.
409 Rome taken and plundered by the Goths, August 24.
412 The Vandals begin their kingdom in Spain.
413 The kingdom of Burgundy begun in Alsace.
415 The kingdom of Thoulouse founded by the Visigoths.
417 The Alans extirpated by the Goths.
419 Many cities in Palestine destroyed by an earthquake.
420 The kingdom of France begins upon the Lower Rhine, under Pharamond.
421 The Salique law promulgated.
426 The Romans, reduced to extremities at home, withdraw their troops from Britain, and never return: advising the Britons to arm in their own defence, and trust to their own valour.
432 The gospel preached in Ireland by St Patrick.
444 All Europe ravaged by the Huns.
446 The Britons, now left to themselves, are greatly harassed by the Scots and Picts, upon which they once more make their complaint to the Romans (which they entitle, *The Groans of the Britons*), but receive no assistance from that quarter.
447 Attila (surnamed the Scourge of God) with his Huns ravage the Roman empire.
449 Vortigern, king of the Britons, invites the Saxons into Britain, against the Scots and Picts.

After Christ.

452 The city of Venice founded.
455 The Saxons having repulsed the Scots and Picts, invite over more of their countrymen, and begin to establish themselves in Kent, under Hengist.
476 The western empire is finished, 523 years after the battle of Pharsalia; upon the ruins of which several new states arise in Italy and other parts, consisting of Goths, Vandals, Huns, and other barbarians, under whom literature is extinguished, and the works of the learned are destroyed.
480 A great earthquake at Constantinople, which lasted 40 days.
493 Italy reduced by Theodoric king of the Goths.
496 Clovis, king of France, baptized, and Christianity begins in that kingdom.
506 The Jews talmud published.
508 Prince Arthur begins to reign over the Britons.
510 Paris made the capital of the French dominions.
514 Constantinople besieged by Vitalianus, whose fleet is burnt by a speculum of brass made by Proclus.
516 The computing of time by the Christian era is introduced by Dionysius the monk.
517 Five years drought and famine in Palestine.
519 A bearded comet appears.
529 The codex of Justinian, the eastern emperor, is published.
534 The kingdom of the Vandals in Africa comes to an end, after having continued 105 years.
536 The manufacture of silk introduced at Constantinople by two Indian monks.
540 Antioch destroyed by the Persians.
541 Basilius the last consul elected at Rome.
542 Antioch rebuilt.
An earthquake all over the world.
550 An earthquake in Palestine and Syria.
The kingdom of Poland founded.
551 An earthquake in Greece, attended with a great commotion in the sea.
553 The empire of the Goths in Italy destroyed by Narses.
A great earthquake at Constantinople.
557 Another violent earthquake at Constantinople, Rome, &c.
A terrible plague all over Europe, Asia, and Africa, which continues near 50 years.
568 The Lombards founded a kingdom in Italy.
569 The Turks first mentioned in history.
The exarchate of Ravenna begins.
575 The first monarchy founded in Bavaria.
580 Antioch destroyed by an earthquake.
581 Latin ceased to be spoken about this time in Italy.
584 The origin of fiefs in France.
588 The city of Paris destroyed by fire.
589 Rome overflowed by the Tiber.
593 The Gascons establish themselves in the country called by their name.
596 John of Constantinople assumes the title of universal bishop.
597 Augustine the monk comes into England with forty monks.

After Christ.

599 A dreadful pestilence in Africa.
604 St Paul's church in London founded.
605 The use of bells introduced into churches.
606 Here begins the power of the popes, by the concessions of Phocas, emperor of the East.
622 Mahomet, the false prophet, flies from Mecca to Medina in Arabia, in the 44th year of his age, and 10th of his ministry, when he laid the foundation of the Saracen empire, and from whom the Mahometan princes to this day claim their descent. His followers compute their time from this era, which in Arabic is called *hegira*, i. e. "the Flight."
628 An academy founded at Canterbury.
632 The era of Jesdegird commenced June 16th.
637 Jerusalem is taken by the Saracens, or followers of Mahomet.
641 Alexandria in Egypt is taken by ditto, and the grand library there burnt by order of Omar, their caliph or prince.
643 The temple of Jerusalem converted into a Mahometan mosque.
653 The Saracens now extend their conquests on every side, and retaliate the barbarities of the Goths and Vandals upon their posterity.
They take Rhodes, and destroy the famous Colossus.
England invaded by the Danes.
660 Organs first used in churches.
663 Glass invented by a bishop, and brought into England by a Benedictine monk.
669 Sicily invaded, and Syracuse destroyed by the Saracens.
685 The Britons, after a brave struggle of near 150 years, are totally expelled by the Saxons, and drove into Wales and Cornwall.
698 The Saracens take Carthage, and expel the Romans from Africa.
700 Cracow built, and first prince of Poland elected.
704 The first province given to the Pope.
713 The Saracens conquer Spain.
714 France governed by Charles Martel.
718 The kingdom of the Asturias in Spain founded by Pelagio.
719 Christianity promulgated in Germany.
726 The controversy about images begins, and occasions many insurrections in the eastern empire.
727 Tax of Peter's pence begun by Ina king of Wessex.
732 Charles Martel defeats the Saracens near Tours.
735 Institution of the office of Pope's nuncio.
746 Three years pestilence in Europe and Asia.
748 The computing of years from the birth of Christ began to be used in history.
749 The race of Abbas become caliphs of the Saracens, and encourage learning.
The empire of the Saracens divided into three.
752 The exarchate of Ravenna abolished by Astolphus king of the Lombards.
755 Commencement of the Pope's temporal dominion.
762 The city of Bagdad upon the Tigris is made the capital for the caliphs of the house of Abbas.

After Christ.

1061 Surnames appointed to be taken in Scotland by a parliament held in Forfar.

1065 The Turks take Jerusalem from the Saracens.

1066 The conquest of England by William (surnamed the bastard) duke of Normandy, in the battle of Hastings, where Harold is slain.

1070 The feudal law introduced into England.

1075 Henry IV. emperor of Germany, and the pope, quarrel about the nomination of the German bishops. Henry, in penance, walks barefooted to the pope towards the end of January.

1076 Justices of the peace first appointed in England.
An earthquake in England.
Asia Minor, having been two years under the power of Soliman, is from this time called Turkey.

1080 Doomsday-book began to be compiled by order of William, from a survey of all the estates in England, and finished in 1086.
The tower of London built by ditto, to curb his English subjects; numbers of whom fly to Scotland, where they introduce the Saxon or English language, are protected by Malcolm, and have lands given them.

1086 The order of Carthusians established by Bruno.

1090 The dynasty of Bathineens or Assassins begins in Irak, and continues for 117 years.

1091 The Saracens in Spain, being hard pressed by the Spaniards, call to their assistance Joseph king of Morocco; by which the Moors get possession of all the Saracen dominions in Spain.

1096 The first crusade to the Holy Land is begun under several Christian princes, to drive the infidels from Jerusalem.

1098 The order of St Benedict instituted.

1099 Jerusalem taken by the crusaders; Godfrey elected king of it; and the order of knights of St John instituted.

1110 Edgar Atheling, the last of the Saxon princes, dies in England, where he had been permitted to reside as a subject.
Learning revived at Cambridge.
Writing on paper made of cotton common about this time.

1118 The order of the Knights Templars instituted to defend the Sepulchre at Jerusalem, and to protect Christian strangers.

1119 Bohemia erected into a kingdom.

1132 The kingdom of Portugal began.

1137 The pandect of Justinian found in the ruins of Amalphi.

1141 The factions of the Guelphs and Gibellines prevailed about this time.

1143 The Koran translated into Latin.

1144 The Peripatetic philosophy introduced into Germany.

1151 The canon law collected by Gratian, a monk of Bologna.

1154 Christianity introduced into Finland.

1156 The city of Moscow in Russia founded.
The order of the Carmelites instituted.

1163 London bridge, consisting of 19 small arches, first built of stone.

1164 The Teutonic order of religious knights begins in Germany.

1171 The dynasty of the Fatemites ended in Egypt; the sovereigns of the country henceforth called Sultans.

1172 Henry II. king of England (and first of the Plantagenets), takes possession of Ireland; which from that period has been governed by an English viceroy or lord-lieutenant.

1176 England is divided by Henry into six circuits, and justice is dispensed by itinerant judges.

1179 The university of Padua founded.

1180 Glass windows began to be used in private houses in England.

1181 The laws of England are digested about this time by Glanville.

1182 Pope Alexander III. compelled the kings of England and France to hold the stirrups of his saddle when he mounted his horse.

1183 Seven thousand Albigenses massacred by the inhabitants of Berry.

1186 A conjunction of all the planets at sunrise September 16. The sun in 30° ♍; Jupiter in $2^\circ\ 3'$ ♎; Venus in $3^\circ\ 49'$; Saturn in $8^\circ\ 6'$; Mercury in $4^\circ\ 10'$; Mars, $9^\circ\ 8'$; tail of the Dragon, $18^\circ\ 23'$ ♎.

1187 Jerusalem taken by Saladin.

1192 The battle of Ascalon, in Judea, in which Richard, king of England, defeats Saladin's army, consisting of 300,000 combatants.

1194 *Dieu et mon Droit*, first used as a motto by Richard, on a victory over the French.

1195 Denmark and Norway laid waste by a dreadful tempest.

1198 Institution of the order of the Holy Trinity.

1200 Chimneys were not known in England.
Surnames now began to be used; first among the nobility.
University of Salamanca in Spain founded.

1204 Constantinople taken by the French and Venetians.
The inquisition established.
The empire of Trebizond established.

1208 London incorporated, and obtained their first charter, for electing their lord mayor and other magistrates, from King John.
The order of *Fratres Minores* established.
The pope excommunicates King John.

1209 The works of Aristotle imported from Constantinople into Europe.
The silk manufacture imported from Greece into Venice.

1210 The works of Aristotle condemned to be burnt at Paris.
The emperor Otho excommunicated by the pope.
Violent persecution of the Albigenses.

1215 Magna Charta is signed by King John and the barons of England.
Court of common pleas established.
Orders of the Dominicans and Knights Hospitallers founded.
The doctrine of transubstantiation introduced.

1216 King Alexander and the whole kingdom of Scotland excommunicated by the pope's legate.

After Christ.

1349 The order of the Garter instituted in England, by Edward III. altered in 1557, and consists of 26 knights.
1352 The Turks first enter Europe.
1353 Asia and Africa desolated by locusts.
1354 The money in Scotland till now the same as in England.
1356 The battle of Poictiers, in which King John of France and his son are taken prisoners by Edward the Black Prince.
1357 Coals first brought to London.
1358 Arms of England and France first quartered by Edward III.
University of Cologne founded.
Tamerlane began to reign in Persia.
1362 The law pleadings in England changed from French to English in favour of Edward III. to his people.
The military order of Janizaries established among the Turks.
1365 The universities of Vienna and Geneva founded.
1369 John Wickliffe, an Englishman, begins to call in question the doctrines of the church of Rome about this time, whose followers are called Lollards.
1370 The office of grand visier established.
1377 Inundation of the sea in Flanders.
1378 Greenland discovered by a Venetian.
1381 Bills of exchange first used in England.
1384 The first act of navigation in England; no goods to be exported or imported by Englishmen in foreign bottoms.
1383 A company of linen weavers from the Netherlands established in London.
Windsor castle built by Edward III.
1387 The first lord high admiral of England instituted.
1388 The battle of Otterburn between Hotspur and the earl of Douglas.
Bombs invented at Venloo.
1391 Cards invented in France for the king's amusement.
1399 Westminster abbey rebuilt and enlarged.—Westminster hall ditto.
Order of the Bath instituted at the coronation of Henry IV. renewed in 1725, consisting of 84 knights.
1402 Tamerlane defeats and takes prisoner Bajazet the Turkish sultan.
1405 The Canary islands discovered by Bathencourt a Norman.
1410 Guildhall, London, built.
Painting in oil-colours invented at Bruges by John Van-eyck.
1411 The university of St Andrew's in Scotland founded.
1412 Algebra brought from Arabia into Europe.
1415 The battle of Agincourt gained over the French by Henry V. of England.
1420 The island of Madeira discovered by the Portuguese.
1421 The revenue of England amounted to 55,754l.
1428 The siege of Orleans, the first blow to the English power in France.
1431 A great earthquake at Lisbon.
1432 Great inundations in Germany.
1427 The obliquity of the ecliptic observed by Ulug Beg to be 23° 30′ 17″.
1440 Printing invented by L. Koster at Haerlem in Holland; brought into England by W. Caxton, a mercer of London, 1471.
1446 The Vatican library founded at Rome.
The sea breaks in at Dort in Holland and drowns 100,000 people.
1453 Constantinople taken by the Turks, which ends the eastern empire, 1123 years from its dedication by Constantine the Great, and 2206 years from the foundation of Rome.
1454 The university of Glasgow in Scotland founded.
1457 Glass first manufactured in England.
1460 Engraving and etching on copper invented.
The obliquity of the ecliptic observed by Purbachius and Regiomontanus to be 23° 29′.
1473 The study of the Greek language introduced into France.
1477 The university of Aberdeen in Scotland founded.
1479 Union of the kingdoms of Arragon and Castile.
1482 The coast of Guinea discovered by the Portuguese.
A court of inquisition erected in Seville.
1485 Richard III. king of England, and last of the Plantagenets, is defeated and killed at the battle of Bosworth, by Henry (Tudor) VII. which put an end to the civil wars between the houses of York and Lancaster, after a contest of 30 years, and the loss of 100,000 men.
1487 Henry establishes fifty yeomen of the guards, the first standing army.
1489 Maps and sea charts first brought to England by Barth. Columbus.
1490 William Groceyn introduces the study of the Greek language into England.
The Moors, hitherto a formidable enemy to the native Spaniards, are entirely subdued by Ferdinand, and become subjects to that prince on certain conditions, which are ill observed by the Spaniards, whose clergy use the inquisition in all its tortures; and in 1609, near one million of the Moors were driven from Spain to the opposite coast of Africa, from whence they originally came.
1492 America first discovered by Columbus, a Genoese in the service of Spain.
The Moors expelled from Granada, which they had possessed upwards of 800 years.
1495 The venereal disease introduced into Europe.
1496 The Jews and Moors banished out of Portugal.
1497 The Portuguese first sail to the East Indies by the Cape of Good Hope.
South America discovered by Americus Vespusius, from whom unjustly it has its name.
1499 North America discovered, for Henry VII. by Cabot, a Venetian.
1508 Maximilian divides the empire of Germany into six circles, and adds four more in 1512.
Brazil discovered by the Portuguese. Florida discovered by John Cabot an Englishman.
Painting in chiaro-obscuro discovered.
A great plague in England.
1505 Shillings first coined in England.

After Christ.

1507 The island of Madagascar discovered by the Portuguese.
1509 Gardening introduced into England from the Netherlands, from whence vegetables were imported hitherto.
1510 The obliquity of the ecliptic observed by Wernerus to be 23° 28′ 30″.
1513 The battle of Flowden, in which James IV. king of Scotland is killed, with the flower of his nobility.
1514 Cannon bullets of stone still in use.
1515 The first Polyglot Bible printed at Alcala.
The kingdom of Navarre annexed to that of Castile by Ferdinand.
1516 The kingdom of Algiers seized by Barbarossa.
1517 Martin Luther began the reformation.
Egypt is conquered by the Turks.
The kingdom of the Mamelukes in Egypt overthrown by the Turks.
1518 Discovery of New Spain, and the Straits of Magellan.
1521 Henry VIII. for his writings in favour of popery, receives the title of Defender of the Faith from his Holiness.
1522 Rhodes taken by the Turks.
The first voyage round the world performed by a ship of Magellan's squadron.
1526 The inquisition established in Portugal.
Lutheranism established in Germany.
1527 Rome taken and plundered by the Imperial army.
1528 Popery abolished in Sweden.
1529 The name of Protestant takes its rise from the reformers protesting against the church of Rome, at the diet of Spires in Germany.
1530 Union of the Protestants at Smallcalde, December 22.
Secretary of State's office established in England.
1531 A great earthquake at Lisbon.
1532 The Court of Session instituted in Scotland.
1533 Insurrection of the Anabaptists in Westphalia.
1534 The reformation takes place in England, under Henry VIII.
Barbarossa seized on the kingdom of Tunis.
1535 The reformation introduced into Ireland.
The society of Jesuits formed.
1539 The first English edition of the Bible authorised; the present translation finished in 1611.
About this time cannon began to be used in ships.
Six hundred and forty-five religious houses suppressed in England and Wales.
1540 The variation of the compass discovered by Sebastian Cabot.
The obliquity of the ecliptic observed by Copernicus to be 23° 28′ 8″.
Society of Jesuits established, September 27.
1543 Silk stockings first worn by the French king; first worn in England by Queen Eliz. 1561; the steel frame for weaving invented by the Rev. Mr Lee, of St John's College, Cambridge, 1589.
Pins first used in England, before which time the ladies used skewers.
Iron cannon and mortars made in England.
1544 Good lands let in England at one shilling per acre.
1545 The famous council of Trent begins, and continues 18 years.
1547 First law in England establishing the interest of money at 10 per cent.
1548 The Reformation gained ground in Poland.
1549 Lords lieutenants of counties instituted in England.
1550 Horse guards instituted in England.
The bank of Venice established about this time.
1552 Books of geography and astronomy destroyed in England, as being infected with magic.
The book of Common Prayer established in England by act of parliament.
1554 The kingdom of Astracan conquered by the Russians.
1555 The Russian company established in England.
1558 Queen Elizabeth begins her reign.
1560 The Reformation in Scotland completed by John Knox.
1561 Livonia ceded to Poland.
1563 Knives first made in England.
1565 Revolt of the Low Countries.
Malta attacked by the Turks.
1566 The 39 articles of the church of England established.
1568 Queen Mary imprisoned in England.
Liberty of professing the reformed religion granted to the Low Countries.
1569 Royal exchange first built.
1571 The island of Cyprus taken by the Turks.
They are defeated at Lepanto.
1572 The great massacre of Protestants at Paris.
A new star in Cassiopeia observed by Cornelius Gemma. It appeared in November, and disappeared in March.
1576 The profession of the Protestant religion authorised in France. This toleration followed by a civil war.
1578 The first treaty of alliance betwixt England and the States General, January 7.
1579 The Dutch shake off the Spanish yoke, and the republic of Holland begins.
English East India company incorporated—established 1600.
——— Turkey company incorporated.
1580 Sir Francis Drake returns from his voyage round the world, being the first English circumnavigator.
Parochial register first appointed in England.
The kingdom of Portugal seized by Philip of Spain.
1581 Copper first used in France.
1582 Pope Gregory introduces the New Style in Italy; the 5th of October being counted the 15th.
1583 Tobacco first brought from Virginia into England.
The first proposal of settling a colony in America.
1587 Mary Queen of Scots is beheaded by order of Elizabeth, after 18 years imprisonment.
1588 The Spanish Armada destroyed by Drake and other English admirals.
Henry IV. passes the edict of Nantes, tolerating the Protestants.

After Christ.

1588 Duelling with small swords introduced into England.
1589 Coaches first introduced into England; hackney act 1693; increased to 1000 in 1770.
1590 Band of pensioners instituted in England.
Telescopes invented by Jansen, a spectacle-maker in Germany.
1591 Trinity College, Dublin, founded.
1593 A great plague in London.
1594 The Jesuits expelled from France.
The obliquity of the ecliptic observed by Byrgius to be 23° 30′.
1595 The same observed by Tycho Brahe to be 23° 29′ 25″.
1596 A great earthquake at Japan,
1597 Watches first brought into England from Germany.
1598 The edict of Nantes by Henry IV. of France.
1602 Decimal arithmetic invented at Bruges.
1603 Queen Elizabeth (the last of the Tudors) dies, and nominates James VI. of Scotland as her successor; which unites both kingdoms under the name of Great Britain.
1605 The Gunpowder plot discovered at Westminster; being a project to blow up the king and both houses of parliament.
1606 Oaths of allegiance first administered in Britain.
1608 Colonies sent from Britain to Virginia.
1609 The independency of the United States acknowledged by Spain.
1610 Galileo, of Florence, first discovers the satellites about the planet Jupiter, by the telescope, lately invented in Germany.
Henry IV. is murdered at Paris, by Ravaillac, a priest.
Thermometers invented by Drebel, a Dutchman.
1611 Baronets first created in Britain by James I. May 22.
An earthquake in Constantinople; 200,000 persons died there of the plague.
1612 The north-west passage to China attempted in vain by the British.
1614 Napier of Marcheston, in Scotland, invents the logarithms.
Sir Hugh Middleton brings the New river to London from Ware.
1616 The first permanent settlement in Virginia.
1619 W. Harvey, an Englishman, confirms the doctrine of the circulation of the blood, which had been first broached by Servetus, a French physician, in 1553.
1620 The broad silk manufacture from raw silk, introduced into England.
Barbadoes discovered by Sir William Courteen.
Navarre united to France.
Copper-money first introduced in England.
1621 New England planted by the Puritans.
The two parties of Whigs and Tories formed in Britain.
1622 The Palatinate reduced by the Imperialists.
1623 The Knights of Nova Scotia instituted.
1624 Massacre of the English at Amboyna.
1625 King James dies, and is succeeded by his son, Charles I.
1625 The island of Barbadoes, the first British settlement in the West Indies, is planted.
1631 The transit of Mercury over the sun's disk, first observed by Gassendi.
A great eruption of Vesuvius.
1632 The battle of Lutzen, in which Gustavus Adolphus, king of Sweden, and head of the Protestants in Germany, is killed.
1633 Galileo condemned by the inquisition at Rome.
Louisiana discovered by the French.
1635 Province of Maryland planted by Lord Baltimore.
Regular posts established from London to Scotland, Ireland, &c.
1636 A transit of Mercury over the sun's disk observed by Cassini.
1639 A transit of Venus over the sun's disk, first observed by Mr Horrox, November 24. O. S. 3 h. 15′ P. M.
1640 King Charles disobliges his Scottish subjects; on which their army, under General Lesley, enters England, and takes Newcastle, being encouraged by the malecontents in England.
The massacre in Ireland, when 40,000 English Protestants were killed.
The independency of Portugal recovered by John duke of Braganza.
1642 King Charles impeaches five refractory members, which begins the civil wars in England.
1643 Excise on beer, ale, &c. first imposed by parliament.
Barometers invented by Torricelli.
1648 A new star observed in the tail of the Whale by Fabricius.
1649 Charles I. beheaded by Cromwell at Whitehall, January 30. aged 49.
Pendulums first applied to clocks by Huygens.
1651 The sect called *Quakers* appeared in England.
1652 The Dutch colony at the Cape of Good Hope established.
1653 Cromwell assumes the protectorship.
The air-pump is invented by Otto Guericke of Magdeburg.
1655 The English under Admiral Penn, take Jamaica from the Spaniards.
One of Saturn's satellites observed by Huygens.
1658 Cromwell dies, and is succeeded in the protectorship by his son Richard.
1660 King Charles II. is restored by Monk, commander of the army, after an exile of twelve years in France and Holland.
The people of Denmark, being oppressed by the nobles, surrendered their privileges to Frederic III. who becomes absolute.
1661 The obliquity of the ecliptic observed by Hevelius to be 23° 29′ 7″.
1662 The royal society established at London by Charles II.
1663 Carolina planted: 1728, divided into two separate governments.
Prussia declared independent of Poland.
1664 The New Netherlands in North America conquered from the Swedes and Dutch by the English.

1665

After Christ.

1665 The plague rages in London, and carries off 68,000 persons.
The magic lantern invented by Kircher.
1666 The great fire of London began Sept. 2. and continued three days, in which were destroyed 13,000 houses and 400 streets.
Tea first used in England.
1667 The peace of Breda, which confirms to the English the New Netherlands, now known by the names of Pennsylvania, New York, and New Jersey.
1668 ——— ditto, Aix-la-Chapelle.
St James's Park planted and made a thoroughfare for public use by Charles II.
1669 The island of Candia taken by the Turks.
1670 The English Hudson's Bay company incorporated.
The obliquity of the ecliptic observed by Mengoli to be 23° 28′ 24″.
1672 Louis XIV. overruns great part of Holland, when the Dutch open their sluices, being determined to drown their country, and retire to their settlements in the East Indies.
African company established.
The obliquity of the ecliptic observed by Richer to be 23° 28′ 54″.
1677 The micrometer invented by Kircher.
1678 The peace of Nimeguen.
The habeas corpus act passed.
A strange darkness at noonday, Jan. 12.
1680 A great comet appeared, and from its nearness to our earth alarmed the inhabitants. It continued visible from Nov. 3. to March 9.
William Penn, a Quaker, receives a charter for planting Pennsylvania.
1683 India stock sold from 360 to 500 per cent.
1685 Charles II. dies, aged 55, and is succeeded by his brother James II.
The duke of Monmouth, natural son to Charles II. raises a rebellion, but is defeated at the battle of Sedgmore, and beheaded.
The edict of Nantes is revoked by Louis XIV. and the Protestants are greatly distressed.
1686 The Newtonian philosophy published.
1687 The palace of Versailles, near Paris, finished by Louis XIV.
1688 The revolution in Great Britain begins Nov. 5. King James abdicates, and retires to France, December 23.
King William and Queen Mary, daughter and son-in-law to James, are proclaimed February 13.
Viscount Dundee stands out for James in Scotland, but is killed by General Mackay at the battle of Killycrankie; upon which the Highlanders, wearied with repeated misfortunes, disperse.
Smyrna destroyed by an earthquake.
1689 The land-tax passed in England.
The toleration act passed in ditto.
William Fuller, who pretended to prove the prince of Wales spurious, was voted by the commons to be a notorious cheat, impostor, and false accuser.
Several bishops are deprived for not taking the oaths to William.

1689 Episcopacy abolished in Scotland.
1690 The battle of the Boyne gained by William against James, in Ireland.
1691 The war in Ireland finished by the surrender of Limeric to William.
The obliquity of the ecliptic observed by Flamstead to be 23° 28′ 32″.
1692 The English and Dutch fleets, commanded by Admiral Russel, defeat the French fleet off La Hogue.
The massacre of Glencoe in Scotland, Jan. 31. O. S.
Earthquakes in England and Jamaica, September 8.
Hanover made an electorate of the empire.
1693 Bayonets at the end of loaded muskets first used by the French against the confederates in the battle of Turin.
Bank of England established by King William.
The first public lottery was drawn this year.
1694 Queen Mary dies at the age of 33, and William reigns alone.
Stamp-duties instituted in England.
1697 The peace of Ryswick.
1699 The Scots settled a colony at the isthmus of Darien in America, and called it *Caledonia*.
1700 Charles XII. of Sweden begins his reign.
1701 King James II. dies at St Germains, in the 68th year of his age.
Prussia erected into a kingdom.
Society for the propagation of the gospel in foreign parts established,
1702 King William dies, aged 50, and is succeeded by Queen Anne, daughter to James II. who, with the emperor and states general, renews the war against France and Spain.
The French sent colonies to the Mississippi.
1703 The obliquity of the ecliptic observed by Bianchini to be 23° 28′ 25″.
1704 Gibraltar taken from the Spaniards by Admiral Rooke.
The battle of Blenheim won by the duke of Marlborough and allies against the French.
The Court of Exchequer instituted in England.
1706 The treaty of union betwixt England and Scotland, signed July 22.
The battle of Ramillies won by Marlborough and the allies.
1707 The first British parliament.
The allies defeated at Almanza.
1708 Minorca taken from the Spaniards by General Stanhope.
The battle of Oudenarde won by Marlborough and the allies.
1709 Peter the Great, czar of Moscovy, defeats Charles XII. at Poltowa, who flies to Turkey.
The battle of Malplaquet won by Marlborough and the allies.
1710 Queen Anne changes the Whig ministry for others more favourable to the interest of her brother the late pretender
The cathedral church of St Paul, London, rebuilt by Sir Christopher Wren in 37 years, at one million expence, by a duty on coals.
The English South sea company began.

After Christ.

1712 Duke of Hamilton and Lord Mohun killed in a duel in Hyde-park.
1713 The peace of Utrecht, whereby Newfoundland, Nova Scotia, New Britain, and Hudson's bay in North America, were yielded to Great Britain; Gibraltar and Minorca in Europe were also confirmed to the said crown by this treaty.
1714 Queen Anne dies at the age of 50, and is succeeded by George I.
Interest reduced to five per cent.
1715 Louis XIV. dies, and is succeeded by his great-grandson Louis XV.
The rebellion in Scotland begins in September, under the earl of Mar, in favour of the pretender. The action of Sheriffmuir, and the surrender of Preston, both in November, when the rebels disperse.
The obliquity of the ecliptic observed by Louville to be 23° 28′ 24″.
1716 The Pretender married the princess of Sobieska, grand-daughter of John Sobieski, late king of Poland.
An act passed for septennial parliaments.
1718 Sardinia erected into a kingdom, and given to the duke of Savoy.
1719 The Mississippi scheme at its height in France.
Lomb's silk-throwing machine, containing 26,586 wheels, erected at Derby: takes up one-eighth of a mile; one water-wheel moves the rest; and in twenty-four hours it works 318,504,960 yards of organzine silk thread.
1720 The South-sea scheme in England begun April 7. was at its height at the end of June, and quite sunk about September 29.
A great earthquake in China.
1724 An earthquake in Denmark.
1727 King George dies, in the 68th year of his age; and is succeeded by his only son, George II.
Inoculation first tried on criminals with success.
Russia, formerly a dukedom, is now established as an empire.
The aberration of the fixed stars discovered and accounted for by Dr Bradley.
1732 Kouli Khan usurps the Persian throne, conquers the Mogul empire, and returns with two hundred and thirty one millions sterling.
Several public-spirited gentlemen begin the settlement of Georgia in North America.
1733 The Jesuits expelled from Paraguay.
1736 Captain Porteous having ordered his soldiers to fire upon the populace at the execution of a smuggler, is himself hanged by the mob at Edinburgh.
A transit of Mercury observed by Cassini.
1737 A dreadful hurricane at the mouth of the Ganges, October 10.
1738 Westminster bridge, consisting of 15 arches, begun; finished in 1750 at the expence of 389,000l. defrayed by parliament.
The order of St Januarius established at Naples.
1739 Letters of marque issued out in Britain against Spain, July 21. and war declared, Oct. 23.
The empire of Indostan ruined by Kouli Khan.
An intense frost in Britain.
1743 The battle of Dettingen won by the English and allies in favour of the queen of Hungary.
1744 A dreadful plague in Sicily.
1744 War declared against France.—Commodore Anson returns from his voyage round the world.
1745 The allies lose the battle of Fontenoy.
The rebellion breaks out in Scotland, and the Pretender's army defeated by the duke of Cumberland at Culloden, April 16. 1746.
1746 British Linen Company erected.
Lima destroyed by an earthquake.
1747 Kouli Khan murdered.
1748 The peace of Aix-la-Chapelle, by which a restitution of all places taken during the war was to be made on all sides.
1749 The interest on the British funds reduced to three per cent.
British herring-fishery incorporated.
The colony of Nova Scotia founded.
1750 Earthquake in England.
1751 Frederic prince of Wales, father to his present majesty, died.
Antiquarian Society at London incorporated.
1752 The new stile introduced into Great Britain; the 3d of September being counted the 14th.
1753 The British Museum erected at Montague-house.
Society of arts, manufactures, and commerce, instituted in London.
1754 A dreadful eruption of Mount Ætna.
A great earthquake at Constantinople, Cairo, &c. Sept. 2.
1755 Quito in Peru destroyed by an earthquake, April 28.
Lisbon destroyed by an earthquake, Nov. 1.
1756 146 Englishmen are confined in the Black Hole at Calcutta in the East Indies by order of the Nabob, and 123 found dead next morning.
Marine society established at London.
The king of Prussia commenced hostilities in the month of August in Saxony. Defeats the Austrians at Lo.
1757 Damien attempted to assassinate the French king.
The king of Prussia invades Bohemia. Defeats the Austrians at Reichenberg, April 21. and at Prague, May 6. Repulsed by Count Daun at Kolin, June 18.
The allies defeated by the French at Hastenbeck, July 26.
Convention of Closter-Seven, Sept. 8.
The king of Prussia defeats the French and Austrians at Rosbach, Nov. 5. The Prussians defeated dear Breslaw, Nov 22. The Austrians defeated at Lissa, Dec. 5.
1758 Senegal taken by the British, May 1. They take Louisbourg, July 27.
The king of Prussia defeats the Russians at Zorndorf, Aug. 25. Is defeated by Count Daun at Hoch-kirchen, Oct. 14.
Goree taken by Commodore Keppel, Dec. 29.
Attempt to assassinate the king of Portugal, Dec. 3.
1759 General Wolfe is killed in the battle of Quebec, which is gained by the British.
The French defeated by Prince Ferdinand at Bergen, April 13.
Guadaloupe taken by the British, May 1.
King of Prussia defeated by the Russians at Cunersdorf, Aug. 12.

After Christ.

1759 The French fleet defeated by Admiral Hawke, Nov. 20.
Balbec and Tripoli destroyed by an earthquake, Dec. 5.

1760 King George II. dies, Oct. 25. in the 77th year of his age, and is succeeded by his late majesty, who, on the 22d September 1761, married the princess Charlotte of Mecklenburgh Strelitz.
Blackfriars bridge, consisting of 9 arches, begun; finished 1770, at the expence of 152,840l. to be discharged by a toll.

1761 A transit of Venus over the sun, June 6.
Earthquakes in Syria, Oct. 13.
The king of Prussia defeats the Austrians at Torgau, Nov. 3.
Pondicherry taken by Col. Coote, Jan. 15.
Belleisle surrendered to the British, Feb. 4.

1762 War declared against Spain.
Peter III. emperor of Russia, is deposed, imprisoned, and murdered.
American philosophical society established in Philadelphia.
George Augustus Frederic, prince of Wales, born August 12.
Martinico surrendered to the British, Feb. 4.
Havannah surrendered to ditto, Aug. 12.
Manilla taken by ditto, Oct. 6.

1763 The definitive treaty of peace between Great Britain, France, Spain, and Portugal, concluded at Paris, February 10th; which confirms to Great Britain the extensive province of Canada, East and West Florida, and part of Louisiana, in North America; also the islands of Grenada, St Vincent, Dominica, and Tobago, in the West Indies.
The Jesuits expelled from France.

1764 The parliament granted 10,000l. to Mr Harrison for his discovery of the longitude by his time-piece.
Famine and pestilence in Italy.
An earthquake at Lisbon.

1765 His majesty's royal charter passed for incorporating the society of artists.
An act passed annexing the sovereignty of the island of Man to the crown of Great Britain.

1766 April 21st, a spot or macula of the sun, more than thrice the bigness of our earth, passed the sun's centre.
The American stamp-act repealed, March 18.
A great earthquake at Constantinople.
The Jesuits expelled from Bohemia and Denmark.

1767 The Jesuits expelled from Spain, Venice, and Genoa, April 2d.
Martinico almost destroyed by an earthquake.
The Protestants tolerated in Poland, Nov. 2d.

1768 Academy of painting established in London.
The Turks imprison the Russian ambassador, and declare war against that empire.
The Jesuits expelled from Naples, Malta, and Parma.

1769 Paoli fled from Corsica, June 13. The island then reduced by the French.

1770 An earthquake at St Domingo.

1771 Dr Solander and Mr Banks, in his majesty's ship the Endeavour, Lieut. Cook, return from a voyage round the world, having made several important discoveries in the South Seas.
An emigration of 500,000 Tourgouths from the coasts of the Caspian sea to the frontiers of China.

1772 The king of Sweden changes the constitution from aristocracy to a limited monarchy.
The Pretender marries a princess of Germany, grand-daughter of Thomas late earl of Aylesbury.
The emperor of Germany, empress of Russia, and the king of Prussia, strip the king of Poland of a great part of his dominions, which they divide among themselves, in violation of the most solemn treaties.

1773 Captain Phipps is sent to explore the North pole; but having made 81 degrees, is in danger of being locked up by the ice, and his attempt to discover a passage in that quarter proves fruitless.
The English East India company having, by conquest or treaty, acquired the extensive provinces of Bengal, Orixa, and Bahar, containing 15 millions of inhabitants, great irregularities are committed by their servants abroad; upon which government interferes, and sends out judges, &c. for the better administration of justice.
The war between the Russians and the Turks proves disgraceful to the latter, who lose the islands in the Archipelago, and by sea are everywhere unsuccessful.
The society of Jesuits suppressed by the pope's bull, Aug. 25.

1774 Peace is proclaimed between the Russians and the Turks.
The British parliament having passed an act laying a duty of 3d. per pound upon all teas imported into America, the colonists, considering this as a grievance, deny the right of the British parliament to tax them.
The American colonies send deputies to Philadelphia, who assume the title of *The Congress of the Thirteen United Provinces*, and all the powers of government.

1775 The American war commences. Action at Bunker's Hill, June 7.
The Spaniards land near Algiers, and are defeated, July 8.

1776 The congress declare the United States of America independent of the crown and parliament of Great Britain.
The Americans receive a dreadful defeat at Long Island, Aug. 27.

1777 Philadelphia taken by the British, Oct. 3.
General Burgoyne with his army surrenders to the Americans.

1778 A most extraordinary eruption of Vesuvius, August 8.
The siege of Gibraltar begun by the Spaniards, July 8.

After Christ.

1780 Jan. 14th, 6h. A. M. the thermometer suspended in the open air at Glasgow, stood at 46° below 0.
The Spanish fleet defeated by Admiral Rodney, Jan. 16th.
Charlestown surrendered to the British, May 12th.
A dreadful insurrection in London, and riots in many other places of the kingdom.
A great number of British ships taken by the combined fleets of France and Spain.
Lord Cornwallis defeats the Americans at Camden.
A dreadful hurricane in the Leeward islands, Oct. 9.
An extraordinary storm of wind in England.
War declared against the Dutch, Dec. 20.

1781 A terrible engagement between the Dutch and British fleets near the Dogger bank, August 5th.
Lord Cornwallis with his army surrenders to the united forces of France and America, Oct. 18th.

1782 Minorca surrendered to the Spaniards, February 4th.
The French fleet under De Grasse defeated and almost destroyed by Admiral Rodney, April 12th.
The Spanish floating batteries before Gibraltar entirely destroyed, Sept. 12.

1783 Preliminaries of a general peace signed. America declared independent, Jan. 20th.
A dreadful earthquake, attended with many extraordinary circumstances, in Italy and Sicily.
The sun obscured by a kind of fog during the whole summer.
A volcanic eruption in Iceland surpassing any thing recorded in history. The lava spouted up in three places to a great height in the air, and continued flowing for two months; during which time it covered a tract of ground to a great extent, and in some places more than 100 feet deep.
A large meteor appears to the northward of Shetland, and takes its direction southward, with a velocity little inferior to that of the earth in its annual course round the sun. Its track observed for more than 1000 miles.
Algiers bombarded by the Spaniards.
A great tumult at Philadelphia between the inhabitants and French soldiery.
An extraordinary aurora borealis seen at London.
Bednore taken by the English.
Magazine at Bencoolen blown up.
Bottles made of the lava of volcanoes.
Byrne, the Irish giant, eight feet four inches, dies by intemperance.
Famine in the Carnatic.
Charles Gustavus prince of Sweden dies.
A father kills three of his children with the thigh bone of a horse, after hearing a sermon on the happiness of those who die young.
Sir Eyre Coote defeats Hyder Ally.
Cremnitz in Hungary destroyed by lightning.
Dartmouth East Indiaman lost.

1783 Definitive treaties between Britain and France, Spain and America, concluded.
The East India house robbed.
Thanks to General Elliot voted by the house of commons.
Embargo on salt in Ireland taken off.
A forest in Poland suddenly disappears.
Island of Formosa destroyed by an earthquake.
Gold and silver lace prohibited in Denmark.
A conspiracy against the Grand Signior discovered.
Grosvenor Indiaman lost.
Mangalore surrenders to the British.
Five meteors or fire-balls seen at different places in England.
Serious mutinies at Portsmouth, Jersey, Guernsey, Dublin, &c.
A plague breaks out at Constantinople.
Powder mills at Ewell blown up.
A man in Moscow has 84 children alive out of 87 by three wives.
Queen Charlotte delivered of a princess.

1784 General Cornwallis made constable of the Tower.
Sluices at Lillo opened by the Dutch.
Great earthquakes in Iceland, Grenoble, &c.
Fort Frederic at Grenada blown up.
Commodore Lindsay visited by the king and queen of Naples.
Pennsylvania in extreme distress.
A general thanksgiving for peace with America, &c.
Allan Ramsay, Esq. son of the celebrated poet of the same name, dies at Dover.
St Augustine in Florida declared a free port.
A gang of desperate robbers apprehended at Glasgow.
A volcano discovered in the moon.

1785 Melancholy fate of two aëronauts.
A singular calamity at Barbadoes, by the sinking of the surface in different places.
A new comet discovered.
The queen of France is delivered of a son.
A remarkable accident happens at the court of king's bench.
A dreadful inundation happens at Vienna in Germany.

1786 The Halsewell East Indiaman struck on the rocks of Purbeck, and about 100 of the crew perished, Jan. 6th.
Joiner's works performed by a blind man in such a masterly manner as to astonish the ablest judges, at Hermanstadt in Transilvania.
The king of Prussia makes a handsome provision during life for the widow and children of Colonel Vantroscke, a deserving officer. April.
The west tower of Hereford church, 125 feet high, built in the 12th century, fell down on the evening of 17th April, but none of the people then in the church-yard received any injury.
M. Blanchard ascends in a balloon 96 miles in as many minutes. Writes a letter in the air, dated April 18th, to the editors of the Paris Journal.

After Christ.

1786 To the number of 6398 boys and girls clothed, educated, and supported by voluntary contributions, assemble under the dome of St Paul's cathedral.

A small prayer-book composed by Queen Elizabeth, and in her own hand-writing, sold in London for 100 guineas, June 7th.

The prince of Wales orders his whole stud to be disposed of by auction, to enable him to liquidate his debts.

1787 The king of Prussia establishes a court of honour for the purpose of suppressing duelling.

A meeting of notables convened by the king of France for reforming abuses relating to the subject of finance, January 10th.

Two ships sailed from Gravesend with black people on board, for a new settlement at Sierra Leone, January 9th.

The king of Poland has an interview with her Imperial majesty at Kiow, March 7th.

Nine ships sailed for Botany Bay from Spithead with convicts, 21st.

A motion in parliament for repealing the test and corporation acts, 28.

M. de Calonne is dismissed from office, April 10th.

Mr Hastings impeached at the bar of the house of lords, May 10th.

—— —— petitions to be admitted to bail, 22d.

The sum of 161,000l. voted for the liquidation of the prince of Wales's debts, 24th.

The Hartwell East Indiaman lost off the island of Bona Vista, 24th.

Two satellites belonging to Georgium Sidus discovered by Dr Herschel, June 7th.

The Russian ambassador at Constantinople imprisoned, August 16th.

The Prussian troops under the duke of Brunswick take possession of Utrecht, Sept. 17th.

Twenty-three sail of the line put into commission, and seventeen new admirals appointed, Sept. 24th.

The Prussians gain possession of Amsterdam, October 11th.

A most remarkable aurora borealis appears, 13th.

Lord George Gordon apprehended and committed to Newgate, December 7th.

1788 Died at Bryngwyn in Radnorshire six persons during the month of January, whose united ages made up 644 years.

A new copper coinage of halfpence begins to circulate in Britain, July 19th.

William Brodie and George Smith tried for breaking into the General excise office for Scotland, and sentenced to be executed, September 1st.

A dreadful hurricane at Martinico laid many parishes waste, and deprived multitudes of their existence, August 14th.

The king of France abolished the torture, and ordained that every accused person shall have counsel immediately assigned him, October 18th. He ordered also, that a majority of one may acquit the accused, while three are required to condemn.

An iron barge built by John Wilkison, Esq. at Wilby wharf Shrewsbury, was launched, drawing only eight inches water, and moving very easily on that element, November 7th.

His Britannic majesty is seized with a severe indisposition, October 17th.

A new comet in the constellation of Ursa Major, discovered by M. Messier astronomer at Paris, November 26th.

1789 Coins bearing date 1057 were found beneath the foundation of the old market-house at Farnham.

Another satellite discovered by Dr Herschel belonging to Saturn.

Earthquake at Comrie, November 3d.

Foundation stone of that magnificent structure the university of Edinburgh, laid by the Right Honourable Francis Lord Napier, grand master-mason of Scotland, November 16th.

Phipps (father and son) hanged for forgery, September 5th.

Revolution of France is begun and gradually advanced.

General Washington makes a splendid entrance into the city of Philadelphia, where a sumptuous entertainment is provided for him by the joyful citizens, April 22d.

An excellent and cheap dye invented in Germany.

Dr Withers sentenced to 12 months imprisonment, to pay a fine of 50l. and to find security for five years, himself in 500l. and two others in 250l. each for defaming the character of Mrs Fitzherbert, November 21st.

The sum of 261l. 3s. voted to Brook Watson, Esq. to defray the expences of a new invented method of cultivating hemp, December 14th.

1790 Exile of the duke de Orleans.

Bed of justice instituted in France.

Calamitous state of affairs in that country.

The archbishop of Toulouse dismissed from office.

A convention signed at the Escurial between his Britannic majesty and the king of Spain, October 28th.

A memorial of the court of Spain delivered to Mr Fitzherbert, June 13th.

M. Montmorin's letter to the national assembly of France.

Louis XVI. delivers a speech to the national assembly.

A blackbird's nest with four eggs found December 25th, near Nuneham in Oxfordshire.

1791 Serious riots at Paris.

The Tiers Etat constitute themselves a national assembly.

Paris is surrounded by the military at the desire of the king.

Prisons set open by the mob, and a great famine in Paris, whether real or artificial is involved in obscurity.

M. Necker is dismissed from office, and the Bastile demolished.

M. La Fayette appointed commander in chief of the national guard.

M. Necker is recalled with every demonstration of joy.

1791

After Christ.

1791 A most horrid insurrection takes place on the 5th of October.
The royal family comes from Versailles to Paris.
The abolition of orders decreed by the assembly.
The island of Corsica united to France.
The unpopular and oppressive tax on salt abolished.
M. Necker again resigns, about which time a riot breaks out at Paris, and a serious mutiny in the harbour of Brest.
Foreign powers combine against France.
The king of France flies, is apprehended, and returns.
The city of Paris put under martial law.
The Netherlands revolt from Germany.
Peace is concluded between Austria and Prussia, and between Prussia and Sweden.
The grand vizier is disgraced, and dies.
A peace concluded between Russia and Constantinople.
A convention is entered into with Spain relative to Nootka Sound.
War carried on in India with Tippoo Saib.
The British parliament is dissolved, and the new parliament is soon after opened by a speech from the throne.
A bill is presented in the British parliament for the relief of Protestant Catholics.
The French constitution settled by the assembly, and presented to the king, September 3d.
Accepted of by the king, 13th.

1792 Washington's speech to both houses of congress, October 25th.
A treaty between Britain and Prussia relative to the marriage of the duke of York with Frederica Charlotte.
Gustavus III. of Sweden is assassinated by Ankarstrom.
General Dillon is inhumanly murdered by his own soldiers.
M. Rochambeau resigns the command of the French army in the north, and is succeeded by M. Luckner.
Horrible outrages are committed in Paris on the 20th June.
The French arms are victorious in the Netherlands.
A petition is presented to the assembly, praying for the deposition of Louis XVI.
The palace is abandoned by the royal family of France, and attacked by the federates, at which time the Swiss guards are massacred.
Louis is deposed, and he and his family imprisoned.
War proclaimed by the assembly of France against the king of Hungary and Bohemia, April 20th.
The king of the French writes a confidential letter to the king of Great Britain.
A manifesto against the French revolution by the emperor of Germany and the king of Prussia.
The French national assembly proceeds to the trial of the king. He is condemned and executed, Jan. 21. after which M. Chauvelin is dismissed from London.
Dumourier arrests the commissioners sent to bring him to the bar of the convention, and sends them as prisoners to the Austrians. He finally abandons the cause of France as hopeless and desperate. He is succeeded by General Dampier.
The Brissotine party is denounced by the people of Paris.
Marat is committed to the abbey, but soon released, and assassinated at last by a female from Normandy.
An expedition is undertaken against Dunkirk, which is rendered abortive.
General Custine, the queen, the deputies of the Gironde, Manuel, Houchard, Bailly, Barnave, Rabaut, the duke of Orleans and Madame Roland, are condemned and executed.
Earl Moira makes an unsuccessful descent on the coast of France.
Toulon surrenders to the British, but is retaken by the French.

1794 Earl Stanhope moves that the French republic be acknowledged by Britain.
Mr Adam proposes to amend the criminal law of Scotland, which gives rise to interesting debates.
The first reading of a bill for suspending the Habeas Corpus act is protested against, May 22.
Protest against the vote of thanks to Lord Hood, June 17.
The king of Prussia withdraws from the coalition.
A bill is brought into parliament for the abolition of the slave-trade, and rejected by the lords.
General Fitzpatrick moves for an inquiry into the reasons of M. la Fayette's imprisonment.
A motion for peace with France is made by the duke of Bedford and Mr Fox.
Thanks are voted by both houses to Lord Howe, Sir Charles Grey, and Sir John Jervis.
That valuable instrument the *telegraph* is invented by the French.
The bold eloquence of Billaud Varennes, and Tallien, opens the eyes of France respecting the ambitious views of that sanguinary monster Maximilian Robespierre, who is condemned and executed (28th June), with about 20 of his diabolical coadjutors.
General Clairfait is defeated, and Louvain and Namur are taken by the French.
A treaty is entered into between Sweden and Denmark, and neutral powers oblige Britain to indemnify them for their losses.

1795 La Pique of 38 guns captured by Vice-admiral Caldwell, Jan. 4.
Admiral Hothman captures two French ships, Ca-ira of 80, and the Censeur of 74 guns, March 16.
Warren Hastings acquitted of the serious charges preferred against him, by a majority of the house of peers, April 25.
The Boyne of 98 guns is blown up at Spithead, but

but not so much damage done to adjacent vessels as there was reason to dread, all her guns being loaded, May 4.

Captain Anthony James Pye Molloy dismissed from the command of the Cæsar of 74 guns, for neglect of duty.

Some ships of war belonging to the French taken by the fleet under the command of Admiral Bridport, 23d June.

Leopold brother to the emperor of Germany died August 10.

La Minerve of 42 guns captured by Captain Towry, June 24.

The beautiful church of St Paul's, Covent-garden, totally consumed by fire, Sept. 19.

A shock of an earthquake felt through most of the town of Birmingham, Nov. 23.

1796 A stone was thrown at his Britannic majesty's carriage on his way from Pall-mall to Buckingham-house, which broke a window and greatly alarmed Lady Harrington, Feb. 1. A reward of 1000l. was offered for the apprehension of the criminal, but without effect.

Admiral Cornwallis is tried on board the Orion, for acting contrary to orders received from the admiralty, and acquitted, April 17.

Sir Sidney Smith taken by the French at Havre, April.

L'Unité, a French frigate of 38 guns, taken by Captain Cole, and La Virginie of 44 by Sir Edward Pellew, April 13. and 20.

Crossfield, for attempting to assassinate his majesty, was tried and acquitted, May 20.

Two houses fell down in Clare-market, in the ruins of which 17 persons were unfortunately buried, June 27.

The Amphion frigate of 32 guns blown up at Plymouth, when about 260 lives were lost, Sept. 22.

The empress Catharine II. of Russia died at her palace of an apoplectic fit, Nov. 17.

1797 Part of a French fleet came to anchor in Bantry bay, having on board an army of 25,000 men, under the command of General Hoche; but afterwards weighed and stood out to sea, January 2.

The steeple of a church near Norwich fell down while the bell was ringing for public worship, Jan. 8.

The city of Savannah nearly consumed to ashes by fire.

Sir John Jervis, with a fleet of 15 sail, engages a Spanish fleet of 27 sail of the line, which he defeats, taking the Salvador del Mundo and San Josef of 112 guns each, the San Nicolas of 80 and San Ysidro of 74 guns, February 14.

The island of Trinidad surrenders to the British forces under the command of Sir Ralph Abercrombie.

Alarming symptoms of a mutiny appear among the seamen of the British fleet, May 7.

The nuptial ceremonies are solemnized between the prince of Wirtemberg Stutgard and Charlotte Augusta Matilda, eldest daughter of his Britannic majesty George III. May 18.

Lord Malmsbury appointed minister plenipotentiary from the court of Britain to France for negotiating a treaty of peace, July 1.

About 30 French war vessels of different dimensions taken or destroyed by the squadron under Sir J. B. Warren, between 17th July and 6th of September.

A desperate engagement off Camperdown between Admirals Duncan and De Winter, when the latter is totally defeated by the former, with the loss of 11 ships.

1798 A powder-mill belonging to Mr Harvey is blown up, which demolishes several adjacent buildings, and kills three of the workmen, April 25.

L'Hercule a French ship of 74 guns, captured by the Mars, April 21.

Rebels in the Curragh of Kildare, Ireland, lay down their arms, May 29.

Wexford rebels defeated with great loss and slaughter, June 10.

Proposals of the Irish rebels rejected by General Lake, June 22.

The Princess Amelia East Indiaman accidentally burnt on the coast of Malabar, and 40 of her crew perished, April 5.

An engagement at Castlebar between General Lake and a party of French landed in Ireland, August 27.

A dreadful engagement between the British fleet under the command of Sir Horatio Nelson, and the French fleet commanded by Admiral Bruys, off the mouth of the Nile, when nine sail of the line belonging to the French were taken, three burnt, one sunk, and four escaped, Aug. 1.

The yellow-fever, which carried off 3000 people in New-York, in a few months, happily ceased to rage, Nov. 15.

1799 A dreadful shock of an earthquake was felt at Guernsey on the night of the 6th.

A desperate battle fought between the Archduke Charles and General Jourdan at Stockash, March 25.

Three frigates captured by the Centaur, J. Wood commander, June 19.

Mantua surrenders to the Austrians, June 30.

The British forces destined to invade Holland begin to disembark, 27th August.

Seven ships of war, and 13 Indiamen and transports, taken in the Nieuve Diep by Admiral Mitchell, August 27.

Seringapatam surrenders to the British forces, when Tippoo Sultan is slain, 4th May.

British and Russian forces obliged to evacuate Holland, November.

1800 A convention between the ambassadors of the Ottoman Porte and General Desaix, signed at El Arisch, 24th January, by which the French troops were permitted to return to their own country.

After Christ.

His Britannic majesty shot at in the theatre, May 16th, by a maniac of the name of Hadfield.

The Queen Charlotte of 100 guns is burnt off Leghorn, and the gallant crew perish, 17th March.

The French ship of war Guillaume Tell of 86 guns and 1000 men surrenders to the Lion, Penelope, and Foudroyant, March 30.

Unsuccessful expedition against Ferrol, August.

His Britannic majesty's ship Marlborough of 74 guns, was completely wrecked off Belleisle, 4th November.

1801 An embargo laid on all Russian, Danish, and Swedish vessels in the ports of Great Britain, 14th January.

The united parliament of Great Britain and Ireland met for the first time, January 22.

The Invincible of 74 guns ran aground on the coast of Norfolk, and was totally lost, when about 400 souls perished, March.

A dreadful engagement off Copenhagen, between the Danish line and the British fleet under Admiral Parker; in which 943 of the British were killed and wounded, April 2.

Aboukir surrenders to the British under the command of Sir Ralph Abercrombie, who received a mortal wound on the 21st March, of which that great officer died on the 28th.

In an engagement between a French and British squadron in the bay of Algeziras, the Hannibal unfortunately fell into the hands of the enemy by taking the ground. The British squadron rendered useless two of 84, one of 74 guns, and a large frigate, July 5.

A cessation of arms by sea and land between Britain and the French republic, resulting from the signing of preliminaries of peace by Lord Hawkesbury, and M. Otto, October 1.

Alexandria surrenders to General Hutchinson on the 2d September.

The Swiftsure captured by Admiral Gantheaume, who treated the crew with the utmost humanity and tenderness.

1802 Mr Moore arrived with the definitive treaty of peace signed at Amiens on the 27th March, at four in the afternoon.

A dreadful fire broke out (May 13.) in the town of Bedford, which destroyed 72 houses, and deprived about 700 persons of their all.

A decision obliging booksellers to publish no books without the name of the printer at the beginning and end of them, was ratified, 20th October.

1803 A serious rebellion suppressed in China, occasioned by the efforts of Ong Fong, a daring chief, at the head of 50,000 men.

1804 Active measures taken in Dublin to secure the country against invasion.

Duke D'Enghien and other emigrants seized, sent to France, and executed, March 15.

Mr Addington's administration dissolved, and a new ministry appointed, with Mr Pitt at its head.

Coronation of Bonaparte as emperor of France.

After Christ.

1805 Impeachment of Lord Melville, June 26.

Bonaparte crowned king of Italy.

Capitulation of General Mack, Oct. 20.

Austrians and Russians defeated at Austerlitz, December 2.

The combined French and Spanish fleets defeated by the British fleet under Lord Nelson at Trafalgar, Oct. 21.

1806 Death of Mr Pitt, January 23.

Acquittal of Lord Melville, June 12.

The Prussians defeated by the French at Jena, October 14.

The Cape of Good Hope taken from the Dutch by the British, January 9.

Buenos Ayres taken by Sir Home Popham, 27th June.

Death of Mr Fox, September 7.

1807 Dissolution of the Whig ministry, duke of Portland appointed first lord of the treasury, 25th March.

Battle of Eylau between the Russians and the French, February 7.

Siege of Copenhagen and surrender of the Danish fleet, September 5.

Portuguese court sail for the Brazils, and the French occupy Portugal, November 29.

Local militia established in Britain, April.

1808 Ferdinand signs a forced renunciation of the Spanish crown at Bayonne, May 5.

1809 French defeated at Vimiera, August 21.

Colonel Wardle brings charges of mismanaging the army against the duke of York, January 27.

French defeated at Talavera, July 27.

Austria declares war against France, April 6.

Battle of Aspern between the Austrians and French, May 21.

Austrians defeated at Wagram, July 6.

Peace signed between France and Austria, October 15.

King of Sweden deposed, March 13.

The Walcheren expedition sails, July 28.

Mr Maddison succeeds Mr Jefferson as president of the United States, March.

Duel between Lord Castlereagh and Mr Canning, September 22.

Marriage of Bonaparte with the archduchess Maria Louisa, March 11.

In the course of this year revolutionary movements began in the Caraccas, and in the other Spanish American colonies.

George the Third affected by a mental disease, November 1.

1811 French defeated by the British at Barrosa, March 5.

Batavia taken by the British, August 26.

1812 United States declare war against Britain, June 12.

French defeated at Salamanca, July 22.

Russians defeated by the French at Smolensk, August 16.

Russians defeated again at Moskwa, Sept. 7.

Napoleon quitted Moscow, October 19.

1813 French defeated at Vittoria, June 20.

——— defeated at Leipsic, October 16.

1814

wood, in the upper side of which there is a groove, hollowed along from the end that stands out to that which is fixed in the ruler, and near each end of it a hole is made: through these holes a pendulum cord is drawn, which runs in the groove: at that end of the cord which comes through the hole farthest from the ruler, the ball is hung: and at the other end there is a small wooden pin, which can be put in any of the holes of the ruler: when the pin is in the uppermost hole at 72, then the pendulum from the top to the centre of the ball must be exactly 72 inches; and therefore, whatever hole of the ruler it is put in, the pendulum will be just so many inches as that figure at the hole denotes. The manner of using the machine is this: The composer lengthens or shortens his pendulum, till one vibration be equal to the designed length of his bar, and then the pin stands at a certain division, which marks the length of the pendulum; and this number being set with the cliff at the beginning of the song, is a direction for others how to use the chronometer in measuring the time according to the composer's design: for with the number is set the note, crotchet, or minim, whose value he would have the vibration to be; which in brisk duple time is best, a minim or half bar; or even a whole bar, when that is but a minim; and in slow time a crotchet. In triple time, it would do well to be the third part, or half, or fourth part of a bar; and in the simple triples that are allegro, let it be a whole bar. And if, in every time that is allegro, the vibration is applied to a whole or half bar, practice will teach us to subdivide it justly and equally. Observe, that, to make this machine of universal use, some canonical measure of the divisions must be agreed upon, that the figure may give a certain direction for the length of the pendulum.

CHROSTASIMA, in *Natural History*, a genus of pellucid gems, comprehending all those which appear of one simple and permanent colour in all lights; such are the diamond, carbuncle, ruby, garnet, amethyst, sapphire, beryl, emerald, and the topaz. See DIAMOND, CARBUNCLE, &c.

CHRYSA, in *Ancient Geography*, a town of Mysia, on the sinus Adramyttenus; extinct in Pliny's time: it had a temple of Apollo Smintheus, (Homer, Strabo). The country of the fair Chryseis, who gave first rise to the quarrel between Agamemnon and Achilles.

CHRYSALIS, or AURELIA, in *Natural History*, a state of rest and seeming insensibility, which butterflies, moths, and several others kinds of insects, must pass through, before they arrive at their winged or most perfect state.

In this state, no creatures afford so beautiful a variety as the butterfly kinds, and they all pass through this middle state without one exception. The figure of the aurelia or chrysalis generally approaches to that of a cone; or at least the hinder part of it is in this shape; and the creature, while in this state, seems to have neither legs nor wings, nor to have any power of walking. It seems indeed to have hardly so much as life. It takes no nourishment in this state, nor has it any organs for taking any; and indeed its posterior part is all that seems animated, this having a power of giving itself some motions. The external covering of the chrysalis is cartilaginous, and considerably large, and is usually smooth and glossy: but some few of them have a few hairs; some are also as hairy as the caterpillars from which they are produced; and others are rough, and, as it were, shagreened all over.

In all these there may be distinguished two sides; the one of which is the back, the other the belly, of the animal. On the anterior part of the latter, there may always be distinguished certain little elevations running in ridges, and resembling the fillets wound about mummies: the part whence these have their origin, is esteemed the head of the animal. The other side, or back, is smooth, and of a rounded figure in most of the chrysalises; but some have ridges on the anterior part, and sides of this part; and these usually terminate in a point, and make an angular appearance on the chrysalis.

From this difference is drawn the first general distinction of these bodies. They are by this divided into two classes; the round and the angular kinds. The first are, by the French naturalists, called *feves;* from the common custom of calling the chrysalis of the silkworm, which is round, by this name.

There is something more regular in this distinction than might at first be conceived; for the division is continued from the fly-state: the rounded chrysalises being almost all produced by the *phalenæ* or moths; and the angular ones by the *papilios*, or day-flies. There are several subordinate distinctions of these kinds; but, in general, they are less different from one another than the caterpillars from whence they are produced.

The head of those of the first class usually terminates itself by two angular parts, which stand separate one from the other, and resemble a pair of horns. On the back, eminences and marks are discovered, which imagination may form into eyes, nose, chin, and other parts of the human face.

There is a great variety and a great deal of beauty in the figures and arrangement of the eminences and spots on the other parts of the body of the chrysalises of different kinds. It is a general observation that these chrysalises which are terminated by a single horn, afford day-butterflies of the kind of those which have buttoned antennæ, and whose wings, in a state of rest, cover the under part of their body, and which use all their six legs in walking, those of many other kinds using only four of them. Those chrysalises which are terminated by two angular bodies, and which are covered with a great number of spines, and have the figure of a human face on their back in the greatest perfection, afford butterflies of the day kind; and of that class the characters of which are, their walking on four legs, and using the other two, that is, the anterior part, in the manner of arms or hands. The chrysalises which have two angular bodies on their heads, but shorter than those of the preceding, and whose back shows but a faint sketch of the human face, and which have fewer spines, and those less sharp, always turn to that sort of butterfly, the upper wings of which are divided into segments, one of which is so long as to represent a tail, and whose under wings are folded over the upper part of the back. A careful observation will establish many more rules of this kind, which are not so perfect as to be free from all exceptions; yet are of great use, as they teach us in general

Chrysalis.

the body of the caterpillar in a weak state, with limbs unable to perform their offices, whereas it comes from the chrysalis perfect.

Hist. of Insects, vol. I. p. 2.—28.

M. Reaumur has given us many curious observations on the structure and uses of the several coverings that attend the varieties of the caterpillar kind in this state.

The creatures in general remain wholly immoveable in this state, and seem to have no business in it but a patient attendance on the time when they are to become butterflies; and this is a change that can happen to them, only as their parts, before extremely soft and weak, are capable of hardening and becoming firm by degrees, by the transpiration of that abundant humidity which before kept them soft: and this is proved by an experiment of M. Reaumur, who, inclosing some chrysalises in a glass tube, found, after some time, a small quantity of water at the bottom of it; which could have come there no other way, but from the body of the inclosed animal. This transpiration depends greatly on the temperature of the air; it is increased by heat, and diminished by cold; but it has also its peculiarities in regard to the several species of butterfly to which the chrysalis belongs.

According to these observations, the time of the duration of the animal in the chrysalis state must be, in different species, very different; and there is indeed this wide difference in the extremes, that some species remain only eight days in this state, and others eight months.

We know that the caterpillar changes its skin four or five times during its living in that state; and that all these skins are at first produced with it from the egg, lying closely over one another. It parts with, or throws off, all these one by one, as the butterfly, which is the real animal, all this time within, grows more and more perfect in the several first changes. When it throws off one, it appears in another skin exactly of the same form; but at its final change from this appearance, that is, when it throws off the last skin, as the creature within is now arrived at such a degree of perfection as to need no farther taking of nourishment, there is no farther need of teeth, or any of the other parts of a caterpillar. The creature, in this last change, proceeds in the very same manner as in all the former, the skin opening at the back, and the animal making its way out in this shape. If a caterpillar, when about to throw off this last skin, be thrown into spirits of wine, and left there for a few days, the membranes within will harden, and the creature may be afterwards carefully opened, and the chrysalis taken out, in which the form of the tender butterfly may be traced in all its lineaments, and its eyes, legs, &c. evidently seen. It is not necessary, however, to seize upon this exact time for proving the existence of the chrysalis or butterfly in the caterpillar: for if one of these animals be thrown into spirit of wine, or into vinegar, some days before that time, and left there for the flesh to harden, it may afterwards be dissected, and all the lineaments of the butterfly traced out in it; the wings, legs, antennæ, &c. being as evident here, and as large, as in the chrysalis.

It is very plain from this, that the change of the caterpillar into chrysalis is not the work of a moment, but is carrying on for a long time before, even from the very hatching of the creature from the egg. The parts of the butterfly, however, are not disposed exactly in the same manner while in the body of the caterpillar, as when left naked in the form of the chrysalis: for the wings are proportionally longer and narrower, being wound up into the form of a cord; and the antennæ are rolled up on the head; the trunk is also twisted up and laid upon the head; but this in a very different manner from what it is in the perfect animal, and very different from that in which it lies within the chrysalis; so that the first formation of the butterfly in the caterpillar, by time arrives at a proper change of the disposition of its parts, in order to its being a chrysalis. The very eggs, hereafter to be deposited by the butterfly, are also to be found, not only in the chrysalis, but in the caterpillar itself, arranged in their natural, regular order. They are indeed in this state very small and transparent; but after the change into the chrysalis, they have their proper colour.

Chrysal

As soon as the several parts of the butterfly, therefore, are arrived at a state proper for being exposed to the more open air, they are thrown out from the body of the caterpillar surrounded only with their membranes; and as soon as they are arrived after this at a proper degree of strength and solidity, they labour to break through these thinner coverings, and to appear in their proper and natural form. The time of their duration in this state of chrysalis is very uncertain, some remaining in it only a few days, others several months, and some almost a year in appearance. But there is a fallacy in this that many are not aware of. It is natural to think, that as soon as the creature has inclosed itself in its shell, be that of what matter it will, it undergoes its change into the chrysalis state. And this is the case with the generality: yet there are some which are eight or nine months in the shell before they become chrysalises, so that their duration in the real chrysalis state is much shorter than it naturally appears to be. M. Reaumur carefully watched the auriculated caterpillar of the oak in its several changes, and particularly from its chrysalis, which is of this last kind, into the fly; and has given an account of the method of this, as an instance of the general course of nature in these operations.

The membranes which envelope the creature in this chrysalis state are at first tough and firm, and immediately touch the several parts of the inclosed animal; but by degrees, as these parts harden, they become covered, some with hairs, and others with scales. These, as they continue to grow, by degrees fall off the several particular membranes which cover the parts on which they are placed, to a greater distance, and by degrees loosen them from the limbs. This is one reason why those membranes dry and become brittle.

The middle of the upper part of the CORSELET is usually marked with a line which runs in a longitudinal direction; and this part is always more elevated than the rest, even in the conic kinds, which are no otherwise angular. This line is in some very bold and plain; in others, it is so faint as not to be distinguishable without glasses; but it is always in the midst of that line that the shell begins to open. The motion of the head

Churches. stantine, and consecrated under Justinian. It was at that time so magnificent, that Justinian is said to have cried out in the consecration thereof, Ενικησα σε, Σαλωμων; *I have outdone thee, Solomon.* The dome, which is said to have been the first that was built, is 330 feet diameter.

The first church publicly built by the Christians, some authors maintain to be that of St Saviour at Rome founded by Constantine; others contend, that several churches abroad, called by the name of *St Peter Vivus*, were built in honour of that apostle during his lifetime.

CHURCH, with regard to architecture, Daviler defines a large oblong edifice, in form of a ship, with nave, choir, aisles, chapel, belfry, &c. See each part under its proper head.

CHURCH, Simple, is that which has only a nave and a choir.

CHURCH with Aisles, that which has a row of porticoes, in form of vaulted galleries, with chapels in its circumference.

CHURCH in a Greek cross, that where the length of the traverse part is equal to that of the nave; so called because most of the Greek churches are built in this form.

CHURCH in a Latin cross, that whose nave is longer than the cross part, as in most of the Gothic churches.

CHURCH in Rotundo, that whose plan is a perfect circle, in imitation of the Pantheon.

For the form of the ancient Greek churches, when they had all their parts, it was as follows: first was a porch, or portico, called the *vaunt-nave*, προναος; this was adorned with columns on the outside, and on the inside surrounded with a wall; in the middle whereof was a door, through which they passed into a second portico. The first of these porticoes was destined for the *energumeni*, and penitents in the first stage of their repentance; the second was much longer, destined for penitents of the second class, and the catechumens, and hence called ναρθηξ, *ferula*, because those placed in it began to be subject to the discipline of the church. These two porticoes took up about one third of the space of the church. From the second portico they passed into the nave, ναος, which took up near another third of the church. In the middle, or at one side of the nave, was the ambo, where the deacons and priests read the gospel and preached. The nave was destined for the reception of the people, who here assisted at prayers.

Near the entrance of this was the baptistery or font. Beyond the nave was the choir, χορος, set with seats, and round: the first seat on the right, next the sanctuary, being for the chantor, or *choragus*.

From the choir they ascended by steps to the sanctuary, which was entered at three doors. The sanctuary had three upsides in its length; a great one in the middle, under which was the altar, crowned with a baldachin, supported by four columns. Under each of the small upsides, was a kind of table or cupboard, in manner of a beaufet.

Though, of the Greek churches now remaining, few have all the parts above described, most of them having been reduced to ruins or converted into mosques.

HIGH Church was a denomination originally given to those otherwise called *Nonjurors*, who refused to acknowledge the title of William III. to the crown of Great Britain, under a notion that James II. though excluded, was still their rightful sovereign. This appellation was given them, because they entertained high notions of the dignity and power of the church, and the extent of its prerogatives and jurisdiction. And those, on the contrary, were called *low-church-men*, who disapproved of the succession and obstinacy of the nonjurors, distinguishing themselves by their moderation towards dissenters, and were less ardent in extending the limits of church authority. The denomination of *high-church-men* is now more generally applied to all who form pompous and ambitious conceptions of the authority and jurisdiction of the church, and who would raise it to an absolute independence on all human power. Church Churchi

CHURCH-Ale. See *WHITSUN-Ale.*

CHURCH Reeves, the same with *CHURCH-Wardens.*

CHURCH Scot, or *Churchesset*, a payment or contribution, by the Latin writers frequently called *primitiæ seminum*; being, at first, a certain measure of wheat, paid to the priest on St Martin's day, as the first fruits of harvest. This was enjoined by the laws of King Malcolm IV. and Canute, c. 10. But after this, *Church scot* came to signify a reverse of corn-rent paid to the secular priests, or to the religious; and sometimes was taken in so general a sense as to include poultry, or any other provision that was paid in kind to the religious. See TITHE.

CHURCH-Wardens (*ecclesiæ guardiani*), in the English ecclesiastical polity, are the guardians or keepers of the church, and representatives of the body of the parish. They are sometimes appointed by the minister, sometimes by the parish, sometimes by both together, as custom directs. They are taken, in favour of the church, to be, for some purposes, a kind of corporation at the common law; that is, they are enabled, by that name, to have a property in goods and chattels, and to bring actions for them, for the use and profits of the parish. Yet they may not waste the church goods, but may be removed by the parish, and then called to account by actions at common law: but there is no method of calling them to account but by first removing them; for none can legally do it but those who are put in their place. As to lands, or other real property, as the church, churchyard, &c. they have no sort of interest therein; but if any damage is done thereto, the parson only or vicar shall have the action. Their office also is to repair the church, and make rates and levies for that purpose: but these are recoverable only in the ecclesiastical courts. They are also joined with the overseers in the care and maintenance of the poor. They are to levy a shilling forfeiture on all such as do not repair to church on Sundays and holidays; and are empowered to keep all persons orderly while there; to which end it has been held that a church-warden may justify the pulling off a man's hat, without being guilty of either an assault or a trespass. There are also a multitude of other petty parochial powers committed to their charge by divers acts of parliament.

CHURCHILL, SIR WINSTON, the father of the great duke of Marlborough, was descended from an ancient and honourable family in Dorsetshire. He was born at Wotton Glanville in that county in 1610; and

Churchill.

and educated at St John's college at Oxford. He engaged in the cause of his unfortunate sovereign Cha. I. for which he suffered severely in his fortune; and having married, while young, Elizabeth, the daughter of Sir John Drake of Ashe in Devonshire, she was forced to seek a refuge in her father's house, when Mr Churchill's misfortunes left him none that he could call his own; and there most of his children were born. After the Restoration, he was elected a burgess to serve in parliament for the borough of Weymouth; and, in 1669, his majesty was pleased to confer on him the honour of knighthood. The next year he was made one of the commisioners of claims in Ireland; and upon his return from thence, was constituted one of the clerks comptrollers of the green cloth: but writing a kind of political essay upon the History of England, which gave great offence to the parliament, he was, in 1678, dismissed from his post. He was, however, soon restored to it again; and lived to see his eldest surviving son raised to the peerage, and the rest of his children in a fair way to promotion. He died in 1688.

Churchill, *John*, duke of Marlborough, and prince of the holy Roman empire, a most renowned general and statesman, was born at Ashe in Devonshire in 1650. He was eldest son of Sir Winston Churchill who carried him to court while very young, and where he was particularly favoured by James duke of York, afterwards King James II. when only twelve years of age. In 1666, he was made an ensign of the guards during the first Dutch war; and afterwards improved himself greatly in the military art at Tangier. In 1672, Mr Churchill attended the duke of Monmouth, who commanded a body of auxiliaries in the French service, and was soon after made a captain in the duke's own regiment. At the siege of Nimeguen, which happened in that campaign, he distinguished himself so much that he was taken notice of by the celebrated Marshal Turenne, who bestowed on him the name of the *handsome Englishman*.—In 1673, he was at the siege of Maestricht, where he gained such applause, that the king of France made him a public acknowledgement of his service; and the duke of Monmouth, who had the direction of the attack, told King Charles II. that he owed his life to Mr Churchill's bravery. In 1681, he married Sarah, daughter and co-heiress (with her sister the countess of Tyrconnel) of Richard Jennings, Esq. of Sandrich, in Hertfordshire. The duke of York recommended him in a very particular manner to the king; who, in 1682, created him baron of Eyemouth in the county of Berwick, in Scotland, and made him colonel of the third troop of guards. A little after King James's accession, he was created Baron Churchill of Sandrich in the county of Hertford, and made brigadier-general of his majesty's army in the west; where, when the duke of Monmouth came to surprise the king's army while the earl of Feversham and the majority of the officers were in their beds, he kept the enemy in play, till the king's forces had formed themselves, and thereby saved the whole army. When James showed an intention of establishing the Catholic religion in Britain, Lord Churchill, notwithstanding the great obligations he owed him, thought it his duty to abandon the royal cause; but even then did not leave him without acquainting him by letter with the reason of his so doing. Lord Churchill was graciously received by the prince of Orange; and was by him employed first to re-assemble the troop of guards at London, and afterwards to reduce some lately raised regiments, and to new-model the army; for which purpose he was invested with the rank and title of lieutenant general. In 1689, he was sworn one of the privy council, and one of the gentlemen of the king's bed-chamber; and on the 9th of April following, was raised to the dignity of earl of Marlborough in the county of Wilts. He assisted at the coronation of their majesties; and was soon after made commander in chief of the English forces sent over to Holland; and here he first laid the foundation of that fame which was afterwards spread over all Europe. In 1690, he was made general of the forces sent to Ireland; where he made the strong garrisons of Cork and Kinsale prisoners of war. The year following, King William showed the good opinion he had of his conduct, by sending him to Flanders to put all things in readiness, and to draw the army together before his arrival. In 1692, he was dismissed from all his employments; and, not long after, was with some other peers committed to the Tower on an accusation of high treason; which, however, was afterwards found to be a false and malicious report, the authors of which were punished. Marlborough was soon restored to favour, and in 1698 was appointed governor to the earl of Gloucester; with this extraordinary compliment from King William, "My lord, make him but what you are, and my nephew will be all I wish to see him." The same day he was again sworn one of the privy council; and in July following was declared one of the lords justices of England, for the administration of the government, in which great trust he was three times successively in the king's absence. In 1701 he was appointed general of the foot, commander in chief of the English forces, and ambassador extraordinary and plenipotentiary at the Hague. Upon the accession of Queen Anne to the throne, he was elected into the order of the Garter, declared captain general of all her majesty's forces, and sent ambassador extraordinary and plenipotentiary to Holland. After several conferences about a war, he put himself at the head of the army, where all the other generals had orders to obey him. His exploits in the field have been taken notice of under the article Britain, No 344—370: we shall therefore only take notice in this place of the rewards and honours conferred upon him for these exploits. After his first campaign he was created marquis of Blandford and duke of Marlborough, with a pension of 5000l. out of the post office, to devolve, for ever upon those enjoying the title of duke of Marlborough. In 1703, he met Charles III. late emperor, going to Spain, who presented him with a sword set with diamonds. In 1704, having forced the enemy's lines at Schellenberg, he received a letter of thanks from the emperor Leopold, written with his own hand; an honour seldom done to any but sovereign princes. After the battle of Blenheim, he received congratulatory letters from most of the potentates in Europe, particularly from the states-general, and from the emperor, who desired him to accept of the dignity of a prince of the empire, which with the queen's leave was conferred upon him by

Churchill. by the title of *Prince of Mildenheim in the province of Suabia.* After the campaign was ended, he visited the court of Prussia, where he laid such schemes as suspended the disputes with the Dutch about King William's estate; which wise conduct caused the whole confederacy to acknowledge that he had done the greatest service possible to the common cause. Upon his return to England, the queen, to perpetuate his memory, granted the interest of the crown in the honour and manor of Woodstock and hundred of Wotton to him and his heirs for ever. In 1705 he made a tour to Vienna, upon the invitation of the emperor Joseph; who highly caressed him, and made him a grant of the lordship of Mildenheim. After the campaign of 1708, the speaker of the house of commons was sent to Brussels on purpose to compliment him; and on his return to England he was again complimented in the house of lords by Lord Chancellor Cowper. All his services, however, and all the honours conferred upon him, were not sufficient to preserve him from being disgraced. After the change of the ministry in 1710, his interest daily declined; and in 1712, on the first day of the new year, he was removed from all his places. Finding all arts used to render him obnoxious in his native country, he visited his principality of Mildenheim, and several towns in Germany; after which he returned to England, and arrived there on the day of the queen's death. After being welcomed by the nobility and foreign ministers, he attended on King George I. in his public entry through London, who appointed him captain-general, colonel of the first regiment of foot guards, one of the commissioners for the government of Chelsea hospital, and master general of the ordnance. Some years before his death, he retired from public business. He died at Windsor-lodge in 1722, aged 73; leaving behind him a very numerous posterity, allied to the noblest and greatest families in these kingdoms. Upon his demise all parties united in doing honour, or rather justice, to his merit, and his corpse was interred the 9th of August following, with all the solemnity due to a person who had deserved so highly of his country, in Westminster-abbey. The noble pile near Woodstock, which bears the name of Blenheim-house, may be justly styled his monument: but without pretending to the gift of prophecy, one may venture to foretel, that his glory will long survive that structure; and that so long as our histories remain, or indeed the histories of Europe, his memory will live and be the boast of Britain, which by his labours was raised to be the first of nations, as during the age in which he lived he was deservedly esteemed the first of men. If he had foibles, as these are inseparable from human nature, they were so hidden by the glare of his virtues as to be scarcely perceived, or were willingly forgotten. A certain parasite, who thought to please Lord Bolingbroke by ridiculing the avarice of the duke, was stopt short by his lordship; who said, "He was so very great a man, that I forgot he had that vice."

Out of a variety of anecdotes and testimonies concerning this illustrious personage, collected in the new edition of the *Biographia Britannica*, the following selection may serve to illustrate more particularly his disposition and manners.

One of the first things which he did, when very young, was to purchase a box to put his money in; an indication this of the economical, not to say avaricious, temper that accompanied him through life. Dr Joseph Warton relates, that, on the evening of an important battle, the duke was heard to chide his servant for having been so extravagant as to light four candles in his tent when Prince Eugene came to confer with him. Mr Tyers, on the other hand, mentioned a circumstance, which, if well founded, redounds to his grace's generosity; though in a different respect it is much to his discredit: It is, that during the rebellion in 1715, he sent 10,000l. to the earl of Mar. We consider the story only as a traditional report, which has not in itself any great degree of probability; and therefore we are by no means convinced of its truth. The late Mr Richardson junior, the painter, hath recorded a pleasing instance of the duke's calmness of disposition; for which, indeed, he was always remarkable. "The duke of Marlborough (says the writer), riding out once with Commissary Marriot, near the commissary's house in the country, it began to rain, and the duke called for his cloak; Marriot having his put on by his servant immediately. The duke's servant not bringing the cloak, he called for it again; but the man was still puzzling about the straps and buckles. At last, it raining now very hard, the duke called again, and asked him, "what he was about that he did not bring his cloak?" 'You must stay (grumbles the fellow), if it rains cats and dogs, till I can get at it.' The duke only turned to Marriot and said, "I would not be of that fellow's temper." The duke of Marlborough (adds Mr Richardson) did by nature and constitution, what Seneca judged by philosophy ought to be done. *Quid est quare ego servi mei hilarius responsum, et contumaciorem vultum, flagellis et compedibus expiem?*

Dr Swift, in one of his letters to Stella, relates the following particulars concerning the duke of Marlborough. "I was early this morning with Secretary St John, and gave him a memorial to get the queen's letter for the first-fruits, who has promised to do it in a very few days. He told me 'he had been with the duke of Marlborough, who was lamenting his former wrong steps in joining with the Whigs, and said he was worn out with age, fatigue, and misfortunes.' I swear it pitied me; and I really think they will not do well in too much mortifying that man, although indeed it is his own fault. He is covetous as hell, and ambitious as the prince of it: he would fain have been general for life, and has broken all endeavours for peace, to keep his greatness and get money. He told the queen 'he was neither covetous nor ambitious.' She said, 'if she could conveniently have turned about, she would have laughed, and could hardly forbear it in his face.' He fell in with all the abominable measures of the late ministry, because they gratified him for their own designs. Yet he has been a successful general, and I hope he will continue his command."

Various characters have been drawn of the duke of Marlborough; most of which we shall omit, as either already sufficiently known, or as not meriting particular notice. That which is given of him by Dr Swift, in his "History of the four last years of the queen," has all the malignity and meanness of a party pamphlet. It is even so foolish as to insinuate, that the duke's

Churchill. duke's military accomplishments were problematical, and that he was destitute of personal courage. Mr Macpherson's character of his grace is very elaborately composed, and displays no small degree of ability and penetration; though it is not, perhaps, entirely free from prejudice. The historian considers it as a fact, that Lord Churchill, at the time of the revolution, had a design of placing his unfortunate master King James II. a prisoner in the hands of his rival the prince of Orange. But this story must be regarded as wholly unworthy of credit. It is founded upon suggestions and informations so groundless and even ridiculous, that it cannot deserve a formal refutation. On the other hand, Mr Macpherson has done justice to the duke of Marlborough's prosecution of the war in Flanders, and hath shown that he conducted it upon the principles of sound wisdom and good policy.

There are two testimonies to the honour of the duke's memory, by two celebrated noble writers, which cannot be passed over. One is by Lord Bolingbroke, in his letters on the Study and Use of History. Speaking of the consternation raised among the allies of the grand confederacy by the death of King William, and of the joy which that event gave to the French, his lordship observes, that "a short time showed how vain the fears of some and the hopes of others were. By his death, the duke of Marlborough was raised to the head of the army, and indeed of the confederacy: where he, a new, a private man, a subject, acquired, by merit and by management, a more deciding influence than high birth, confirmed authority, and even the crown of Great Britain, had given to King William. Not only all the parts of that vast machine, the grand alliance, were kept more compact and entire, but a more rapid and vigorous motion was given to the whole: and instead of languishing out disastrous campaigns, we saw every scene of the war full of action. All those wherein he appeared, and many of those wherein he was not then an actor, but abettor however of their action, were crowned with the most triumphant success. I take, with pleasure, this opportunity of doing justice to that great man, whose faults I knew, whose virtues I admired; and whose memory, as the greatest general, and as the greatest minister, that our country, or perhaps any other, has produced, I honour."

The other testimony to the duke's accomplishments is by the earl of Chesterfield, in his Letters to his Son. "Of all the men (says his lordship) that ever I knew in my life (and I knew him extremely well), the late duke of Marlborough possessed the graces in the highest degree, not to say engrossed them: and indeed he got the most by them; for I will venture (contrary to the custom of profound historians, who always assign deep causes for great events) to ascribe the better half of the duke of Marlborough's greatness and riches to those graces. He was eminently illiterate; wrote bad English, and spelled it still worse. He had no share of what is commonly called *parts*; that is, he had no brightness, nothing shining in his genius, He had had, most undoubtedly, an excellent good plain understanding, with sound judgment. But these alone would probably have raised him but something higher than they found him, which was page to King James II.'s queen. There the graces protected and promoted him: for while he was an ensign of the guards, the duchess of Cleveland, then favourite mistress to King Charles II. struck by those very graces, gave him 5000l.; with which he immediately brought an annuity for his life of 500l. of my grandfather Halifax; which was the foundation of his subsequent fortune. His figure was beautiful; but his manner was irresistible by either man or woman. It was by this engaging graceful manner that he was enabled, during all his wars, to connect the various and jarring powers of the grand alliance, and to carry them on to the main object of the war, notwithstanding their private and separate views, jealousies, and wrongheadedness. Whatever court he went to (and he was often obliged to go himself to some testy and refractory ones,) he as constantly prevailed, and brought them into his measures. The pensionary Heinsius, a venerable old minister, grown gray in business, and who had governed the republic of the United Provinces for more than 40 years, was absolutely governed by the duke of Marlborough, as that republic feels to this day. He was always cool; and nobody ever observed the least variation in his countenance: he could refuse more gracefully than other people could grant; and those who went away from him the most dissatisfied as to the substance of their business, were yet personally charmed with him, and in some degree comforted by his manner. With all his gentleness and gracefulness, no man living was more conscious of his situation, nor maintained his dignity better."

A perusal of the above passage will convince us of the frivolous turn of the earl of Chesterfield's mind. His lordship, in his zeal to exalt the duke of Marlborough's external accomplishments, either forgets or depreciates the far greater talents of which he was possessed. There is an observation upon the subject in the British Biography, with which we entirely concur. "That the duke of Marlborough (says the writer) was eminently distinguished for the gracefulness of his manners, cannot be questioned; but the earl of Chesterfield appears to have attributed too much to their influence, when he ascribes—the better half of the duke of Marlborough's greatness and riches to those graces. That the uncommon gracefulness of his manners facilitated his advancement, and contributed to the success of his negotiations, may readily be admitted; but surely it must have been to much higher qualities that he owed the esteem of King William and of Prince Eugene, his reputation throughout all Europe, and his many victories and conquests. It was not by a polite exterior that he obtained his laurels at Schellenberg, at Oudenarde, at Ramillies, and at Blenheim."

How much the duke of Marborough has been celebrated by our poets, is well known by Addison's "Campaign;" and by Philips's "Bleinheim." Mr Addison, in his Rosamond, has properly assumed another and voluntary occasion of paying a fine compliment to his grace's military exploits, and the glory by which they would be followed. Upon the duke's removal from his places, an ode was inscribed to him by Mr Somerville, animated with all the zeal of whiggish enthusiasm, and containing some passages that are truly poetical. Another ode, not much inferior in spirit, was

Churchill. was addressed to his grace, on occasion of his embarking for Ostend in the year 1712.

The duke of Marlborough's Scots title of Baron Eyemouth, being to heirs male, died with himself; but his English title going to his daughters and their heirs-male, went into the Spencer family, who retain their own surname of Spencer.

CHURCHILL, *Charles*, a celebrated satirist, the son of Mr Charles Churchill, curate and lecturer of St John's, Westminster, was educated at Wesminster school, and received some applause for his abilities from his tutors in that famous seminary. His capacity, however, was greater than his application, so that he acquired the character of a boy that could do good if he would. As the slightest accounts of persons so noted are agreeable, it may not be amiss to observe, that having one day got an exercise to make, and from idleness or attention having failed to bring it at the time appointed, his master thought proper to chastise him with some severity, and even reproached his stupidity: what the fear of stripes could not effect, the fear of shame soon produced, and he brought his exercise the next day, finished in such a manner, that he received the public thanks of all the masters. Still, however, his progress in the learned languages was but slow; nor is it to be wondered at, if we consider how difficult it was for a strong imagination, such as he was possessed of, to conform and walk tamely forward in the trammels of a school education; minds like his are ever starting aside after new pursuits; desirous of embracing a multiplicity of amusing objects; eager to come at an end, without the painful investigation of the means. In short, for want of proper skill in these languages, he was rejected from Oxford, whither his father had sent him; and probably this might have given occasion to the frequent invectives we find in his works against that most respectable university. Upon his return from thence, he again applied to his studies in Westminster school, where, at 17 years of age, he contracted an intimacy with a lady, to whom he was married, and their mutual regard for each other continued for several years. At the usual age of going into orders, Mr Churchill was ordained by the late bishop of London, and obtained a small curacy in Wales of 30l. a-year. Thither he carried his wife; they took a small house; and he passed through the duties of his station with assiduity and cheerfulness. Happy had it been for him had he continued there to enjoy the fruits of piety, peace, and simplicity of manners. He was beloved and esteemed by his parishioners; and though his sermons were rather above the level of his audience, they were commended and followed. But endeavouring to advance his fortune, by keeping a cyder cellar, it involved him in difficulties which obliged him to leave Wales and come to London. His father dying soon after, he stepped into the church in which he had officiated; and in order to improve his income, which scarcely produced 100l. a-year, he taught young ladies to read and write English at a boarding school, kept by Mrs Dennis, where he behaved with that decency and decorum which became his profession. His method of living, however, bearing no proportion to his income, he contracted several debts in the city; which being unable to pay, a jail, the terror of indigent genius, seemed ready to complete his misfortunes; but from this state of wretchedness he was relieved by the benevolence of Mr Lloyd, father to the poet of that name. Meanwhile, Mr Lloyd, the son, wrote a poetical epistle called the *Actor*, which being read and approved by the public, gave the author a distinguished place among the writers of his age. This induced Mr Churchill to write the *Rosciad*. It first came out without the author's name; but the justness of the remarks, and the severity of the satire, soon excited public curiosity. Though he never disowned his having written that piece, and even openly gloried in it; yet the public, unwilling to give so much merit to one alone, ascribed it to a combination of wits, nor were Messrs Lloyd, Thornton, or Colman, left unnamed upon this occasion. This misplaced praise soon induced Mr Churchill to throw off the mask, and the second edition appeared with his name at full length. As the Rosciad was the first of this poet's performances, so many are of opinion that it is the best. In it we find a very close and minute discussion of the particular merit of each performer; their defects pointed out with candour, and their merits praised without adulation. This poem, however, seems to be one of those few works which are injured by succeeding editions; when he became popular, his judgment became intoxicated with applause; and we find, in the later editions, men blamed whose merit was incontestable, and others praised that were at that time in no degree of esteem with the judicious. His next performance was his *Apology to the Critical Reviewers*. This work is not without its peculiar merit; and as it was written against a set of critics whom the world was willing enough to blame, the public read it with their usual indulgence. In this performance he showed a particular happiness of throwing his thoughts, if we may so express it, into poetical paragraphs; so that the sentence swells to the break or conclusion, as we find in prose.

But while his writings amused the town, his actions disgusted it. He now quitted his wife, with whom he had cohabited many years; and resigning his gown and all clerical functions, commenced a complete *man of the town*, got drunk, frequented stews; and, giddy with false praise, thought his talents a sufficient atonement for all his follies. In some measure to palliate the absurdities of his conduct, he now undertook a poem called *Night*, written upon a general subject indeed, but upon false principles; namely, that whatever our follies are, we should never attempt to conceal them. This, and Mr Churchill's other poems, being shown to Dr Johnson, and his opinion being asked, he allowed them but little merit; which being told to the author, he resolved to requite this private opinion with a public one. In his next poem, therefore, of the *Ghost*, he has drawn this gentleman under the character of Pomposo; and those who disliked Dr Johnson allowed it to have merit. Dr Johnson's only reply to Churchill's abuse was, "that he thought him a shallow fellow in the beginning, and could say nothing worse of him still." The poems of Night and the Ghost had not the rapid sale the author expected; but his *Prophecy of Famine* soon made ample amends for the late paroxysm in his fame. In this piece, written in the spirit of the famous North Briton, CHYTRIUM, in *Ancient Geography*, a place in Ionia, in which formerly stood Clazomene; the Clazomenians, through fear of the Persians, removing from the continent to an adjacent island (Pausanias), Alexander reduced the island, by a mole or causeway, to a peninsula.

CHYTRUS, in *Ancient Geography*, an inland town of Cyprus, to the north of Citium; famous for its excellent honey.

CIANUS SINUS, in *Ancient Geography*, a bay of Bithynia, named from the town and river Cius.

CIBALÆ, or CIBALIS, in *Ancient Geography*, a town of Pannonia Inferior, on an eminence, near the lake Hiulka, to the north-west of Sirmium; the country of the emperor Gratian, where he was brought up to rope-making: a place rendered famous for the surprisal and defeat of Licinius by Constantine.

CIBBER, COLLEY, a celebrated comedian, dramatic writer, and poet laureat to the king, was born at London in 1671. His father Caius Gabriel Cibber, was a native of Holstein, and a skilful statuary, who executed the basso relievo on the pedestal of the Monument, and the two admired figures of lunatics over the piers of the gate to Bethlehem Hospital in Moorfields. Colley, who derived his Christian name from the surname of his mother's family, was intended for the church, but betook himself to the stage, for which he conceived an early inclination; and he was some time before he acquired any degree of notice, or even a competent salary. His first essay in writing, was the comedy of *Love's Last Shift*, acted in 1695, which met with success; as did his own performance of the character of the fop in it. From that time, as he says himself, "My muse and my spouse were so equally prolific, that the one was seldom the mother of a child, but in the same year the other made me the father of a play. I think we had a dozen of each sort between us; of both which kinds some died in their infancy, and near an equal number of each were alive when we quitted the theatre." The *Careless Husband*, acted in 1704, met with great applause, and is reckoned his best play: but none was of more importance to him than the *Nonjuror*, acted in 1717, and levelled against the Jacobites. This laid the foundation of the misunderstanding between him and Mr Pope, raised him to be the hero of the Dunciad, and made him poet-laureat in 1730. He then quitted the stage, except a few occasional performances; and died in 1757. Cibber neither succeeded in writing nor in acting tragedy; and his odes were not thought to partake of the genius or spirit he showed in his comedies.

His son *Theophilus*, also a comic actor after him, was born during a great storm in 1703; and after passing a life of extravagance, distress, and perplexity, perished in another storm in 1758, in the passage between Dublin and England. Theophilus married the sister of Thomas Augustine Arne, the famous musical composer; who became a celebrated tragic actress, and whose honour was sacrificed to her husband's extravagance.

CIBDELOPLACIA, an old term in *Natural History*; applied to spars debased by a very large admixture of earth: they are opaque, formed of thin crusts, covering vegetables and other bodies, by way of incrustations.

Of this genus we have the following species; 1. A grayish white one, with a rough surface. 2. A whitish brown one: both these are friable. 3. A hard, pale brown kind, which is the osteocolla of the shops. 4. The whitish-gray kind, with a smooth surface: this is the unicornu fossil and ceratites of authors. 5. The whitish brown coralloid kind.

CIBDELOSTRACIA, an old term in *Natural History*, including earthy spars, destitute of transparency, formed into thin plates, and usually found coating over the sides of fissures, and other cavities of stones with congeries of them to great extent, and of plain or botryoid surfaces.

Of these there are usually reckoned seven kinds: the first the hard, brownish-white cibdelostracium, found in Germany: the second is the hard, whitish cibdelostracium, with thin crusts, and a smoother surface, found also in the Harts-forest in Germany: the third is the hard, pale-brown cibdelostracium, with numerous very thin crusts, found in subterranean caverns in many parts of England as well as Germany: the fourth is the white, light, and friable cibdelostracium, found also in Germany, but very rarely in any part of England; the fifth is the light, hard, pale-brown cibdelostracium, with a smooth surface, found in almost all parts of the world: the sixth is the whitish, friable, crustaceous cibdelostracium, with a rougher surface, frequent in Germany and England; and the seventh is the brownish-white friable cibdelostracium, with a dusky surface, found in several parts of Ireland as well as Germany.

CIBORIA, in antiquity, the large husks of Egyptian beans, which are said to have been so large as to serve for drinking-cups: whence they had their name *ciborium*, signifying a cup, in the Egyptian language.

CIBORIUM, in ecclesiastical writers, the covering for the altar. This covering is supported by four high columns, and forms a kind of tent for the eucharist, in the Romish churches. Some authors call it *turris gestatoria*, and others *pyxis*; but the pyxis is properly the box in which the eucharist is preserved.

CIBUS FERIALIS, in antiquity, an entertainment peculiar to a funeral; for which purpose, beans, parsley, lettuce, bread, eggs, lentils, and salt, were in use.

CICADA, the FROG-HOPPER or FLEA-LOCUST, a genus of insects belonging to the order of hemiptera. See ENTOMOLOGY *Index*.

CICATRICULA, among natural historians, denotes a small whitish speck in the yolk of an egg, supposed to be the first rudiments of the future chick.

CICATRIX, in *Surgery*, a little seam or elevation of callous flesh rising on the skin, and remaining there after the healing of a wound or ulcer. It is commonly called a *scar*.

CICATRIZANTS, in *Pharmacy*, medicines which assist nature to form a cicatrix. Such are Armenian bole, powder of tutty, &c.

Cicatrizants are otherwise called *escharotics*, *epulotics*, *incarnatives*, *agglutinants*, &c.

CICCA, in *Botany*, a genus of the tetrandria order, belonging to the monœcia class of plants. The male calyx is tetraphyllous; there is no corolla: the female calyx triphyllous; no corolla; four stiles; the capsule quadricoccous or four-berried.

CICELY, in *Botany*, the English name of a species of by the votes of particular citizens, but the common suffrage of the city; nor declared by the voice of the crier, but of the whole Roman people,"

Cicero had no sooner entered upon his office than he had occasion to exert himself against P. Servilius Rullus, one of the new tribunes, who had been alarming the senate with the promulgation of an agrarian law; the purpose of which was to create a decemvirate, or ten commissioners, with absolute power for five years over all the revenues of the republic, to distribute them at pleasure to the citizens, &c. These laws used to be greedily received by the populace, and were proposed therefore by factious magistrates as oft as they had any point to carry with the multitude against the public good; so that Cicero's first business was to quiet the apprehensions of the city, and to baffle, if possible, the intrigues of the tribune. Accordingly, in an artful and elegant speech from the rostra, he gave such a turn to the inclination of the people, that they rejected this law with as much eagerness as they had ever received one. But the grand affair of all, which constituted the glory of his consulship, and has transmitted his name with such lustre to posterity, was the skill he showed, and the unwearied pains he took, in suppressing that horrid conspiracy which was formed by Catiline and his accomplices for the subversion of the commonwealth. For this great service he was honoured with the glorious title of *pater patriæ*, "the father of his country," which he retained for a long time after.

Cicero's administration was now at an end; but he had no sooner quitted his office, than he began to feel the weight of that envy which is the certain fruit of illustrious merit. He was now, therefore, the common mark, not only of all the factious, against whom he had declared perpetual war, but of another party not less dangerous, the envious too, whose united spleen never left him from this moment till they had driven him out of that city which he had so lately preserved. Cicero, upon the expiration of his consulship, took care to send a particular account of his whole administration to Pompey, who was finishing the Mithridatic war in Asia, in hopes to prevent any wrong impressions there from the calumnies of his enemies, and to draw from him some public declaration in praise of what he had been doing. But Pompey being informed by Metellus and Cæsar of the ill humour that was rising against Cicero in Rome, answered him with great coldness, and instead of paying him any compliment, took no notice at all of what had passed in the affair of Catiline, upon which Cicero expostulates with him in a letter which is still extant.

About this time Cicero bought a house of M. Crassus on the Palatine-hill, adjoining to that in which he had always lived with his father, and which he is now supposed to have given up to his brother Quintius. The house cost him near 30,000l. and seems to have been one of the noblest in Rome. It was built about 30 years before by the famous tribune M. Livius Drusus; on which occasion we are told, that when the architect promised to build it for him in such a manner that none of his neighbours should overlook him; "But if you have any skill (replied Drusus), contrive it rather so, that all the world may see what I am doing." The purchase of so expensive a house raised some censure on his vanity; and especially as it was made with borrowed money. This circumstance he himself does not dissemble, but says merrily upon it, that "he was now plunged so deeply in debt, as to be ready for a plot, only that the conspirators would not trust him."

The most remarkable event that happened in this year, which was the 45th of Cicero's life, was the pollution of the mysteries of the *bona dea* by P. Clodius, which, by an unhappy train of consequences, involved Cicero in a great and unexpected calamity. Clodius had an intrigue with Cæsar's wife Pompeia, who, according to annual custom, was now celebrating in her house those awful sacrifices of the goddess, to which no male creature ever was admitted, and where every thing masculine was so scrupulously excluded, that even pictures of that sort were covered during the ceremony. It flattered Clodius's imagination greatly to gain access to his mistress in the midst of her holy ministry; and with this view he dressed himself in a woman's habit, that by the benefit of his smooth face, and the introduction of one of the maids, he might pass without discovery; but by some mistake between him and his guide, he lost his way when he came within the house, and fell unluckily among the other female servants. Here he was detected by his voice, and the servants alarmed the whole company by their shrieks, to the great amazement of the matrons, who threw a veil over their sacred mysteries, while Clodius found means to escape. The story was presently spread abroad, and raised a general scandal and horror throughout the city. The whole defence which Clodius made when, by order of the senate, he was brought to trial, was to prove himself absent at the time of the fact, for which purpose he produced two men to swear that he was then at Interamna, about two or three days journey from the city. But Cicero being called upon to give his testimony, deposed, that Clodius had been with him that very morning at his house in Rome. Irritated by this, Clodius formed a scheme of revenge. This was to get himself chosen tribune, and in that office to drive Cicero out of the city, by the publication of a law, which, by some stratagem or other, he hoped to obtrude upon the people. But as all patricians were incapable of the tribunate, by its original institution, so his first step was to make himself a plebeian, by the pretence of an adoption into a plebeian house, which could not yet be done without the suffrage of the people. The first triumvirate was now formed, which was nothing else in reality but a traitorous conspiracy of three of the most powerful citizens of Rome, to extort from their country by violence what they could not obtain by law. Pompey's chief motive was to get his acts confirmed by Cæsar in his consulship, which was now coming on; Cæsar, by giving way to Pompey's glory, to advance his own; and Crassus, to gain that ascendence by the authority of Pompey and Cæsar, which he could not sustain alone. Cicero might have made what terms he pleased with the triumvirate, and been admitted even a partner of their power, and a fourth in their league; but he would not enter into any engagements with the three, whose union he and all his friends of the republic abhorred. Clodius, in the mean time, had been pushing employed all their common friends to press him with letters on that subject; all which was done; but in vain, for Cicero was impatient to be gone to Pompey. In the mean time, these letters give us a most sensible proof of the high esteem and credit in which Cicero flourished at this time in Rome; when in a contest for empire, which force alone was to decide, we see the chiefs on both sides so solicitous to gain a man to their party, who had no peculiar skill in arms or talents for war. Pursuing, however, the result of all his deliberations, he embarked at length to follow Pompey, who had been obliged to quit Italy some time before, and was then at Dyrrhachium; and arrived safely in his camp with his son, his brother, and his nephew, committing the fortunes of the whole family to the issue of that cause. After the battle of Pharsalia, in which Pompey was defeated, Cicero returned into Italy, and was afterwards received into great favour by Cæsar, who was now declared dictator the second time, and Mark Antony his master of horse. We may easily imagine, what we find indeed from his letters, that he was not a little disconcerted at the thoughts of an interview with Cæsar, and the indignity of offering himself to a conqueror against whom he had been in arms; for though upon many accounts he had reason to expect a kind reception from Cæsar, yet he hardly thought his life, he says, worth begging, since what was given by a master might always be taken away again at pleasure. But at their meeting he had no occasion to say or do any thing that was below his dignity; for Cæsar no sooner saw him than he alighted, ran to embrace him, and walked with him alone, conversing very familiarly, for several furlongs.

Cicero was now in his 61st year, and forced at last to part with his wife Terentia, whose humour and conduct had been long uneasy to him. She was a woman of an imperious and turbulent spirit, and though he had borne her perverseness in the vigour of health, and flourishing state of his fortunes; yet, in declining life, soured by a continual succession of mortifications from abroad, the want of ease and quiet at home was no longer tolerable to him. But he was immediately oppressed by a new and most cruel affliction, the death of his beloved daughter Tullia, who died in child-bed soon after her divorce from her third husband Dolabella. She was about 32 years old at the time of her death; and, by the few hints which are left of her character, appears to have been an excellent and admirable woman. She was most affectionately and piously observant of her father, and, to the usual graces of her sex, having added the more solid accomplishments of knowledge and polite letters, was qualified to be the companion and delight of his age; and was justly esteemed not only as one of the best, but the most learned of the Roman ladies. His affliction for the death of this daughter was so great, that to shun all company as much as he could, he removed to Atticus's house, where he lived chiefly in his library, turning over every book he could meet with on the subject of moderating grief. But finding his residence here too public, and a greater resort to him than he could bear, he retired to Asturia, one of his seats near Antium; a little island on the Latian shore, at the mouth of a river of the same name, covered with wood and groves cut into shady walks; a scene of all others the fittest to indulge melancholy, and where he could give a free course to his grief. "Here (says he to Atticus) I live without the speech of man; every morning early I hide myself in the thickest of the wood, and never come out till the evening. Next to yourself, nothing is so dear to me as this solitude; and my whole conversation is with my books." Indeed his whole time was employed in little else than reading and writing during Cæsar's administration, which he could never cheerfully submit to; and it was within this period that he drew up one of the gravest of those philosophical pieces which are still extant in his works.

Upon the death of Cæsar, Octavius his nephew and heir coming into Italy, was presented to Cicero by Hirtius and Pansa, with the strongest professions on the part of the young man that he would be governed entirely by his direction. Indeed Cicero thought it necessary to cherish and encourage Octavius, if for nothing else, yet to keep him at a distance from Antony; but could not yet be persuaded to enter heartily into his affairs. He suspected his youth and want of experience; and that he had not strength enough to deal with Antony; and, above all, that he had no good disposition towards the conspirators. He thought it impossible he should ever be a friend to them; and was persuaded rather, that if ever he got the upper hand, his uncle's acts would be more violently enforced, and his death more cruelly revenged, than by Antony himself. And when Cicero did at last consent to unite himself to Octavius's interests, it was with no other view but to arm him with a power sufficient to oppress Antony; yet so checked and limited, that he should not be able to oppress the republic.

In the midst of all this political bustle, he was still prosecuting his studies with his usual application; and besides some philosophical pieces, now finished his book of offices, or the duties of man, for the use of his son: A work admired by all succeeding ages as the most perfect system of Heathen morality, and the noblest effort and specimen of what reason could do in guiding men through life with innocence and happiness. However, he paid a constant attention to public affairs; missed no opportunities, but did every thing that human prudence could do for the recovery of the republic: for all that vigour with which it was making this last effort for itself, was entirely owing to his counsels and authority. This appears from those memorable philippics which from time to time he published against Antony, as well as from other monuments of antiquity. But all was in vain; for though Antony's army was entirely defeated at the siege of Modena, which made many people imagine that the war was at an end, and the liberty of Rome established; yet the death of the consuls Pansa and Hirtius in that action gave the fatal blow to all Cicero's schemes, and was the immediate cause of the ruin of the republic.

Octavius having subdued the senate to his mind, marched towards Gaul to meet Antony and Lepidus; who had already passed the Alps, and brought their armies into Italy, in order to have a personal interview with him; which had been privately concerted for settling the terms of a triple league, and dividing the power and provinces of Italy among themselves.

an important public object roused his mind, and demanded indignation and force, he departs considerably from that loose and declamatory manner to which he at other times is addicted, and becomes very forcible and vehement. This great orator, however, is not without his defects. In most of his orations there is too much art, even carried to a degree of ostentation. He seems often desirous of obtaining admiration rather than of operating conviction. He is sometimes, therefore, showy rather than solid, and diffuse where he ought to have been urgent. His sentences are always round and sonorous. They cannot be accused of monotony, since they possess variety of cadence; but from too great a fondness for magnificence, he is on some occasions deficient in strength. Though the services which he had performed to his country were very considerable, yet he is too much his own panegyrist. Ancient manners, which imposed fewer restraints on the side of decorum, may in some degree excuse, but cannot entirely justify, his vanity."

CICHORIUM, SUCCORY. See BOTANY *Index*.

CICINDELA, the SPARKLER, in *Zoology*, a genus of insects belonging to the order of coleoptera. See ENTOMOLOGY *Index*.

CICISBEO, an Italian term, which in its etymology signifies a *whisperer*; a term bestowed in Italy both on lovers, and those who to outward appearance act as such, waiting on married ladies with as much attention and respect as if they were their lovers. This Italian custom has been spoken of very reproachfully by some writers: Mr Baretti has taken great pains to vindicate it. He ascribes it to a spirit of gallantry, derived from the ages of chivalry, and much heightened and refined by the revival of the Platonic philosophy in Italy, about the thirteenth century; and by the verses of Petrarch in compliment to the beautiful Laura, and his numerous imitators.

CICLUT, or CICLUCH, a strong frontier town of Dalmatia, situated on the river Narentha, in E. Long. 18. 22. N. Lat. 43. 29. It is surrounded with walls built in the ancient manner, and was taken by the Venetians from the Turks in 1694.

CICONES, a people of Thrace near the Hebrus. Ulysses at his return from Troy conquered them, and plundered their chief city Ismarus. They tore to pieces Orpheus for his obscene indulgencies.

CICUTA, properly signifies a hollow intercepted between two knots, of the stalks or reeds of which the ancient shepherds used to make their pipes. It is now, however, generally used to signify the water-hemlock, and also the common sort; but Linnæus has described the latter under the old name of CONIUM. See that article.

There are three species of water-hemlock; the virosa, the bulbifera, and the maculata. Of these the first is the only one remarkable, and that for the poisonous qualities of its roots, which have been often known to destroy children who ate them for parsnips.

CICUTA is also used, chiefly among the ancients, for the juice of liquor expressed from the above plant, being the common poison wherewith the state criminals at Athens were put to death: Though some have suggested, that the poisonous draught to which the Athenians doomed their criminals was an inspissated juice compounded of the juice of *cicuta* and some other corrosive herbs.

Socrates drank the *cicuta*.—Plato, in his dialogue on the immortality of the soul, observes, that "The executioner advised Socrates not to talk, for fear of causing the *cicuta* to operate too slowly." M. Petit, in his *Observationes Miscellaneæ*, remarks, that this advice was not given by the executioner out of humanity, but to save the *cicuta*; for he was only allowed so much poison per ann. which, if he exceeded, he was to furnish at his own expence. This construction is confirmed by a passage in Plutarch: the executioner who administered the *cicuta* to Phocion, not having enough, Phocion gave him money to buy more; observing by the way, "that it was odd enough, that at Athens a man must pay for every thing, even for his own death."

CID, RODERIGO DIAS LE, a Castilian officer, who was very successful against the Moors, under Ferdinand II. king of Castile; but whose name would hardly have been remembered, if Corneille had not made his passion for Chimene the subject of an admired tragedy, founded on a simple but affecting incident. The Cid is desperately in love with Chimene, daughter of the count de Gomes; but he is at variance with the count, and being challenged by him, kills him in a duel. The conflict between love and honour in the breast of Chimene, who at length pardons and marries the Cid, forms the beauty of the piece. He died in 1098.

CIDARIS, in antiquity, the mitre used by the Jewish high-priests. The Rabbins say, that the bonnet used by priests in general was made of a piece of linen cloth 16 yards long, which covered their heads like a helmet or turban; and they allow no other difference between the high-priest's bonnet and that of other priests, than that the one is flatter, and more in the form of a turban; whereas that worn by ordinary priests rose something more in a point.

CIGNANI, CARLO, an Italian painter, was born at Bologna in 1628: and was the disciple of Albani. He was esteemed by Pope Clement XI. who nominated him prince of the academy of Bologna, and loaded him with favours. Cignani died at Forli in 1719. The cupola of la Madona del Fuoco at Forli, in which he represented Paradise, is an admirable work. His principal pictures are at Rome, Bologna, and Forli.

CIGOLI, or CIVOLI, the painter. See CIVOLI.

CILIA, the EYE-LASHES. See ANATOMY *Index*.

CILIATED LEAF, among botanical writers, one surrounded with parallel filaments somewhat like the hairs of the eyelids.

CILICIA, an ancient kingdom of Asia, lying between the 36th and 40th degree of north latitude: bounded on the east by Syria, or rather by Mount Amanus, which separates it from that kingdom; by Pamphylia on the west; by Isauria, Cappadocia, and Armenia Minor, on the north; and by the Mediterranean sea on the south. It is so surrounded by steep and craggy mountains, chiefly Taurus and Amanus, that it may be defended by a handful of resolute men against a numerous army, there being but three narrow passes leading into it, commonly called *Pylæ Ciliciæ*, or the gates of Cilicia; one on the side of Cappadocia, Cimbri. under the consul Papirius Carbo. On the approach of the Roman army, the Cimbri made proposals of peace. The consul pretended to accept of it; but having thrown them into a disadvantageous situation, treacherously attacked their camp. His perfidy was rewarded as it deserved; the Cimbri ran to arms, and not only repulsed the Romans, but, attacking them in their turn, utterly defeated them, and obliged the shattered remains of their forces to conceal themselves in the neighbouring forests. After this victory the Cimbri entered Transalpine Gaul, which they quickly filled with slaughter and desolation. Here they continued five or six years, when another Roman army under the consul Silanus marched against them. This general met with no better success than Carbo had done. His army was routed at the first onset; in consequence of which, all Narbonne Gaul was exposed at once to the ravages of these barbarians.

About 105 years before Christ, the Cimbri began to threaten the Roman empire itself with destruction. The Gauls marched from all parts with a design to join them, and to invade Italy. The Roman army was commanded by the proconsul Cæpio, and the consul Mallius; but as these two commanders could not agree, they were advised to separate, and divide their forces. This advice proved the ruin of the whole army. The Cimbri immediately fell upon a strong detachment of the consular army commanded by M. Aurelius Scaurus, which they cut off to a man, and made Scaurus himself prisoner. Mallius being greatly intimidated by this defeat, desired a reconciliation with Cæpio, but was haughtily refused. He moved nearer the consul, however, with his army, that the enemy might not be defeated without his having a share in the action. The Cimbri, by this movement, imagining the commanders had made up their quarrel, sent ambassadors to Mallius with proposals of peace. As they could not help going through Cæpio's camp, he ordered them to be brought before him; but finding they were empowered to treat only with Mallius, he could scarce be restrained from putting them to death. His troops, however, forced him to confer with Mallius about the proposals sent by the barbarians: but as Cæpio went to the consul's tent against his will, so he opposed him in every thing; contradicted with great obstinacy, and insulted him in the grossest manner. The deputies on their return acquainted their countrymen that the misunderstanding between the Roman commanders still subsisted; upon which the Cimbri attacked the camp of Cæpio, and the Gauls that of Mallius. Both were forced, and the Romans slaughtered without mercy. Eighty thousand citizens and allies of Rome, with 40,000 servants and sutlers, perished on that fatal day. In short, of the two Roman armies only 10 men, with the two generals, escaped to carry the news of so dreadful a defeat. The conquerors destroyed all the spoil, pursuant to a vow they had made before the battle. The gold and silver they threw into the Rhone, drowned the horses they had taken, and put to death all the prisoners.

The Romans were thrown into the utmost consternation on the news of so terrible an overthrow. They saw themselves threatened with a deluge of Cimbri and Gauls, numerous enough to overrun the whole country. They did not, however, despair. A new army was raised with incredible expedition; no citizen whatever who was fit to bear arms being exempted. On this occasion also, fencing-masters were first introduced into the Roman camp; by which means the soldiers were soon rendered in a manner invincible. Marius, who was at that time in high reputation on account of his victories in Africa, was chosen commander, and waited for the Cimbri in Transalpine Gaul: but they had resolved to enter Italy by two different ways; the Cimbri over the eastern, and the Teutones and other allies over the western Alps. The Roman general, therefore, marched to oppose the latter, and defeated the Ambrones and Teutones with great slaughter *. The Cimbri, in the mean time, entered Italy, and struck the whole country with terror. Catullus and Sylla attempted to oppose them; but their soldiers were so intimidated by the fierce countenances and terrible appearance of these barbarians, that nothing could prevent their flying before them. The city of Rome was now totally defenceless; and, had the Cimbri only marched briskly forwards they had undoubtedly become masters of it; but they waited in expectation of being joined by their allies the Ambrones and Teutones, not having heard of their defeat by Marius, till the senate had time to recal him to the defence of his country. By their order he joined his army to that of Catullus and Sylla; and upon that union was declared commander in chief. The Roman army consisted of 52,300 men. The cavalry of the Cimbri were no more than 15,000, but their foot seemed innumerable; for, being drawn up in a square, they are said to have covered 30 furlongs. The Cimbri attacked the Romans with the utmost fury; but, being unaccustomed to bear the heats of Italy, they soon began to lose their strength, and were easily overcome. But they had put it out of their power to fly; for, that they might keep their ranks the better, they had, like true barbarians, tied themselves together with cords fastened to their belts, so that the Romans made a most terrible havoc of them. The battle was therefore soon over, and the whole day employed only in the most terrible butchery. An hundred and twenty thousand were killed on the field of battle, and 60,000 taken prisoners. The victorious Romans then marched to the enemy's camp, where they had a new battle to fight with the women, whom they found more fierce than even their husbands had been. From their carts and waggons, which formed a kind of fortification, they discharged showers of darts and arrows on friends and foes without distinction. They first suffocated their children in their arms, and then put an end to their own lives. The greatest part of them hanged themselves on trees. One was found hanging at a cart with two of her children at her heels. Many of the men, for want of trees and stakes, tied strings in running knots about their necks, and fastened them to the tails of their horses, and the horns and feet of their oxen, in order to strangle themselves that way; and thus the whole multitude was destroyed.

The country of the Cimbri, which, after this terrible catastrophe, was left a mere desert, was again peopled by the Scythians; who being driven by Pompey out of that vast space between the Euxine and the Caspian sea, marched towards the north and west of Europe,

* See Ambrones and Teutones.

Europe, subduing all the nations they met with in their way. They conquered Russia, Saxony, Westphalia, and other countries as far as Finland, Norway, and Sweden. It is pretended that Wodin their leader, traversed so many countries, and endeavoured to subdue them, only with a view to excite the people against the Romans; and that the spirit of animosity which he had excited operated so powerfully after his death, that the northern nations combined to attack it, and never ceased their incursions till it was totally subverted.

CIMEX, or BUG, in *Zoology*, a genus of insects belonging to the order of hemiptera. See ENTOMOLOGY *Index*.

The methods of expelling house bugs are various, as oil of turpentine, the smoke of corn-mint, of narrow-leaved wild cress, of herb-robert, of the reddish agaric, of mustard, Guinea pepper, peats, or turf, &c. See also BUG and CIMICIFUGA.

CIMICIFUGA. See BOTANY *Index*.

The cimicifuga fœtida has obtained the name of *cimicifuga*, or *bugbane*, both in Siberia and Tartary, from its property of driving away those insects; and the botanists of those parts of Europe which are infested with them have long desired to naturalise it in their several countries. Gmelin mentions that in Siberia the natives also use it as an evacuant in dropsy, and that its effects are violently emetic and drastic.

CIMMERII, anciently a people near the Palus Mæotis. They invaded Asia Minor 1284 years before Christ, and seized upon the kingdom of Cyaxares. After they had been masters of the country for 28 years, they were driven back by Alyates king of Lydia. The name also of another nation on the western coast of Italy. The country which they inhabited was supposed to be so gloomy, that to express a great obscurity, the expression of *Cimmerian darkness* has proverbially been used; and Homer, according to Plutarch, drew his images of hell and Pluto from the gloomy and dismal country where they dwelt.

CIMMERIUM, in *Ancient Geography*, a town at the mouth of the Palus Mæotis; from which the Bosphorus Cimmerius is named; that strait which joins the Euxine and the Palus Mæotis. *Cimmerii* was the name of the people (Homer): and here stood the Promontorium Cimmerium (Ptolemy); and hence probably the modern appellation *Crim*.

CIMMERIUM, in *Ancient Geography*, a place near Baiæ, in Campania, where formerly stood the cave of the sibyl. The people were called *Cimmerii*, who living in subterraneous habitations, from which they issued in the night to commit robberies and other acts of violence, never saw the light of the sun (Homer). To give a natural account of this fable, Festus says, there was a valley surrounded with a pretty high ridge, which precluded the morning and evening sun.

CIMOLIA TERRA, in *Natural History*, a name applied by the ancients to an earth, at one time much employed in medicine; but which later ages have supposed to be no other than our tobacco-pipe clay and fullers earth.

The cimolia terra of the ancients was found in several of the islands of the Archipelago, particularly in the island of Cimolus, from whence it has its name. It was used with great success in the erysipelas, inflammations, and the like, being applied by way of cataplasm to the part. They also used, as we do, what we call *cimolia*, or fullers earth, for the cleansing of clothes. This earth of the ancients, though so long disregarded, and by many supposed to be lost, is yet very plentiful in Argentiere (the ancient Cimolus), Sphanto, and many of those islands. It is a marl of a lax and crumbly texture, and a pure bright white colour, very soft to the touch. It adheres firmly to the tongue, and, if thrown into water, raises a little hissing and ebullition, and moulders to a fine powder. It makes a considerable effervescence with acids, and suffers no change of colour in the fire. These are the characters of what the ancients called simply *terra cimolia*; but besides this, they had from the same place another earth which they called by the same general name, but distinguished by the epithet purple, *purpurescens*. This they described to be fattish, cold to the touch, of a mixed purple colour, and nearly as hard as a stone. And this was evidently the substance we call *steatites*, or the *soap-rock*, common in Cornwall, and also in the island of Argentiere, or Cimolus.

CIMOLIA *Alba*, the officinal name of the earth of which we now make tobacco-pipes. Its distinguishing characters are, that it is a dense, compact, heavy earth, of a dull white colour, and very close texture; it will not easily break between the fingers, and slightly stains the skin in handling. It adheres firmly to the tongue; melts very slowly in the mouth, and is not readily diffusible in water. It is found in many places. That of the isle of Wight is much esteemed for its colour. Great plenty of it is found near Pole in Dorsetshire, and near Wedensbury in Staffordshire.

CIMOLIA *Nigra*, is of a dark lead colour, hard, dry, and heavy: of a smooth compact texture, and not viscid: it does not colour the hands; crumbles when dry; adheres to the tongue; diffuses slowly in water; and is not acted upon by acids. It burns perfectly white, and acquires a considerable hardness. The chief pits for this clay are near Northampton, where it is used in the manufacture of tobacco-pipes. It is also mixed with the critche clay of Derbyshire, in the proportion of one part to three, in the manufacture of the hard reddish brown ware.

CIMOLUS, in *Ancient Geography*, one of the Cyclades, now called *Argentiere*.

CIMON, an Athenian, son of Miltiades and Hegisipyle. He was famous for his debaucheries in his youth, and the reformation of his morals when arrived to years of discretion. He behaved with great courage at the battle of Salamis, and rendered himself popular by his munificence and valour. He defeated the Persian fleet, took 200 ships, and totally routed their land army, the very same day, A. U. C. 284. The money that he had obtained by his victories was not applied for his own private use, but with it he fortified and embellished the city. He some time after lost all his popularity, and was banished by the Athenians, who declared war against the Lacedæmonians. He was recalled from his exile, and at his return he made a reconciliation between Lacedæmon and his countrymen. He was afterwards appointed to carry on the war against Persia in Egypt and Cyprus, with a fleet of 200 ships, and on the coast of Asia he gave battle to the enemy, and totally ruined their fleet, A. U. C. 304.

He died as he was besieging the town of Citium in Cyprus. He may be called the last of the Greeks whose spirit and boldness defeated the armies of the barbarians. He was such an inveterate enemy to the Persian power, that he formed a plan of totally destroying it; and in his wars he had so reduced the Persians, that they promised in a treaty not to pass the Chelidonian islands with their fleet, or to approach within a day's journey of the Grecian seas. See ATTICA.

CINALOA, a province of Mexico in South America, abounding in corn, cattle, and cotton; and rendered extremely picturesque by a number of beautiful cascades of clear water that fall down from the mountains. It lies on the eastern coast of the sea of California, but is now included in the province of Sonora.

CINARA, the ARTICHOKE. See CYNARA, BOTANY *Index*.

CINCHONA. See BOTANY *Index*.

According to some, the Peruvians learned the use of the bark of this tree by observing certain animals affected with intermittents instinctively led to it; while others say, that a Peruvian having an ague, was cured by happening to drink of a pool which, from some trees having fallen into it, tasted of cinchona; and its use in gangrene is said to have originated from its curing one in an aguish patient. About the year 1640, the lady of the Spanish viceroy, the Comitissa del Cinchon, was cured by the bark, which has therefore been called *Cortex* or *Pulvis Comitissæ Cinchonæ*, *Chinachina* or *Chinchina*, *Kinakina* or *Kinkina*, *Quinaquina* or *Quinquina;* and from the interest which the cardinal de Lugo and the Jesuit fathers took in its distribution, it has been called *Cortex* or *Pulvis Cardinalis de Lugo*, *Jesuiticus*, *Patrum*, *&c.*

On its first introduction into Europe, it was reprobated by many eminent physicians; and at different periods long after, it was considered a dangerous remedy; but its character, in process of time, became very universally established. For a number of years, the bark which is rolled up into short thick quills, with a rough coat, and a bright cinnamon colour in the inside, which broke brittle, and was sound, had an aromatic flavour, a bitterish astringent taste, with a degree of aromatic warmth, was esteemed the best; though some esteemed the large pieces as of equal goodness. During the time of the late war, in the year 1779, the Hussar frigate took a Spanish ship, loaded principally with Peruvian bark, which was much larger, thicker, and of a deeper reddish colour than the bark in common use. Soon after it was brought to London, it was tried in St Bartholomew's hospital, and in other hospitals about town, and was said to be more efficacious than the quill bark. This put practitioners upon examining into the history of the bark, on trying experiments with it, and of making comparative trials of its effects with those of the bark in common use on patients labouring under intermittent complaints. In July 1782, Dr William Saunders published an account of this red bark, in which he says that the small quill bark used in England is either the bark of young trees, or of the twigs or branches of the old ones; and that the large bark, called the *red bark* from the deep colour, is the bark of the trunk of the old trees; and he mentions a Mr Arnot, who himself gather[ed] the bark from the trees in Peru; and Mons. Cond[amine], who gives an account of the tree in the M[e]moirs of the Academy of Sciences at Paris in t[he] year 1738; who both say, that taking the bark fro[m] an old tree effectually kills it; but that most of t[he] young trees which are barked recover, and contin[ue] healthy; and that for these reasons the Spaniards n[ow] barked the younger trees for foreign markets, thou[gh] they still imported into Spain some of the bark of t[he] old trees, which they esteemed to be much more ef[fi]cacious than what was got from the young. Fro[m] these accounts Dr Saunders concludes, that the lar[ge] red bark brought to London in the year 1779 was the same kind as that used by Sydenham and Morto[n], as it answers to the description of the bark used [in] their time, which is given by Dale and other write[rs] on the materia medica, who were their contemporari[es]. Dr Saunders says, that it is not only stronger a[nd] more resinous, but likewise more efficacious and certa[in] in its effect, than the common bark, and had cur[ed] many agues after the other had failed.

A species of cinchona has also been discovered [in] the West India islands, particularly in Jamaica. It [is] accurately described by Dr Wright, under the ti[tle] of *Cinchona Jamaicensis*, in a paper published in t[he] Philosophical Transactions, In Jamaica it is call[ed] the *sea-side beech*, and grows from 20 to 40 feet hig[h]. The white, furrowed, thick outer bark is not use[d]; the dark brown inner bark has the common flavo[ur], with a mixed kind of a taste, at first of horse-radi[sh] and ginger, becoming at last bitter and astringent. [It] seems to give out more extractive matter than the ci[n]chona officinalis. Some of it was imported from [St] Lucia, in consequence of its having been used with a[d]vantage in the army and navy during the last war; a[nd] it has lately been treated of at considerable length [by] Dr Kentish, under the title of *St Lucia bark*. T[he] fresh bark is found to be considerably emetic and c[a]thartic, which properties it is said to lose on drying.

The pale and the red are chiefly in use in Britai[n]. The pale is brought to us in pieces of different siz[es], either flat or quilled, and the powder is rather of [a] lighter colour than that of cinnamon. The red is g[e]nerally in much larger, thicker, flattish pieces, b[ut] sometimes also in the form of quills, and its powder [is] reddish like that of Armenian bole. As already o[b]served, it is much more resinous, and possesses the se[n]sible qualities of the cinchona in a much higher deg[ree] than the other sorts; and the more nearly the oth[er] kinds resemble the red bark, the better they are n[ow] considered. The red bark is heavy, firm, sound, a[nd] dry; friable between the teeth; does not separate i[nto] fibres; and breaks, not shivery, but short, close, a[nd] smooth. It has three layers; the outer is thin, ru[g]ged, of a reddish brown colour, but frequently cov[er]ed with mossy matter; the middle is thicker, m[ore] compact, darker coloured, very resinous, brittle, a[nd] yields first to the pestle; the inmost is more woo[dy], fibrous, and of a brighter red.

The Peruvian bark yields its virtues both to c[old] and boiling water; but the decoction is thicker, gi[ves] out its taste more readily, and forms an ink wit[h] chalybeate more suddenly than the fresh cold infusi[on]. This infusion, however, contains at least as much [ex]tract

Cinchona. tractive matter, but more in a state of solution; and its colour, on standing some time with the chalybeate, becomes darker, while that of the decoction becomes more faint. When they are of a certain age, the addition of a chalybeate renders them green; and when this is the case, they are found to be in a state of fermentation, and effete. Mild or caustic alkalies, or lime, precipitate the extractive matter, which in the case of the caustic alkali is redissolved by a farther addition of the alkali. Lime-water precipitates less from a fresh infusion than from a fresh decoction; and in the precipitate of this last some mild earth is perceptible. The infusion is by age reduced to the same state with the fresh decoction, and then they deposite nearly an equal quantity of mild earth and extractive matter; so that lime-water, as well as a chalybeate, may be used as a test of the relative strength, and perishable nature of the different preparations, and of different barks. Accordingly cold infusions are found by experiments to be less perishable than decoctions; infusions and decoctions of the red bark than those of the pale; those of the red bark, however, are found by length of time to separate more mild earth with the lime-water, and more extractive matter. Lime-water, as precipitating the extractive matter, appears an equally improper and disagreeable menstruum.

Water is found to suspend the resin by means of much less gum than has been supposed. Alcohol extracts a bitterness, but no astringency, from a residuum of 20 affusions of cold water; and water extracts astringency, but no bitterness, from the residuum of as many affusions of alcohol. The residuum in both is insipid.

From many ingenious experiments made on the Peruvian bark by Dr Irvine, which are now published in a dissertation which gained the prize medal given by the Harveian Society of Edinburgh for 1783, the power of different menstrua, as acting upon Peruvian bark, is ascertained with greater accuracy than had before been done; and it appears, that with respect to comparative power, the fluids after mentioned act in the order in which they are placed.

Dulcified spirit of vitriol.
Caustic ley.
French brandy.
Rhenish wine.
Soft water.
Vinegar and water.
Dulcified spirit of nitre.
Mild volatile alkali.
Alcohol.
Mild vegetable alkali.
Lime-water.

The antiseptic powers of vinegar and bark united are double the sum of those taken separately. The astringent power of the bark is increased by sulphuric acid; and the bitter taste is destroyed by it.

The officinal preparations of the bark are, 1. The powder: of this, the first parcel that passes the sieve, being the most resinous and brittle layer, is the strongest. 2. The extract: the watery and spirituous extract conjoined form the most proper preparations of this kind. 3. The resin: this cannot perhaps be obtained separate from the gummy part, nor would it be desirable. 4. Spirituous tincture: this is best made with proof-spirit. 5. The decoction: this preparation, though frequently employed, is yet in many respects inferior even to a simple watery infusion.

The best form is that of powder, in which the constituent parts are in the most effectual proportion. The cold infusion, which can be made in a few minutes by agitation, the spirituous tincture, and the extract, are likewise proper in this respect. For covering the taste, different patients require different vehicles; liquorice, aromatics, acids, port-wine, small beer, porter, milk, butter-milk, &c. are frequently employed; and those who dislike the taste of the bark itself, vary in their accounts to which the preference is due; or it may be given in form of electuary with currant jelly, or with brandy or rum.

Practitioners have differed much with regard to the mode of operation of the Peruvian bark. Some have ascribed its virtues entirely to a stimulant power. But while the strongest and most permanent stimuli have by no means the same effect with bark in the cure of diseases, the bark itself shows hardly any stimulant power, either from its action on the stomach, or on other sensible parts to which it is applied. From its action on dead animal fibres, there can be no doubt of its being a powerful astringent; and from its good effects in certain cases of disease, there is reason to presume that it is a still more powerful tonic. To this tonic power some think than its action as an antiseptic is to be entirely attributed; but that, independently of this, it has a very powerful effect in resisting the septic process to which animal substances are naturally subjected, appears beyond all dispute, from its effects in resisting putrefaction, not only in dead animal solids, but even in animal fluids, when entirely detached from the living body.

But although it be admitted that the Peruvian bark acts powerfully as an astringent, as a tonic, and as an antiseptic; yet these principles will by no means explain all the effects derived from it in the cure of diseases. And accordingly, from no artificial combination in which these powers are combined, or in which they exist even to a higher degree, can the good consequences resulting from Peruvian bark be obtained. Many practitioners, therefore, are disposed to view it as a specific. If by a specific we mean an infallible remedy, it cannot indeed be considered as entitled to that appellation; but in as far as it is a very powerful remedy, of the operation of which no satisfactory explanation has yet been given, it may with great propriety be denominated a specific. But whatever its mode of operation may be, there can be no doubt that it is daily employed with success in a great variety of different diseases.

It was first introduced, as has already been said, for the cure of intermittent fevers; and in these, when properly exhibited, it rarely fails of success. Practitioners, however, have differed with regard to the best mode of exhibition; some prefer giving it just before the fit, some during the fit, others immediately after it. Some, again, order it in the quantity of an ounce, between the fits; the dose being the more frequent and larger according to the frequency of the fits and this mode of exhibition, although it may perhaps sometimes lead to the employment of more bark than is is necessary, we consider as upon the whole preferable, from being best suited to most stomachs. The requisite quantity is very different in different cases; and in many vernal intermittents it seems even hardly necessary.

It often pukes or purges, and sometimes oppresses the stomach. These, or any other effects that may take place, are to be counteracted by remedies particularly appropriated to them. Thus, vomiting is often restrained by exhibiting it in wine; looseness, by combining it with opium; and oppression at stomach, by the addition of an aromatic. But unless for obviating particular occurrences, it is more successful when exhibited in its simple state than with any addition; and there seems to be little ground for believing that its powers are increased by crude sal ammoniac, or any other additions which have frequently been made.

It is now given, from the very commencement of the disease, without previous evacuations, which, with the delay of the bark, or under doses of it, by retarding the cure, often seem to induce abdominal inflammation, schirrus, jaundice, hectic, dropsy, &c. symptoms formerly imputed to the premature or intemperate use of the bark, but which are best obviated by its early and large use. It is to be continued not only till the paroxysms cease, but till the natural appetite, strength, and complexion, return. Its use is then to be gradually left off, and repeated at proper intervals to secure against a relapse; to which, however unaccountable, independently of the recovery of vigour, there often seems to be a peculiar disposition, and especially when the wind blows from the east. Although, however, most evacuants conjoined with the Peruvian bark in intermittents are rather prejudicial than otherwise, yet it is of advantage, previous to its use, to empty the alimentary canal, particularly the stomach; and on this account good effects are often obtained from premising an emetic.

It is a medicine which seems not only suited to both formed and latent intermittents, but to that state of fibre on which all rigidly periodical diseases seem to depend; as periodical pain, inflammation, hemorrhagy, spasm, cough, loss of external sense, &c.

Bark is now used by some in all continued fevers: at the same time attention is paid to keep the bowels clean, and to promote when necessary the evacuation of redundant bile; always, however, so as to weaken as little as possible.

In confluent small-pox, it promotes languid eruption and suppuration, diminishes the fever through the whole course of it, and prevents or corrects putrescence and gangrene.

In gangrenous sore throats it is much used, as it is externally and internally in every species of gangrene.

In contagious dysentery, after due evacuation, it has been used by the mouth, and by injection with and without opium.

In all those hemorrhagies called *passive*, and which it is allowed all hemorrhagies are very apt to become, and likewise in other increased discharges, it is much used; and in certain undefined cases of hæmoptysis, some allege that it is remarkably effectual when joined with an absorbent.

It is used for obviating the disposition to nervous and convulsive diseases; and some have great confidence in it joined with sulphuric acid, in cases of phthisis, scrophula, ill-conditioned ulcer, rickets, scurvy, and in states of convalescence.

In these cases, in general, notwithstanding the use of the acid, it is proper to conjoin it with a milk diet.

In dropsy, not depending on any particular local affection, it is often alternated or conjoined with diuretics, or other evacuants; and by its early exhibition after the water is once drawn off, or even begins to be freely discharged, a fresh accumulation is prevented, and a radical cure obtained. In obstinate venereal cases, particularly those which appear under the form of pains in the bones, the Peruvian bark is often successfully subjoined to mercury, or even given in conjunction with it.

CINCINNATUS, the Roman dictator, was taken from the plough, to be advanced to the dignity of consul, in which office he restored public tranquillity, and then returned to his rural employments. Being called forth a second time to be dictator, he conquered the enemies of Rome, and refusing all rewards, retired again to his farm, after he had been dictator only 16 days. The same circumstance occurred once more in the 80th year of his age. He died 376 years before Christ.

Order of CINCINNATUS, or *the Cincinnati*, a society which was established in America soon after the peace, and consists of the generals and officers of the army and navy of the United States. This institution, called after the name of the Roman dictator mentioned in the preceding article, was intended to perpetuate the memory of the revolution, the friendship of the officers, and the union of the states; and also to raise a fund for the relief of poor widows and orphans, whose husbands and fathers had fallen during the war, and for their descendants. The society was subdivided into state societies, which were to meet on the 4th of July, and with other business depute a number of their members to convene annually in general meetings. The members of the institution were to be distinguished by wearing a medal, emblematical of the design of the society; and the honours and advantages were to be hereditary in the eldest male heirs, and in default of male issue, in the collateral male heirs. Honorary members were to be admitted, but without the hereditary advantages of the society; and provided their number should never exceed the ratio of one to four of the officers or their descendants. Though the apparent designs of this society were harmless and honourable, it did not escape popular jealousy. Views of a deeper nature were imputed to the framers, and the institution was censured and opposed as giving birth to a military nobility, of a dangerous aristocratic power, which might ultimately prove ruinous to the liberties of the new empire. But the principal ground of apprehension was the supposed right of inheritance connected with this honour to render it hereditary; which, however, has been given up and totally disclaimed by the society.

CINCTURE, in *Architecture*, a ring, list, or orle, at the top and bottom of the shaft of a column, separating the shaft at one end from the base, and at the other from the capital.

CINEAS, a Thessalian, minister and friend to Pyrrhus.

great hall on his right hand; to be exempted from subsidies and other aids; their heirs to be free from personal wardship, notwithstanding any tenure; to be impleaded in their own towns, and not elsewhere; not to be liable to tolls, &c.

The Cinque-ports give the following titles: Hastings, a barony to the ancient family of Huntington: Romney, to the Marshams: Dover, new barony, to a branch of the York family; formerly a dukedom (now extinct) to the Queensberry family: Sandwich, an earldom to a branch of the Montagues.

CINTRA, a cape and mountain of Portugal, in the the province of Estremadura. It lies on the north side of the entrance of the river Tajo; and is famous for a convention concluded here in August 1808 between the generals of the French and British armies.

CINUS, or CYNUS, a famous civilian of Pistoia in the 14th century. His commentary on the Code was finished in 1313; he also wrote on some parts of the Digest. He was no less famous for his Italian poems, and is ranked among those who first gave graces to the Tuscan lyric poetry.

CINYRA, in the Jewish antiquities, a musical instrument. This, and the Hebrew *cinnor*, which is generally translated *cithera*, *lyra*, or *psalterium*, are the same. It was made of wood, and was played on in the temple of Jerusalem. Josephus says that the *cinyra* of the temple had ten strings, and that it was touched with a bow. In another place he says that Solomon made a great number of them with a precious kind of metal called *electrum*, wherein he contradicts the Scriptures, which inform us that Solomon's *cinnors* were made of wood.

CINYRAS, in fabulous history, a king of Cyprus, son of Paphus. He married Cenchreis, by whom he had a daughter called *Myrrha*. Myrrha fell in love with her father, and in the absence of her mother she introduced herself into his bed by means of her nurse. Cinyras had by her a son called *Adonis*; and when he knew the incest he had committed, he attempted to stab his daughter, who escaped his pursuit and fled to Arabia, where, after she had brought forth, she was changed into a tree which still bears her name. Cinyras, according to some, stabbed himself.

CION, or CYON, in *Gardening*, a young shoot, sprout, or sprig, put forth by a tree. Grafting is performed by the application of the cion of one plant upon the stock of another. To produce a stock of cions for grafting, planting, &c. the gardeners sometimes cut off the bodies of trees a little above the ground, and only leave a stump or root standing: the redundant sap will not fail next spring to put forth a great number of shoots. In dressing dwarf-trees, a great many cions are to be cut off.

CIOTAT, a sea-port town of Provence in France; famous for Muscadine wine. It is seated on the bay of Laquea, between Marseilles and Toulon; and the harbour is defended by a strong fort. E. Long. 5. 30. N. Lat. 43. 10.

CIPHER, or CYPHER, one of the Arabic characters or figures used in computation, formed thus, 0. See ARITHMETIC.

CIPHER is also a kind of enigmatic character composed of several letters interwoven, which are generally the initial letters of the persons names for whom the ciphers are intended. These are frequently used on seals, coaches, and other moveables.—Anciently, merchants and tradesmen were not allowed to bear arms: in lieu thereof, they bore their ciphers, or the initial letters of their names, artfully interwoven about a cross, of which we have divers instances on tombs, &c. See DEVICE.

CIPHER, denotes likewise certain secret characters, disguised and varied, used in writing letters that contain some secret, not to be understood but by those between whom the cipher is agreed on.

De la Guilletiere, in his *Lacedæmon ancient and modern*, endeavours to make the ancient Spartans the inventors of the art of writing in cipher. Their scytala, according to him, was the first sketch of this mysterious art: these scytalæ were two rollers of wood, of equal length and thickness; one of them kept by the ephori, the other by the general of the army sent on any expedition against the enemy. Whensoever these magistrates would send any secret orders to the general, they took a slip of parchment, and rolled it very justly about the scytala which they had reserved, and in this state wrote their intentions, which appeared perfect and consistent while the parchment continued on the roll: when taken off, the writing was maimed, and without connection, but was easily retrieved by the general, upon his applying it to his scytala.

Polybius says, that Æneas Tacitus, 2000 years ago, collected together 20 different manners of writing so as not to be understood by any but those in the secret; part whereof were invented by himself, and part used before his time.—Trithemius, Cap. Porta, Vigenere, and P. Niceron, have written expressly on the subject of *ciphers*.

As the writing of *cipher* is become an art, so is the reading or unravelling thereof, called *deciphering*.—The rules of deciphering are different in different languages. By observing the following, you will soon make out any common cipher written in English.

1. Observe the letters or characters that most frequently occur, and set them down for the six vowels, including *y*, and of these the most frequent will generally be *e*, and the least frequent *u*.

2. The vowels that most frequently come together are *ea* and *ou*.

3. The consonant most common at the end of words is *s*, and the next frequent *r* and *t*.

4. When two similar characters come together, they are most likely to be the consonants *f*, *l*, or *s*, or the vowels *e* or *o*.

5. The letter that precedes or follows two similar characters is either a vowel, or *l*, *m*, *n*, or *r*.

6. In deciphering, begin with the words that consist of a single letter, which will be either *a*, *I*, *o*, or *&*.

7. Then take the words of two letters, one of which, will be a vowel. Of these words the most frequent are, *an*, *to*, *be*, *by*, *of*, *on*, *or*, *no*, *so*, *as*, *at*, *if*, *in*, *is*, *it*, *he*, *me*, *my*, *us*, *we*, *am*.

8. In words of three letters there are most commonly two consonants. Of these words the most frequent are, *the*, *and*, *not*, *but*, *yet*, *for*, *tho'*, *how*, *why*, *all*, *you*, *she*, *his*, *her*, *our*, *who*, *may*, *can*, *did*, *was*, *are*, *has*, *had* *let*, *one*, *two*, *six*, *ten*, *&c.*—Some of these, or those of two letters, will be found in every sentence.

9. The most common words of four letters are, *this*, *that*,

Cipher.

that, then, thus, with, when, from, here, some, most, none, they, them, whom, mine, your, self, must, will, have, been, were, four, five, nine, &c.

10. The most usual words of five letters, are, *their, these, those, which, where, while, since, there, shall, might, could, would, ought, three, seven, eight*, &c.

11. Words of two or more syllables frequently begin with double consonants, or with a proposition; that is, a vowel joined with one or more consonants. The most common double consonants are *bl, br, dr, fl, fr, gl, gr, ph, pl, pr, sh, sb, sp, st, th, tr, wh, wr*, &c. and the most common prepositions are *com, con, de, dis, ex, im, in, int, mis, per, pre, pro, re, sub, sup, un*, &c.

12. The double consonants most frequent at the end of long words, are *ck, ld, lf, mn, nd, ng, rl, rm, rn, rp, rt, sm, st, xt*, &c. and the most common terminations are *ed, en, er, es, et, ing, ly, son, sion, tion, able, ence, ent, ment, full, less, ness*, &c.

On Plate CXLIV. in Vol. V. fig. 7. is given an example of a cipher wrote in arbitrary characters as is commonly practised. It will be easily deciphered by observing the rules: but when the characters are all placed close together, as is the example fig. 8. and as they always should be, the deciphering is much more difficult.

To decipher a writing of this sort, you must first look for those characters that most frequently occur, and set them down for vowels as before. Then observe the similar characters that come together; but you must remember that two such characters may here belong to two words. You are next to remember the combinations of two or three characters that are most frequent; which will be some of the words in the seventh and eighth of the foregoing rules; and by observing the other rules, you will infallibly discover, with time and attention, any cipher wrote on these principles.

When the words are wrote all close together, if the key to the cipher were to be changed every word, according to a regular method agreed on between the parties, as might be done by either of the methods mentioned in N° II. below, with very little additional trouble, the writing would then be extremely difficult to decipher. The longer any letter written in cipher is, the more easy it is to decipher, as then the repetitions of the characters and combinations are the more frequent.

The following are the contents of the two foregoing ciphers, in which we have inverted the order of the words and letters, that they who are desirous of trying their talent at deciphering, may not, inadvertently, read the explanation before the cipher.

enil eno ton dna shtnom elohw eerht, suoidifrep dna leurc o noituac & ecnedurp fo klat lliw uoy: on, rotiart, tcelgen & ecnereffidni si ti. yltrohs rettel a em dnes ot snaem emos dnif rehtie, traeh eht morf semoc ti taht ees em tel &, erom ecaf ym ees ot erad reven ro.

evlewt fo ruoh eht ta thgin siht, ledatic eht fo etag eht erofeb elbmessa lliw sdneirf ruo lla. ruoh eht ot lautcnup eb: deraperp llew emoc dna, ytrebil ruoy niager ot, ylevarb eid ro. thgin eht si siht, su sekam rehtie taht, etiesp su seodon ro.

Contrivances for communicating intelligence by CIPHER.

I. *By means of a pack of cards.* The parties must previously agree in what manner the cards shall be first placed, and then how they shall be shuffled. Thus suppose the cards are to be first placed in the order as hereafter follows, and then shuffled by taking off 3 from the top, putting the next 2 over them, and the following 3 under them *, and so alternately. Therefore the party who sends the cipher first writes the contents of it on a separate paper, and then copies the first 32 letters on the cards, by writing one letter on every card; he then shuffles them in the manner described, and writes the second 32 letters: he shuffles them a second time, and writes the third 32 letters, and so of the rest. An example will make this plain. Suppose the letter to be as follows.

Cipher.

* By shuffling the cards in this manner, there will remain only 2 to put under at last.

I am in full march to relieve you; within three days I shall be with you. If the enemy in the mean time should make an assault, remember what you owe to your country, to your family, and yourself. Live with honour or die with glory.

Order of the cards before the 1st shuffle.

Ace spades	*i a d u y i*
Ten diamonds	*a l e u l*
Eight hearts	*m l m o i u*
King spades	*i s u m i*
Nine clubs	*n h l e e*
Seven diamonds	*f b m r i*
Nine diamonds	*u p a r t n*
Ace clubs	*l w k r y i*
Knave hearts	*l s e e a e*
Seven spades	*m i a r m w*
Ten clubs	*a i t h e r*
Ten hearts	*r r h o f*
Queen spades	*c h e e i*
Eight diamonds	*h a h y w*
Eight clubs	*t y o v o l*
Seven hearts	*o y a o h o*
Queen clubs	*r o n u y h*
Nine spades	*c u i y f y*
King hearts	*l e t e u o*
Queen diamonds	*i d s o v*
Eight spades	*e i n w s o*
Knave clubs	*v f a n t g*
Seven clubs	*e t s d y*
Ace hearts	*y r e b r*
Nine hearts	*o l n w o t*
Ace diamonds	*u h s t & d*
Knave spades	*w d m a l*
Ten spades	*i e y t r r*
King diamonds	*t t i b u r*
Queen hearts	*d h m m u*
King clubs	*i n s t h*
Knave diamonds	*n e u s o*

The person that receives these cards first places them in the order agreed on, and transcribes the first letter on every card. He then shuffles them, according to order, and transcribes the second letter on each card. He shuffles them a second time, and transcribes the third letter, and so of the rest.

If the cards were to be shuffled the second time by threes and fours, the third time by twos and fours, &c. it would make the cipher still more difficult to discover:

Cipher.

ver: though as all ciphers depend on the combination of letters, there are scarce any that may not be deciphered with time and pains; as we shall show further on. Those ciphers are the best that are by their nature most free from suspicion of being ciphers; as, for example, if the letters were there written with sympathetic ink, the cards might then pass for a common pack.

II. *By a dial.* On a piece of square pasteboard ABCD, fig. 3. 4. draw the circle EFGH, and divide it into 26 equal parts, in each of which must be written one of the letters of the alphabet.

On the inside of this there must be another circle of pasteboard, ILMN, moveable round the centre O, and the extremity of this must be divided into the same number of equal parts as the other. On this also must be written the letters of the alphabet, which, however, need not be disposed in the same order. The person with whom you correspond must have a similar dial, and at the beginning of your letter you must put any two letters that answer to each other when you have fixed the dial.

Exam. Suppose you would write as follows: "If you will come over to us, you shall have a pension, and you may still make a sham opposition." You begin with the letters *Ma*, which show how the dial is fixed: then for *If you*, you write *un juc*, and so for the rest, as you see at fig. 6.

The same intention may be answered by a ruler, the upper part of which is fixed, and the lower part made to slide; but in this case the upper part must contain two alphabets in succession, that some letter of that part may constantly correspond to one in the lower part. The divisions standing directly over each other in a straight line will be much more obvious than in the circumference of a circle. Or two straight pieces of pasteboard regularly divided, the one containing a single, and the other a double alphabet, would answer exactly the same purpose. In this case a blank space may be left at each end of the single alphabet, and one or two weights being placed on both the pieces will keep them steady.

III. *The corresponding spaces.* Take two pieces of pasteboard or stiff paper, through which you must cut long squares, at different distances, as you will see in the following example. One of these pieces you keep yourself, and the other you give to your correspondent. When you would send him any secret intelligence, you lay the pasteboard upon a paper of the same size, and in the spaces cut out, you write what you would have understood by him only, and then fill up the intermediate spaces with somewhat that makes with those words a different sense.

I shall be much obliged to you, as reading alone engages my attention at present, if you will lend me any one of the eight volumes of the Spectator. I hope you will excuse this freedom, but for a winter's evening I dont know a better entertainment. If I fail to return it soon, never trust me for the time to come.

A paper of this sort may be placed four different ways, either by putting the bottom at the top, or by turning it over; and by these means the superfluous words may be the more easily adapted to the sense of the others.

Cipher || Circassia.

This is a very eligible cipher, as it is free from suspicion, but it will only do for short messages; for if the spaces be frequent, it will be very difficult to make the concealed and obvious meanings agree together; and if the sense be not clear, the writing will be liable to suspicion.

IV. *The musical cipher.* The construction of this cipher is similar to that of N° II. The circle EFGH (fig. 3.) is to be divided into twenty-six equal parts; in each part there must be written one of the letters of the alphabet, and on the anterior circle ILMN, moveable round the centre O, there is to be the same number of divisions: the circumference of the inner circle must be ruled in the manner of a music paper; and in each division there is to be placed a note, differing either in figure or position. Lastly, within the musical lines place the three keys, and on the outer circle, the figures that are commonly used to denote the time.

Then provide yourself with a ruled paper, and place one of the keys, as suppose that of *ge re sol*, against the time two fourths at the beginning of the paper, which will inform your correspondent how to fix his circle. You then copy the notes that answer to the several letters of the words you intend to write, in the manner expressed at fig. 5.

A cipher of this sort may be made more difficult to discover by frequently changing the key, and that will not in the least embarrass the reader. You may likewise add the mark ♯ or ♭ to the note that begins a word, which will make it more easy to read, and at the same time give the music a more natural aspect. This cipher is preferable to that of N° II. above, as it may be inclosed in a letter about common affairs, and pass unsuspected.

CIPUS, in antiquity, a low column, with an inscription, erected on the high roads, or other places, to show the way to travellers; to serve as a boundary; to mark the grave of a deceased person, &c.

CIR, St, a village of France, two miles from Versailles, which was remarkable for a nunnery founded by Louis XIV. The nuns were obliged to take care of the education of 250 girls, who could prove their families to have been noble from the 4th generation on the father's side. They could not enter before 7, nor after 12 years of age; and they continued till they were 20 years and three months old. The house was formerly a most magnificent structure.

CIRCARS, Northern, a district of Hindostan. See Supplement.

CIRCASSIA, a large country of Asia, situated between forty-two and forty-five degrees of north latitude, and between forty and forty-five of east longitude. It is bounded by Russia on the north; by Astracan and Dagistan on the east; by Georgia and Shirvan on the south; and by the territories of the Russian Cossacs on the west. This country has long been celebrated for the extraordinary beauty of its women; and here it was that the practice of inoculating for the smallpox first began. Terki, the principal city, is seated in a very spacious plain, very swampy, towards the sea-side, in 43° 24′ north latitude: it is about three wersts in compass, well fortified with ramparts and cury, went to Circe, and demanded sword in hand the restoration of his companions to their former state. She complied, and loaded the hero with pleasures and honours. In this voluptuous retreat Ulysses had by Circe one son called Telegonus, or two, according to Hesiod, called Agrius and Latinus. For one whole year Ulysses forgot his glory in Circe's arms. At his departure the nymph advised him to descend to hell, and to consult the manes of Tiresias concerning the fates that attended him. Circe showed herself cruel to Scylla her rival, and to Picus.

CIRCENSIAN GAMES, a general term under which was comprehended all combats exhibited in the Roman circus, in imitation of the Olympic games in Greece. Most of the feasts of the Romans were accompanied with Circensian games; and the magistrates, and other officers of the republic, frequently presented the people with them, in order to procure their favour. The grand games were held five days, commencing on the 13th of September. See CIRCUS.

CIRCLE, in *Geometry*, a plane figure comprehended by a single curve line, called its circumference, to which right lines drawn from a point in the middle, called the centre, are equal to each other. See GEOMETRY.

CIRCLES of the Sphere, are such as cut the mundane sphere, and have their periphery either on its moveable surface, or in another immoveable, conterminous, and equidistant surface. See SPHERE. Hence arise two kinds of circles, moveable and immoveable. The first, those whose peripheries are in the moveable surface, and which therefore revolve with its diurnal motion; as, the meridians, &c. The latter having their periphery in the immoveable surface, do not revolve; as the ecliptic, equator, and its parallels, &c. See GEOGRAPHY.

CIRCLES of Altitude, otherwise called *almucantars*, are circles parallel to the horizon, having their common pole in the zenith, and still diminishing as they approach the zenith. See ALMUCANTAR.

Diurnal CIRCLES, are immoveable circles, supposed to be described by the seven stars, and other points of the heavens, in their diurnal rotation round the earth; or rather, in the rotation of the earth round its axis. The diurnal circles are all unequal: the equator is the biggest.

Horary CIRCLES, in *Dialing*, are the lines which show the hours on dials; though these be not drawn circular, but nearly straight. See DIALING.

CIRCLES of Latitude, or *Secondaries of the Ecliptic*, are great circles parallel to the plane of the ecliptic, passing through the poles thereof, and through every star and planet. They are so called, because they serve to measure the latitude of the stars, which is nothing but an arch of one of these circles intercepted between the star and the ecliptic. See LATITUDE.

CIRCLES of Longitude, are several lesser circles, parallel to the ecliptie; still diminishing, in proportion as they recede from it. On the arches of these circles, the longitude of the stars is reckoned.

CIRCLE of perpetual Apparition, one of the lesser circles, parallel to the equator, described by any point of the sphere touching the northern point of the horizon, and carried about with the diurnal motion. All the stars included within this circle never set, but are ever visible above the horizon.

CIRCLE of perpetual Occultation, is another circle at a like distance from the equator, and contains all those stars which never appear in our hemisphere. The stars situated between these circles alternately rise and set at certain times.

Polar CIRCLES, are immoveable circles, parallel to the equator, and at a distance from the poles equal to the greatest declination of the ecliptic. That next the northern pole is called the ARCTIC; and that next to the southern one the ANTARCTIC.

Fairy CIRCLE. See *FAIRY-Circle*.

Druidical CIRCLES, in British topography, a name given to certain ancient inclosures formed by rude stones circularly arranged, in the manner represented on Plate CXLV. These, it is now generally agreed, were temples, and many writers think, also places of solemn assemblies for councils or elections, and seats of judgment. Mr Borlase is of this opinion. "Instead, therefore (says he), of detaining the reader with a dispute, whether they were places of worship or council, it may with great probability be asserted, that they were used for both purposes; and having for the most part been first dedicated to religion, naturally became afterwards the curiæ and fora of the same community." These temples, though generally circular, occasionally differ as well in figure as magnitude: with relation to the first, the most simple were composed of one circle: Stonehenge consisted of two circles and two ovals, respectively concentric, whilst that at Bottalch near St Just in Cornwall is formed by four intersecting circles. And the great temple at Avebury in Wiltshire, it is said, described the figure of a seraph or fiery flying serpent, represented by circles and right lines. Some besides circles have avenues of stone pillars. Most, if not all of them, have pillars or altars within their penetralia or centre. In the article of magnitude and number of stones, there is the greatest variety, some circles being only twelve feet diameter, and formed only of twelve stones, whilst others, such as Stonehenge and Avebury, contained, the first 140, the second 652, and occupied many acres of ground. All these different numbers, measures, and arrangements had their pretended reference; either to the astronomical divisions of the year, or some mysteries of the druidical religion. Mr Borlase, however, supposes, that those very small circles, sometimes formed of a low bank of earth, sometimes of stones erect, and frequently of loose small stones thrown together in a circular form, inclosing an area of about three yards diameter, without any larger circle round them, were originally places of burial.

CIRCLE, in *Logic*, or *Logical CIRCLE*, is when the same terms are proved *in orbem* by the same terms; and the parts of the syllogism alternately by each other, both directly and indirectly.

CIRCLES of the Empire, such provinces and principalities of the German empire as have a right to be present at diets. Maximilian I. divided the empire into six, and some years after into ten circles. This last division was confirmed by Charles V. The circles, as they stand in the Imperial Matricola, are as follow: Austria, Burgundy, the Lower Rhine, Bavaria, Upper ter of a second; and that its motion was instantaneous through a wire of 1319 feet. In 1747, Dr Watson, and other English philosophers, after many experiments of a similar kind, conveyed the electric matter through a circuit of four miles; and they concluded, from this and another trial, that its velocity is instantaneous.

CIRCULAR, in a general sense, any thing that is described, or moved in a round, as the circumference of a circle, or surface of a globe.

Circular Numbers, called also *spherical ones*, according to some, are such whose powers terminate in the roots themselves. Thus, for instance, 5 and 6, all whose powers do end in 5 and 6, as the square of 5 is 25; the square of 6 is 36, &c.

Circular Sailing, is the method of sailing by the arch of a great circle. See Navigation.

CIRCULATION, the act of moving round, or in a circle; thus we say, the circulation of the blood, &c.

Circulation of the Blood, the natural motion of the blood in a living animal, whereby that fluid is alternately carried from the heart into all parts of the body, by the arteries, from whence it is brought back to the heart again by the veins. See Anatomy *Index*.

In a fœtus, the apparatus for the circulation of the blood is somewhat different from that in adults. The septum, which separates the two auricles of the heart, is pierced through with an aperture, called the *foramen ovale;* and the trunk of the pulmonary artery, a little after it has left the heart, sends out a tube into the descending aorta, called the *communicating canal.* The fœtus being born, the foramen ovale closes by degrees, and the canal of communication dries up, and becomes a simple ligament.

As to the velocity of the circulating blood, and the time wherein the circulation is completed, several computations have been made. By Dr Keil's account, the blood is driven out of the heart into the aorta with a velocity which would carry it twenty-five feet in a minute; but this velocity is continually abated in the progress of the blood, in the numerous sections or branches of the arteries; so that before it arrives at the extremities of the body, its motion is greatly diminished. The space of time wherein the whole mass of blood ordinarily circulates is variously determined. Some state it thus: Supposing the heart to make two thousand pulses in an hour, and that at every pulse there is expelled an ounce of blood; as the whole mass of blood is not ordinarily computed to exceed twenty-four pounds, it must be circulated seven or eight times over in the space of an hour.

The curious in microscopic observations, have found an easy method of seeing the circulation of the blood in the bodies of animals: for these inquiries it is necessary to choose such animals as are small, and easily manageable, and which are either wholly or in part transparent. The observations made by this means are preferable to any others we can have recourse to, since, in dissections, the animal is in a state of pain, or dying; whereas in animals small enough to be thus viewed, all is left in its usual course, and we see what nature does in her own undisturbed method. In these creatures also, after viewing, as long as we please the natural state and current of the blood, we may, by pressure, and several other ways impede its course; and by putting various mixtures into the creature's water, induce a morbid state, and finally see the creature die, either by means of this or by any other method; and we may thus accurately observe all the changes it undergoes, and see what occasions the trembling pulse, &c. of dying people.

The current of the blood in small animals, that is, its passing on through the vessels, either to or from the heart, is very easily seen by the microscope; but its circulation, that is, its running to the extremities of the parts, and thence returning, is more difficult; because the vessels where this should be seen are so extremely minute, as not easily to come under observation. The larger arteries are easily distinguished from the veins by the motion of the blood through them, which in the veins is always smooth and regular; but in the arteries, by several propulsions after the manner of pulsation. But this difference is not to be found in the more minute vessels, in all which, as well arteries as veins, the motion of the blood is even and regular.

The transparent membrane, or web between the toes of a frog's hinder foot, is a very proper object to observe the circulation of the blood in. The tails or fins of fishes are also very fine objects; and when the fish is very small, these are manageable, and afford a view of a great number of veins and arteries, with a very quick and beautiful succession of blood through them. The tail of a flounder may be very conveniently placed before the double microscope on a plate of glass; and its body being supported by something of equal height, the fish will lie still, and the circulation may be seen very agreeably. In the minutest vessels thus examined, the blood always appears pale or colourless, but in the large ones it is manifestly red. The arteries usually branch out extremely before they join the veins to carry the blood back to the heart; but this is not always the case; for Mr Leuwenhoeck has observed, that on each side of the little gristles which give a stiffness to the tail of a flounder, there may be seen a very open communication of the veins and arteries; the blood running towards the extremities through arteries, and returning back again through veins, which were evidently a continuation of those arteries and of the same diameter with them. The whole fish, on the tail of which this examination was made, was not more than half an inch in length; it is easy to conceive, therefore, how small the tail must be; and yet in it there were 68 vessels which carried and returned the blood; and yet these vessels were far from being the most minute of all. How inconceivably numerous then must the *circulations* in the whole human body be? Mr Leuwenhoeck is of opinion, that a thousand different circulations are continually carried on in every part of a man's body in the breadth of a finger nail.

The tail of a newt or water-lizard affords also a very entertaining prospect of the circulation of the blood through almost numberless small vessels; but no object shows it so agreeably as one of these animals, while so young as not to be above an inch long; for then the whole body is so very transparent, that the circulation may be seen in every part of it, as well as in in the tail; and, in these objects, nothing is more beautiful than the course of the blood into the toes and back again, where it may be traced all the way with great ease. Near the head there are also found three small fins which afford a very delightful prospect; these are all divided like the leaves of polypody; and in every one of the branches of these, the blood may be very accurately traced, running to the end through the artery, and there returning back again by a vein of the same size, and laid in the same direction; and as the vessels are very numerous and large in this part, and the third or fourth magnifier may be used, there are sometimes seen thirty or forty channels of running blood at once; and this the more as the globules of blood in the newt are large, and fewer in number, in proportion to the quantity of serum, than in any other animal: and their figure, as they are protruded through the vessels, changes in a very surprising manner. The impetus occasioning the circulation is great enough in some animals to raise the blood six, seven, or eight feet high from the blood-vessel it springs out at, which, however, is far exceeded by that of the sap of a vine in bleeding time, which will sometimes rise 40 feet high.

CIRCULATION of the Sap of Plants. See PLANTS and SAP.

CIRCULATION of the Spirits, or Nervous Fluid. See ANATOMY *Index*.

CIRCULATION, in *Chemistry*, is an operation whereby the same vapour, raised by fire, falls back, to be returned and distilled several times.

CIRCULATION of Money. See COMMERCE and MONEY.

Subterranean CIRCULATION. See SPRINGS.

CIRCULUS, in *Chemistry*, an iron instrument in form of a ring, which being heated red hot, and applied to the neck of retorts and other glass vessels till they grow hot, a few drops of cold water thrown upon them, or a cold blast, will make the necks fly regularly and evenly off.

Another method of doing this is, to tie a thread, first dipt in oil of turpentine, round the place where you would have it break; and then setting fire to the thread, and afterwards sprinkling the place with cold water, the glass will crack exactly where the thread was tied.

CIRCUMAMBIENT, an appellation given to a thing that surrounds another on all sides; chiefly used in speaking of the air.

CIRCUMCELLIONES. See CIRCONCELLIONES.

CIRCUMCISION, the act of cutting off the prepuce; a ceremony in the Jewish and Mahometan religions, wherein they cut off the foreskin of their males, who are to profess the one or the other law.

Circumcision commenced in the time of Abraham; and was the seal of a covenant stipulated between God and him. It was in the year of the world 2178 that Abraham, by divine appointment, circumcised himself and all the males of his family; from which time it became an hereditary practice among his descendants.

The ceremony, however, was not confined to the Jews. Herodotus and Philo Judæus observe, that it obtained also among the Egyptians and Ethiopians. Herodotus says, that the custom was very ancient among each people; so that there was no determining which of them borrowed it from the other. The same historian relates, that the inhabitants of Colchis also used circumcision; whence he concludes, that they were originally Egyptians. He adds, that the Phenicians and Syrians were likewise circumcised; that they borrowed the practice from the Egyptians; and, lastly, that a little before the time when he wrote, circumcision had passed from Colchis to the people inhabiting near Thermodon and Parthenius.

Marsham is of opinion, that the Hebrews borrowed circumcision from the Egyptians; and that God was not the first author thereof, citing Diodorus Siculus and Herodotus as evidences on his side. This latter proposition seems directly contrary to the testimony of Moses, who assures us (Gen. xvii.), that Abraham, though 99 years of age, was not circumcised till he had the express command of God for it. But as to the former position of Marsham, it will admit of more debate. The arguments on both sides may be seen in one view in *Spencer de Legibus Hebræorum*, l. 2. c. 4.

Be this as it will, it is certain the practice of circumcision among the Hebrews differed very considerably from that of the Egyptians. Among the first it was a ceremony of religion, and was performed on the eighth day after the birth of the child. Among the latter, a point of mere decency and cleanliness; and, as some will have it, of physical necessity; and was not performed till the 13th year, and then on girls as well as boys.

Among the Jews, the time for performing this rite was the eighth day, that is, six full days, after the child was born. The law of Moses ordained nothing with respect to the person by whom, the instrument with which, or the manner how, the ceremony was to be performed; the instrument was generally a knife of stone. The child is usually circumcised at home, where the father or godfather holds him in his arms, while the operator takes hold of the prepuce with one hand, and with the other cuts it off; a third person holds a porringer, with sand in it, to catch the blood; then the operator applies his mouth to the part, and, having sucked the blood, spits it into a bowl of wine, and throws a styptic powder upon the wound. This ceremony was usually accompanied with great rejoicings and feasting; and it was at this time that the child was named in presence of the company. The Jews invented several superstitious customs at this ceremony, such as placing three stools, one for the circumcisor, the second for the person who holds the child, and the third for Elijah, who, they say, assists invisibly at the cremony, &c.

The Jews distinguished their proselytes into two sorts, according as they became circumcised or not: those who submitted to this rite were looked upon as children of Abraham, and obliged to keep the laws of Moses; the uncircumcised were only bound to observe the precepts of Noah, and were called *Noachidæ*.

The Turks never circumcise till the seventh or eighth year, as having no notion of its being necessary to salvation. The Persians circumcise their boys at 13, and their girls from 9 to 15. Those of Madagascar cut the flesh at three several times, and the most zealous

of

of the relations present catches hold of the preputium and swallows it.

Circumcision is practised on women by cutting off the foreskin of the clitoris, which bears a near resemblance and analogy to the preputium of the male penis. We are told that the Egyptian captive women were circumcised; and also the subjects of Prester John.

CIRCUMCISION is also the name of a feast, celebrated on the first of January, in commemoration of the circumcision of our Saviour.

CIRCUMDUCTION, in *Scots Law*. When parties in a suit are allowed a proof of allegeances; after the time limited by the judge for taking the proof is elapsed, either party may apply for circumduction of the time of proving; the effect of which is, that no proof can afterwards be brought, and the cause must be determined as it stood when circumduction was obtained.

CIRCUMFERENCE, in a general sense, denotes the line or lines bounding a plane figure. However, it is generally used in a more limited sense for the curve line which bounds a circle, and otherwise called a *periphery;* the boundary of a right-lined figure being expressed by the term *perimeter*.

CIRCUMFERENTOR, an instrument used by surveyors for taking angles.

Plate CXLV. It consists of a brass index and circle, all of a piece. The index is commonly about 14 inches long, and an inch and a half broad; the diameter of the circle is about seven inches. On this circle is made a chart, whose meridian line answers to the middle of the breadth of the index, and is divided into 360 degrees. There is a brass ring soldered on the circumference of the circle, on which screws another ring, with a flat glass in it, so as to form a kind of box for the needle, suspended on the pivot in the centre of the circle. There are also two sights to screw on, and slide up and down the index, as also a spangle and socket screwed on the back side of the circle for putting the head of the staff in.

Ibid. *How to observe the Quantity of an angle by the Circumferentor*. Let it be required to find the quantity of the angle EKG; first place your instrument at K, with the flower-de-luce of the chart towards you; then direct your sights to E, and observe what degrees are cut by the south end of the needle, which let be 296; then, turning the instrument about, direct your sights to G, noting then also what degrees are cut by the south end of the needle, which suppose 247. This done, always subtract the lesser from the greater, as in this example, 247 from 296, the remainder is 49 degrees, which is the true quantity of the angle EKG.

A circumferentor was made by Mr Jones of Holborn on an improved construction. From a very simple contrivance, it is rendered sufficient to take angles with the accuracy of a common theodolite; and by it angles of altitude and depression may be observed as readily *Ibid.* as horizontal ones. The improvement chiefly consists in an arm or index (G), so applied to the centre of the compass box, and within it, that, at the time of observing, by only slipping a pin (*p*) out, the circle of degrees alone may move round, and leave the index (G) fixed. This index will remain stationary, from its being attached to the socket that screws on the head of the staffs. On the end of this index, next the degrees in the box, there is graduated a nonius scale, by which the circle of 360 degrees is subdivided into five minutes or less if desired. To take angles of altitudes or depressions, the instrument is turned down on its ball and socket into a perpendicular position, and adjusted to its level by a plumb line (*l*), that is hung on a pin at the back of the box, and made to coincide with a mark made thereon. Then by looking through the small sight holes (*s*) purposely made, the angles are shown on the circles of degrees by the nonius as before. The arms (AA) of the instrument slip off (at BB), and the whole packs into a case but $5\frac{1}{2}$ inches square and 3 deep.

CIRCUMFLEX, in *Grammar*, an accent serving to note, or distinguish, a syllable of an intermediate sound between acute and grave; and generally somewhat long.—The Greeks had three accents, the acute, the grave, and the circumflex; formed thus, ´, `, ˜. In Latin, English, French, &c. the circumflex is made thus ^.—The acute raises the voice, and the grave falls or lowers it: the circumflex is a kind of undulation, or wavering of the voice, between the two. It is seldom used among the moderns, unless to show the omission of a letter which made the syllable long and open; a thing much more frequent in the French than among us: thus they write *pâte* for *paste; tête* for *teste; fûmes* for *fusmes*, &c. They also use the circumflex in the participles; some of their authors writing *conneu*, *peu*, others *connû*, *pû*, &c. Father Buffier is at a loss for the reason of the circumflex on this occasion.

The form of the Greek circumflex was anciently the same with that of ours, viz. ^; being a composition of the other two accents ^ in one.—But the copyists changing the form of the characters, and introducing the running hand, changed also the form of the circumflex accent; and instead of making a just angle, rounded it off, adding a dash, through too much haste; and thus formed an *s*, laid horizontally, which produced this figure ˜, instead of this ^.

CIRCUMGYRATION, denotes the whirling motion of any body round a centre; such is that of the planets round the sun.

CIRCUMLOCUTION, an ambages, or tour of words, used either when a proper term is not at hand, to express a thing naturally and immediately by; or when one chooses not to do it, out of respect, or for some other reason. The word comes from *circumloquor*, "I speak about."

CIRCUMLOCUTION, in oratory, is the avoiding of something disagreeable or inconvenient to be expressed in direct terms; by intimating the sense thereof in a kind of paraphrase, so conceived as to soften or break the force thereof.

Thus Cicero, unable to deny that Clodius was slain by Milo, owns it, with this circumlocution, "Milo's "servants being prevented from assisting their master, "who was reported to be killed by Clodius; they, in "his absence, and without his privity, or consent, did "what every body would expect from their own servants on such an occasion."

ampton. Not many years ago they discovered, by digging in a meadow near the town, an ancient building under ground, 50 feet long, 40 broad, and 4 high, and supported by 100 brick pillars, curiously inlaid with stones of various colours, supposed to have been a Roman bath. Circenster has now but one church, in the windows of which are the remains of very valuable painted glass. The town is governed by two high constables, and 14 wards-men, who govern seven distinct wards; and it sends two members to parliament. It has a free-school, a charity-school, with several alms-houses; and is seated on the river Churn, 36 miles north-east of Bristol. Population 4540 in 1811. W. Long. 0. 2. N. Lat. 51. 42.

CIRENZA, a city of Naples, capital of the Basilicate, with an archbishop's see. It was formerly a considerable place, but is now of small consequence. It is situated on the river Brandano, at the foot of the Apennine mountains, in E. Long. 16. 44. N. Lat. 40. 48.

CIRO FERRI, an excellent Italian painter and architect, was born at Rome in 1614, and was the disciple of Peter de Cortona, whose designs he imitated with such exactness, that it is difficult to distinguish them. He was esteemed by Pope Alexander VII. and his three successors, and died at Rome in 1698.

CIRRUS, or CIRRHUS, in *Botany*, a clasper or tendril; that fine spiral string or fibre put out from the footstalks, by which some plants, as the ivy and vine, fasten themselves to walls, pales, or trees for support. The term is synonymous to the capreolus, clavicula, and viticulus of other botanists; and is ranked by Linnæus among the fulcra, or parts of plants that serve for protection, support, and defence.

Tendrils are sometimes placed opposite to the leaves, as in the vine; sometimes at the side of the footstalk of the leaf, as in the passion flower; and sometimes, as in winged pea, *pisum ochrus*, they are emitted from the leaves themselves. With respect to composition, they are either simple, that is, composed of one fibre or chord, as in the vetch; or compound, that is, consist of two, three, or more, as in the everlasting pea. Bitter sweet, *solanum dulcamara*, bignonia, and ivy, send forth tendrils which plant themselves like roots in the adjacent walls, or the bark of the neighbouring trees. Claspers, says the ingenious Dr Grew, are like trunk roots, a mean betwixt a root and a trunk, but a compound of both, as may be gathered from their circumvolutions, in which they mutually ascend and descend. In the mounting of the trunk, continues the same author, claspers serve for support. Thus, in vines, the branches being very long, fragile, and slender, would be liable to frequent breaking, unless, by means of their claspers, they were mutually contained together; so that the whole care is divided betwixt the gardener and nature: the former with his ligaments of leather, secures the main branches; and nature, with those of her own providing, secures the less. Their aptitude to this end is seen in their convolutions, a motion not proper to any other part; and also in their toughness, which is so much the more remarkable, as they are slenderer than the branches from which they proceed. In the trailing of the trunk, tendrils serve for stabilement and shade: thus, in cucumbers the trunk and branches being long and fragile, would be driven to and fro by the winds, to the great prejudice both of themselves and their tender fruits, were they not, by these ligaments, held fast together, and preserved in association and good fellowship. The same claspers serve likewise for shade, so that a natural arbour is formed by the branches of the cucumber, in the same manner as an artificial one is made by tangling together the branches of trees; for the branches, by the linking of the claspers, being couched together, the tender fruits lie under the umbrage of a bower made of their own leaves.

CIRRI, in *Ichthyology*, certain oblong and soft appendages, not unlike little worms, hanging from the under jaws or mouths of some fishes; these cirri, commonly translated *beards*, afford marks to distinguish the different species of the fishes on which they are found.

CIRRIPEDES, in *Zoology*, a class of animals. See SUPPLEMENT.

CIRTA, in *Ancient Geography*, the metropolis and royal residence, not far from the river Ampsaga, in the inland parts of Numidia Propria. A colony, surnamed *Colonia Sittianorum*, very rich, when in the hands of Syphax. The colony was led by one P. Sittius, under the auspices of Cæsar, and was surnamed *Julia*. Now called *Constantina*, in Algiers. E. Long. 7. 0. N. Lat. 35. 30.

CISALPINE, any thing on this side the Alps. The Romans divided Gaul and the country now called *Lombardy*, into Cisalpine and Transalpine. That which was Cisalpine with regard to the Romans, is Transalpine with regard to us.

CISLEU, in Hebrew chronology, the ninth month of their ecclesiastical, and third of their civil, year, answering nearly to our November.

CISPADANA GALLIA, in *Ancient Geography*; a district of Italy, to the south of the Po, occupied by the Gauls in the time of the kings of Rome, separated from Liguria on the west, as is thought by the Iria, running from south to north into the Po; bounded on the south by the Apennines, and on the east by the Adriatic. The term is formed analogically, there being much mention in Cicero, Tacitus, Suetonius, and ancient inscriptions, made of the *Transpadani*; which and *Cispadani* are terms used with respect to Rome. Ptolemy calls the *Cispadana* peculiarly *Gallia Togata*, extending between the Po and Appenines, to the Sapis and Rubicon.

CISSA, or CISSUM, in *Ancient Geography*, a town of the Hither Spain, in Lusitania, on the east side of the Iberus (thought to be *Guissona*), where the Carthaginians were first defeated by Scipio. Another *Cissa* of Thrace, situated on the river Ægos Potamus, which Scylax seems to call *Cressa*, or *Crissa*; so that the reading is doubtful.

CISSAMPELOS. See BOTANY *Index*. There are two species of this genus, the pareira and caapeba, both natives of the warmest parts of America. The root of the second, applied externally, is said to be an antidote against the bites of venomous serpents. The plant being infused in water, quickly fills the liquor with a mucilaginous substance, which is as thick as jelly;

vescens, pyramide brevi. It is never found colourless like the other crystals, but has great variety of tinges, from that of the deeper ochres to a pale lemon colour. It is very plentiful in the West Indies, and is sometimes found in Bohemia. Our jewellers have learned from the French and Italians, who are very fond of it, to call it *citrine;* and often cut stones for rings out of it, particularly out of the pyramid, which is always finer than the column; and these, after they have passed through two or three hands, are generally mistaken for topazes.

CITRON-TREE. See CITRUS, BOTANY *Index*.

CITRON Water, a well-known strong water or cordial, which may be thus made: Take of fine thin lemon-peel, 18 ounces; of orange-peel, 9 ounces; perfect nutmegs, 4 ounces; the finest and best alcohol 2 gallons and a half. Digest in balneo mariæ for one night: draw off with a slow fire; then add as much water as will just make the matter milky (which will be about 7 quarts or 2 gallons); and lastly, add 2 pounds of fine sugar. This composition may be improved by fresh elder flowers, hung in a cloth in the head of the still, sprinkled with ambergris in powder, or its essence.

CITRON-Wood, the wood of an American tree, called by the natives *candle-wood*, because, being cut into splinters, it burns like a candle. The tree is frequent in the Leeward islands, and grows to a considerable size: the leaves are like those of the bay-tree, but of a finer green; the flower is sweet, and much like those of the orange; the fruit succeeding these is black, and of the size of a pepper-corn. The trunk is so like the yellow saunders in colour, that there was once an opinion that it was the same tree, and much of it was imported into Europe, and sold as such; but they were soon found to be different; the saunders being of a sweet scent, and but moderately heavy and resinous: but the citron-wood considerably heavy, very oily, and of a strong smell. It is of no known use in medicine; but is used in France and Germany by the turners, being a fine firm-grained wood, and taking a fine polish, and with age becoming of a very beautiful brown.

CITRUS, the CITRON-TREE. See BOTANY *Index*. This genus includes the citron, the lemon, the lime, the orange, of which there are different varieties, the shaddock, and the forbidden fruit.

CITTERN, a musical instrument much resembling the guitar, for which it has been frequently mistaken. Anciently it was called the *cistrum*, and till lately was held in great contempt both in France and Britain. The practice on it being very easy, it was formerly the amusement and recreation of lewd women and their visitors, insomuch, that in many of the old English dramatic writers, it is made the symbol of a woman that lived by prostitution. It was also the common amusement of waiting customers in barbers shops, as being the most easy of all instruments to play on, and therefore it was thought that almost every body could make use of it.

CITY, according to Cowel, is a town corporate which hath a bishop and cathedral church; and is called *civitas*, *oppidum*, and *urbs: civitas*, in regard it is governed by justice and order of magistracy; *oppidum*, because it contains a great number of inhabitants; and *urbs* because it is in due form surrounded with walls.

Kingdoms have been said to contain as many cities as they have seats of archbishops and bishops; but, according to Blount, *city* is a word that hath obtained since the Conquest; for in the time of the Saxons, there were no cities, but all the great towns were called *burghs*, and even London was then called *Londonburgh*, as the capital of Scotland is called *Edinburgh*. And long after the Conquest the word *city* is used promiscuously with the *burgh*, as in the charter of Leicester, where it is both called *civitas* and *burgus;* which shows that those writers were mistaken who tell us every city was, or is, a bishop's see. And though the word *city* signifies with us such a town corporate as hath usually a bishop and a cathedral church, yet it is not always so.

As to the ancient state of cities and villages, whilst the feudal policy prevailed, they held of some great lord on whom they depended for protection, and were subject to his arbitrary jurisdiction. The inhabitants were deprived of the natural and most unalienable rights of humanity. They could not dispose of the effects which their own industry had acquired, either by a latter will or by any deed executed during their life. They had no right to appoint guardians for their children during their minority. They were not permitted to marry without purchasing the consent of the lord on whom they depended. If once they had commenced a law-suit, they durst not terminate it by an accommodation, because that would have deprived the lord, in whose court they pleaded, of the perquisites due to him on passing his sentence. Services of various kinds, no less disgraceful than oppressive, were exacted from them without mercy or moderation. The spirit of industry was checked in some cities by absurd regulations, and in others by unreasonable exactions; nor would the narrow and oppressive maxims of a military aristocracy have permitted it ever to rise to any degree of height or vigour.

Robertson's Charles V.

The freedom of cities was first established in Italy, owning principally to the introduction of commerce. As soon as they began to turn their attention towards this object, and to conceive some idea of the advantages they might derive from it, they became impatient to shake off the yoke of their insolent lords, and to establish among themselves such a free and equal government, as would render property secure and industry flourishing. The German emperors, especially those of the Franconian and Suabian lines, as the seat of their government was far distant from Italy, possessed a feeble and imperfect jurisdiction in that country. Their perpetual quarrels, either with the popes or their own turbulent vassals, diverted their attention from the interior police of Italy, and gave constant employment for their arms. These circumstances induced some of the Italian cities towards the beginning of the 11th century, to assume new privileges; to unite together more closely, and to form themselves into bodies politic, under the government of laws established by common consent. The rights which many cities acquired by bold or fortunate usurpations, others purchased from the emperors, who deemed themselves gainers when they received large sums for immunities which they were no longer able to withhold; and some cities obtained than any other crown, though composed of no better materials than oak boughs. Plutarch, in the life of C. M. Coriolanus, accounts as follows for using on this occasion the branches of this tree before all others: because, says he, the oaken wreath being sacred to Jupiter, the great guardian of their city, they thought it the most proper ornament for him who had preserved the life of a citizen. Pliny*, speaking of the honour and privileges conferred on those who had merited this crown, says, "They who had once obtained it, might wear it always." When they appeared at the public spectacles, the senate and people rose to do them honour, and they took their seats on these occasions among the senators. They were not only personally excused from all troublesome offices, but procured the same immunity for their father and grandfather by the father's side.

* *Lib.* xvi. *cap.* 4.

CIVIDAD DE LAS PALMAS, the capital town of the island of Canary, with a bishop's see, and a good harbour. The houses are well built, two stories high, and flat-roofed. The cathedral is a very handsome structure; and the inhabitants are gay and rich. The air is temperate, and free from extremes of heat and cold. It is defended by a small castle seated on a hill. W. Long. 14. 35. N. Lat. 28. 0.

CIVIDAD *Real*, a town of Spain, in New Castile, and capital of La Mancha. The inhabitants are noted for dressing leather extremely well for gloves. W. Long. 4. 15. N. Lat. 39. 2.

CIVIDAD *Roderigo*, a strong and considerable town of Spain, in the kingdom of Leon, with a bishop's see. It was taken by Lord Wellington in January 1812. W. Long. 6. 52. N. Lat. 40. 38.

CIVIDAD *di Friuli*, a small but ancient town of Italy, in Friuli, and in the territory of Venice; seated on the river Natisona. E. Long. 13. 25. N. Lat. 46. 15.

CIVIL, in a general sense, something that regards the policy, public good, or peace, of the citizens or subjects of the state; in which sense we say, civil government, civil law, civil right, civil war, &c.

CIVIL, in a popular sense, is applied to a complaisant and humane behaviour in the ordinary intercourse of life. See CIVILITY.

CIVIL, in a legal sense, is also applied to the ordinary procedure in an action, relating to some pecuniary matter or interest; in which sense it is opposed to criminal.

CIVIL *Death*, any thing that cuts off a man from civil society; as a condemnation to the galleys, perpetual banishment, condemnation to death, outlawry, and excommunication.

CIVIL *Law*, is properly the peculiar law of each state, country, or city: but what we usually mean by the civil law, is a body of laws composed out of the best Roman and Grecian laws, compiled from the laws of nature and nations; and, for the most part, received and observed, throughout all the Roman dominions for above 1200 years. See LAW *Index*.

It was first brought over into England by Theobald a Norman abbot, who was elected to the see of Canterbury in 1138; and he appointed a professor, viz. Roger surnamed *Vicarius*, in the university of Oxford, to teach it to the people of this country. Nevertheless, it gained ground very slowly. King Stephen issued a proclamation, prohibiting the study of

it. And though the clergy were attached to it, the laity rather wished to preserve the old constitution. However, the zeal and influence of the clergy prevailed; and the civil law acquired great reputation from the reign of King Stephen to the reign of King Edward the III. both inclusive. Many transcripts of Justinian's Institute are to be found in the writings of our ancient authors, particularly of Bracton and Fleta; and Judge Blackstone observes, that the common law would have been lost and overrun by the civil, had it not been for the incident of fixing the court of common pleas in one certain spot, and the forming the profession of the municipal law into an aggregate body.

It is allowed that the civil law contains all the principles of natural equity; and that nothing can be better calculated to form good sense and sound judgment. Hence, though in several countries it has no other authority but that of reason and justice, it is everywhere referred to for authority. It is not received at this day in any nation without some alterations; and sometimes the feudal law is mixed with it, or general and particular customs; and often ordinances and statutes cut off a great part of it.

In Turkey, the Basilics are only used. In Italy, the canon law and customs have excluded a good part of it. In Venice, custom hath almost an absolute government. In the Milanese, the feudal law and particular customs bear sway. In Naples and Sicily, the constitutions and laws of the Lombards are said to prevail. In Germany and Holland, the civil law is esteemed to be the municipal law; but yet many parts of it are there grown obsolete; and others are altered, either by the canon law or a different usage. In Friesland, it is observed with more strictness; but in the northern parts of Germany, the jus Saxonicum, Lubecense, or Culmense, is preferred before it. In Denmark and Sweden, it hath scarce any authority at all. In France, only a part of it is received, and that part is in some places as a customary law; and in those provinces nearest to Italy it is received as a municipal written law. In criminal causes, the civil law is more regarded in France; but the manner of trial is regulated by ordinances and edicts. In Spain and Portugal, the civil law is connected with the jus regium and custom. In Scotland, the statutes of the sederunt, part of the regiam majestatem, and their customs, controul the civil law.

In England, it is used in the ecclesiastical courts, in the high court of admiralty, in the court of chivalry, in the two universities, and in the courts of equity; yet in all these it is restrained and directed by the common law.

CIVIL *Society*. See LAW *Index*.

CIVIL *State*, in the British polity, one of the general divisions of the LAITY, comprehending all orders of men, from the highest nobleman to the meanest peasant, that are not included under the MILITARY or MARITIME states; though it may sometimes include individuals of these as well as of the CLERGY; since a nobleman, a knight, a gentleman, or a peasant, may become either a divine, a soldier, or a seaman. The division of this state is into NOBILITY and COMMONALTY. See these articles.

CIVIL *War*, a war between people of the same state, or the citizens of the same city.

manners: some indeed are plain; but others, particularly three, are richly adorned, having a double row of Etruscan inscriptions running round the upper part of the walls, and under them a kind of frieze of figures in painting; some have an ornament under the figures, which seems to supply the place of an architrave. The paintings seem to be in fresco; and in general resemble those which are usually seen upon Etruscan vases; though some of them are perhaps superior to any thing as yet seen of the Etruscan art in painting. In general they are slight, but well conceived; and prove, that the artist was capable of producing things more studied and better finished; though, in such a subterraneous situation, the delicacy of a finished work would in a great measure have been thrown away. It is probable, however, that among the immense number of these apartments that yet remain to be opened, many paintings and inscriptions may be found, sufficient to form a very useful and entertaining work. At present this great scene of antiquities is almost entirely unknown, even in Rome. Mr Jenkins, resident at Rome, was the first Englishman who visited it.

Civita Vecchia, a sea-port town of Italy in the patrimony of St Peter, with a good harbour and an arsenal. It contains about 9000 inhabitants, and was made a free port in 1741. The air is very unwholesome. E. Long. 12. 31. N. Lat. 45. 5.

CIVOLI, or Cigoli, *Lewis*, an Italian painter, whose family name was *Cardi*, was born at the castle of Cigoli, in Tuscany, in the year 1559. His *ecce homo*, which he performed as a trial of skill with Barochio and Michael Angelo de Caravaggio, was judged better than those executed by them. He excelled in designing, and was employed by the popes and princes of his time. He died at Rome in 1613.

CIUS, in *Ancient Geography*, a town and river of Bithynia, which gave name to the Sinus Cianus. The town was afterwards called *Prusia*, Cius having been destroyed by Philip father of Perseus, and rebuilt by Prusias king of Bithynia. In the river, Hylas, the favourite boy of Hercules, was drowned; (Apollonius Rhodius).

CLAC, among countrymen. To clack wool, is to cut off the sheep's mark, which makes the weight less, and yields less custom to the king.

CLACKMANNAN, the name of a small shire in Scotland, not exceeding eight miles in length and five in breadth. It is bounded on the south by the frith of Forth; on the north and west by Perthshire; and on the east by Fife. The country is plain and fertile towards the frith, producing corn and pasture in abundance. It likewise yields great abundance of excellent coal, considerable quantities of which are shipped to supply Edinburgh with fuel. It is watered by the rivers Forth and Devon, and joins the shire of Kinross in sending a member alternately to parliament.

Population of the different Parishes in this County at two Periods.

	In 1755.	In 1790—1798.
Alloa,	5816	4802
Clackmannan,	1913	2528
Dollar,	517	510
Tillicoultry,	757	909
	9003	8749

Population in 1811, 12,010 *.
See Clackmananshire, Supplement.

* *Statist. Hist.*

Clackmannan, a small town of Scotland, and capital of the county of that name, is situated on the northern shore of the Forth, in W. Long. 3. 40. N. Lat. 56. 15. It stands on a hill, on the top of which is the castle, commanding a noble prospect. It was long the seat of the chief of the Bruces, who was hereditary sheriff of the county before the jurisdictions were abolished. The large square tower is called after *Robert Bruce*, whose great sword and casque are still preserved here. The hill, with the tower, forms a picturesque object. Clackmannan had 3605 inhabitants in 1811, and is still the seat of the Bruces of Kennet.

CLAGENFURT, a strong town of Germany, and capital of Carinthia, situated in E. Long. 13. 56. N. Lat. 46. 50.

CLAGET, William, an eminent and learned divine, born in 1646. He was preacher to the society of Gray's Inn, which employment he exercised until he died in 1688, being then also one of the king's chaplains. Archbishop Sharp gives him an excellent character; and Bishop Burnet has ranked him among those worthy men whose lives and labours contributed to rescue the church from the reproaches which the follies of others had drawn upon it. Dr Claget published several things; but his principal work is his "Discourse concerning the Operations of the Holy Spirit;" nor must it be forgotten that he was one of those excellent divines who made a noble stand against the designs of James II. to introduce popery. Four volumes of his sermons were published after his death by his brother Nicholas Claget, archdeacon of Sudbury, father of Nicholas Claget, afterwards bishop of Exeter.

CLAIM, in *Law*, a challenge of interest in any thing that is in possession of another.

CLAIR obscure. See *Claro Obscuro.*

CLAIRAULT, Alexis, of the French academy of sciences, was one of the most illustrious mathematicians in Europe. He read to the academy in 1726, when he was not 13 years old, "A Memoir upon Four new Geometrical Curves of his own invention;" and supported the character he thus laid a foundation for by various publications from time to time. He published *Elémens de Géometrie*, 1741, in 8vo; *Elemens d' Algebre*, 1746, in 8vo; *Theorie de la Figure de la Terre*, 1743, in 8vo; *Tables de la Lune*, 1754, in 8vo. He was concerned also in the *Journal des Sçavans*, which he furnished with many excellent extracts. He died in 1765. He was one of the academicians who were sent into the north to determine the figure of the earth.

CLAM, in *Zoology*, a shell-fish. See Venus.

CLAMP, a piece of wood joined to another.

Clamp is likewise the term for a pile of unburnt bricks greatly narrowed the total exemption they claimed from secular jurisdiction.

CLARENDON, *Earl of*. See HYDE.

CLARENNA, (Tabulæ), in *Ancient Geography*, a town of Vindelicia, at the confluence of the Lycus and Danube. Now *Rain*, a town of Bavaria, on the south side of the Danube, at the confluence of the Lech. E. Long. 11. 0. N. Lat. 48. 45.

CLARENZA, the capital of a duchy of the same name in the Morea; it is a sea-port town, situated on the Mediterranean. E. Long. 21. 40. N. Lat. 37. 40.

CLARET, a name given by the French to such of their red wines as are not of a deep or high colour. See WINE.

CLARICHORD, or MANICHORD, a musical instrument in form of a spinet.

It has 49 or 50 stops, and 70 strings, which bear on five bridges; the first whereof is the highest, the rest diminishing in proportion. Some of the strings are in unison, their number being greater than that of the stops. There are several little mortizes for passing the jacks, armed with brass-hooks, which stop and raise the chords instead of the feather used in virginals and spinets; but what distinguishes it most is, that the chords are covered with pieces of cloth, which render the sound sweeter, and deaden it so that it cannot be heard at any considerable distance; whence it comes to be particularly in use among the nuns, who learn to play, and are unwilling to disturb the silence of the dormitory.

CLARIFICATION, the act of cleaning or fining any fluid from all heterogeneous matter or feculencies.

The substances usually employed for clarifying liquor, are whites of eggs, blood, and isinglass. The two first are used for such liquors as are clarified whilst boiling hot; the last for those which are clarified in the cold, such as wines, &c. The whites of eggs are beaten up into a froth, and mixed with the liquor, upon which they unite with and entangle the impure matters that float in it; and presently growing hard by the heat, carry them up to the surface in the form of a scum, no longer dissoluble in the liquid. Blood operates in the same manner, and is chiefly used in purifying the brine from which salt is made. Great quantities of isinglass are consumed for fining turbid wines. For this purpose some throw an entire piece, about a quarter of an ounce, into a wine cask; by degrees the glue dissolves, and forms a skin upon the surface, which at length subsiding, carries down with it the feculent matter which floated in the wine. Others previously dissolve the isinglass; and having boiled it down to a slimy consistence, mix it with the liquor, roll the cask strongly about, and then suffer it to stand to settle. Neumann questions the wholesomeness of wines thus purified, and assures us that he himself, after drinking only a few ounces of sack thus clarified, but not settled quite fine, was seized with sickness and vomiting, followed by such a vertigo, that he could not stand upright for a minute together. The giddiness continued with a nausea and want of appetite for several days.

CLARIGATIO, in Roman antiquity, a ceremony that always preceded a formal declaration of war. It was performed in this manner: first four heralds crowned with vervain were sent to demand satisfaction for the injuries done the Roman state. These heralds taking the gods to witness that their demands were just, one of them, with a clear voice, demanded restitution within a limited time, commonly 33 days, which being expired without restitution made, then the *pater patratus*, or prince of the heralds, proceeded to the enemies frontiers, and declared war.

CLARII APOLLINIS FANUM (Strabo, Pliny), a temple and grove of Apollo, situated between Colophon and Lebedos, in Ionia; called *Claros* (Thucydides, Ovid). The name also of a town and mountain there (Nicander); and of a fountain (Clemens Alexandrinus), the waters of which inspired with prophetic fury. *Clarius* the epithet of Apollo (Strabo).

CLARION, a kind of trumpet, whose tube is narrower and its tone acuter and shriller than that of the common trumpet. It is said that the clarion, now used among the Moors, and Portuguese who borrowed it from the Moors, served anciently for a treble to several trumpets, which sounded tenor and bass.

CLARISSES, an order of nuns so called from their founder St Clara or St Clare. (See St CLARE.) She was in the town of Assisa in Italy; and having renounced the world to dedicate herself to religion, gave birth to this order in the year 1212; which comprehends not only those nuns that follow the rule of St Francis, according to the strict letter, and without any mitigation, but those likewise who follow the same rule softened and mitigated by several popes. It is at present one of the most flourishing orders of nuns in Europe. After Ferdinand Cortez had conquered Mexico for the king of Spain, Isabella of Portugal, wife of the emperor Charles V. sent thither some nuns of the order of St Clara, who made several settlements there. Near their monasteries were founded communities of Indian young women, to be instructed by the clarisses in religion, and such works as were suitable to persons of their sex. These communities are so considerable that they usually consist of four or five hundred.

CLARKE, DR SAMUEL, a preacher and writer of considerable note in the reign of Charles II. was, during the interregnum, and at the time of the ejection, minister of St Dennet Fink in London. In November 1660, he, in the name of the Presbyterian ministers, presented an address of thanks to the king for his declaration of liberty of conscience. He was one of the commissioners of the Savoy, and behaved on that occasion with great prudence and moderation. He sometimes attended the church as a hearer and communicant, and was much esteemed by all that knew him, for his great probity and industry. The most valuable of his numerous works are said to be his Lives of the Puritan Divines and other persons of note, 22 of which are printed in his Martyrology; the rest are in his Lives of sundry eminent Persons in this latter Age, folio; and his Marrow of Ecclesiastical History, in folio and quarto. He died in 1680.

CLARK, *Samuel*, the son of the former, was fellow of Pembroke-hall in Cambridge; but was ejected from his fellowship for refusing to take the engagements, as he was also afterwards from his rectory of Grendon in Buckinghamshire. He applied himself early to the study of the Scriptures, and his Annotations on the Bible, printed together with the sacred text, is highly commended

Clarke.

soners, for one that goes right, ten lose themselves in mist, or ramble after visions, which deprive them of all sight of their end, and mislead them in the choice of wrong means." Clarke, it is probable, would not have denied this; and the poet perhaps would have spared his better reasoners, and not have joined them with such company, had he collected our author's apology for using the argument *à priori*. "The argument *à posteriori* (says he) is indeed by far the most generally useful argument, most easy to be understood, and in some degree suited to all capacities; and therefore it ought always to be insisted upon: But for as much as atheistical writers have sometimes opposed the being and attributes of God by such metaphysical reasonings, as can no otherwise be obviated than by arguing *à priori;* therefore this manner of arguing also is useful and necessary in its proper place." To this may be added the answer he made to Mr Whiston upon this occasion, as narrated by the latter in his Historical Memoirs. "When Clarke brought me his book, I was in my garden against St Peter's college in Cambridge, where I then lived. Now I perceived that in these sermons he had dealt a great deal in abstract and metaphysical reasoning. I therefore asked him how he ventured into such subtleties, which I never durst meddle with; and showing him a nettle, or some contemptible weed in my garden, I told him that weed contained better arguments for the being and attributes of God than all his metaphysics. Clarke confessed it to be so; but alleged for himself, that since such philosophers as Hobbes and Spinosa had made use of those kind of subtleties against, he thought proper to show that the like way of reasoning might be made better use of on the side of, religion; which reason or excuse I allowed to be not inconsiderable." Undoubtedly, as the present editor of the Biographia Britannica observes, the grand, the proper, the decisive proof of the existence, perfections, and providence of the Deity, must be drawn from his works. On this proof, as being equally satisfactory to the profoundest philosopher and the meanest peasant, the cause of religion will ever stand secure. Nevertheless if there be such a thing as an argument *à priori*, why may not speculative men be employed in its examination? Several able divines and philosophers have thought, and still think, that this argument for the being and attributes of God will stand the test of the severest scrutiny; and therefore they cannot be blamed for endeavouring to set it in a convincing light to others. As to the merit, indeed, of the whole work under consideration, including the evidences of natural and revealed religion, it is undoubtedly of the first order. Difficulties may be raised on particular points, and the ablest and most candid inquirers may sometimes see cause to hesitate with regard to the validity of the reasoning; but still in general, the book reflects honour on the age as well as the author that produced it, and will descend, with distinguished reputation, to a late posterity. The defence, in particular, of the sacred original and authority of Christianity is admirably conducted.

In 1706 he published "A letter to Mr Dodwell;" wherein all the arguments in his epistolary discourse against the immortality of the soul are particularly answered, and the judgment of the fathers, to whom Mr Dodwell had appealed concerning that matter, truly represented. Bishop Hoadly observes, that in this letter he answered Mr Dodwell in so excellent a manner, both with regard to the philosophical part, and to the opinions of some of the primitive writers, upon whom these doctrines were fixed, that it gave universal satisfaction. But this controversy did not stop here; for the celebrated Collins, coming in as a second to Dodwell, went much farther into the philosophy of the dispute, and indeed seemed to produce all that could possibly be said against the immateriality of the soul, as well as the liberty of human actions. This enlarged the scene of the dispute, into which our author entered, and wrote with such a spirit of clearness and demonstration, as at once showed him greatly superior to his adversaries in metaphysical and physical knowledge, and made every intelligent reader rejoice, that such an incident had happened to provoke and extort from him that plenty of strong reasoning and perspicuity of expression, which were indeed very much wanted upon this intricate and obscure subject. "And I am persuaded (continues the bishop), that as what he has written in this controversy comprehends the little that the ancients had said well, and adds still more evidence than ever appeared clearly before, and all in words that have a meaning to them, it will remain the standard of good sense on that side of the question, on which he spent so many of his thoughts, as upon one of his favourite points. Clarke's letter to Dodwell was soon followed by four defences of it, in four several letters to the author of "A letter to the learned Mr Henry Dodwell, containing some Remarks on a pretended Demonstration of the Immateriality and natural Immortality of the Soul, in Mr Clarke's Answer to his late Epistolary Discourse, &c." They were afterwards all printed together; and the "Answer to Toland's Amyntor" added to them. In the midst of all these labours, he found time to show his regard to mathematical and physical studies, and exact knowledge and skill in them. And his natural affection and capacity for these studies were not a little improved by the friendship of Sir Isaac Newton, at whose request he translated his "Optics" into Latin in 1706. With this version Sir Isaac was so highly pleased, that he presented him with the sum of 500l. or 100l. for each child, Clarke having then five children.

This year also, Bishop Moore, who had long formed a design of fixing him more conspicuously, procured for him the rectory of St Bennet's, Paul's Wharf, in London; and soon after carried him to court, and recommended him to the favour of Queen Anne. She appointed him one of her chaplains in ordinary; and, in consideration of his great merit, and at the request of the bishop, presented him to the rectory of St James's, Westminster, when it became vacant in 1709. Upon this advancement to this station, he took the degree of D. D. when the public exercise which he performed for it at Cambridge was prodigiously admired. The questions which he maintained were these: 1. "Nullum fidei Christianæ dogma, in sacris scripturis traditum, est rectæ rationi dissentaneum;" that is, "No article of the Christian faith delivered in the Holy Scriptures, is disagreeable to right reason." 2. "Sine actionum humanarum libertate nulla potest esse religio;" that is, "Without the liberty of human actions

Clarke.

Books and pamphlets, however, were not all which the "Scripture Doctrine of the Trinity" occasioned: it made its author obnoxious to the power ecclesiastical, and his book to be complained of by the Lower House of convention. The doctor drew up a preface, and afterwards gave in several explanations, which seemed to satisfy the Upper House; at least the affair was not brought to any issue, the members appearing desirous to prevent dissensions and divisions.

In 1715 and 1716, he had a dispute with the celebrated Leibnitz, relating to the principles of natural philosophy and religion; and a collection of the papers which passed between them was published in 1717. This performance of the doctor's is inscribed to her late Majety Queen Caroline, then princess of Wales, who was pleased to have the controversy pass through her hands. It related chiefly to the important and difficult subjects of liberty and necessity.

In 1718, Dr Clarke made an alteration in the forms of doxology in the singing psalms, which produced no small noise and disturbance, and occasioned some pamphlets to be written. The alteration was this:

> To God, through Christ, his only Son,
> Immortal glory be, &c.
> And
> To God, through Christ, his Son, our Lord,
> All glory be therefore, &c.

A considerable number of these select psalms and hymns having been dispersed by the Society for Promoting Christian Knowledge, before the alteration of the doxologies was taken notice of, he was charged with a design of imposing upon the society; whereas, in truth, the edition of them had been prepared by him for the use of his own parish only, before the society had thoughts of purchasing any of the copies; and as the usual forms of doxology are not established by any legal authority, ecclesiastical or civil, in this he had not offended.

About this time he was presented by the lord Lechmere, the chancellor of the duchy of Lancaster, to the mastership of Wigston's hospital in Leicester. In 1724, he published 17 sermons preached on several occasions, 11 of which were never before printed: and the year following, a sermon, preached at the parish-church of St James's, upon the erecting a charity-school for the education of women servants. In 1727, upon the death of Sir Isaac Newton, he was offered by the court the place of master of the mint, worth *communibus annis* 1200 or 1500l. a-year. But to this secular preferment he could not reconcile himself, and therefore absolutely refused it. Whiston seems to wonder, that Clarke's eulogists should lay so little stress upon this refusal, as to mention it not at all, or at least very negligently; while "he takes it," he says "to be one of the most glorious actions of his life, and to afford undeniable conviction, that he was in earnest in his religion." In 1728, was published, "A Letter from Dr Clarke to Mr Benjamin Hoadly, F. R. S. occasioned by the controversy, relating to the Proportion of Velocity and Force in Bodies in Motion;" and printed in the Philosophical Transactions, No 401.

In 1729, he published the 12 first books of "Homer's Iliad." This edition was printed in 4to, and dedicated to the duke of Cumberland. The Latin version is almost entirely new, and annotations are added to the bottom of the pages. Homer, Bishop Hoadly tells us, was Clarke's admired author, even to a degree of something like enthusiasm, hardly natural to his temper, and that in this he went a little beyond the bounds of Horace's judgment, and was so unwilling to allow the favourite poet ever to nod, that he has taken remarkable pains to find out, and give a reason for every passage, word, and title, that could create any suspicion. "The translation, (adds the Bishop), with his corrections, may now be styled accurate, and his notes, as far as they go, are indeed a treasury of grammatical and critical knowledge. He was called to his task by royal command; and he has performed it in such a manner, as to be worthy of the young prince, for whom it was laboured." The year of its publication was the last of this great man's life. Though not robust, he had always enjoyed a firm state of health, without any indisposition bad enough to confine him, except the small-pox in his youth; till on Sunday May 11. 1729, going out in the morning to preach before the judges at Sergeant's-Inn, he was there seized with a pain in his side, which made it impossible for him to perform the office he was called to; and quickly became so violent, that he was obliged to be carried home. He went to bed, and thought himself so much better in the afternoon, that he would not suffer himself to be bled; against which remedy, it is remarkable that he had entertained strong prejudices. But the pain returning violently about two the next morning, made bleeding absolutely necessary; he appeared to be out of danger, and continued to think himself so, till the Saturday morning following; when, to the inexpressible surprise of all about him, the pain removed from his side to his head; and, after a very short complaint, took away his senses so, that they never returned any more. He continued breathing till within seven and eight of the evening of that day, which was May 17. 1729; and then died, in his 54th year.

Soon after his death were published, from his original manuscripts, by his brother Dr John Clarke, dean of Sarum, "An Exposition of the Church Catechism," and ten volumes of sermons, in 8vo. His "Exposition" is made up of those lectures he read every Thursday morning for some months in the year, at St James's church. In the latter part of his time he revised them with great care, and left them completely prepared for the press. As to the sermons, few discourses in the English language are more judicious, and fewer still are equally instructive. The reasoning and the practical parts are excellent, and the explanations of Scripture are uncommonly valuable. Though Dr Clarke had not the turn of mind which qualified him for moving the passions, and indeed did not make it his object, his sentiments, nevertheless, are frequently expressed with such a clearness of conception, and such a force of language, as to produce in well disposed readers all the effect of the pathetic. Several volumes of sermons have been published since his time, which are far superior in point of elegance and beauty, and we have the highest sense of their merit. But still if we were called upon to recommend discourses, which abound with the most solid instruction, and promise the most lasting improvement, we should never forget a the discovery made by Martin Folkes, Esq. of the old Saxon pound. It was dedicated to the duke of Newcastle, whose beneficent disposition is celebrated for having conferred obligations upon the author, which were not the effects of importunity. Mr Clarke's performance was perused in manuscript by Arthur Onslow, Esq. speaker of the house of commons, who honoured him with some useful hints and observations; but he was chiefly indebted to Mr Bowyer, who took upon him all the care of the publication, drew up several of the notes, wrote part of the dissertation on the Roman sesterce, and formed an admirable index to the whole. By this work our author acquired a great and just reputation. Indeed, it reflects honour upon the country by which it was produced; for there are few performances that are more replete with profound and curious learning. Mr Clarke's last promotions were the chancellorship of the church of Chichester, and the vicarage of Amport, which were bestowed upon him in 1770. These preferments he did not long live to enjoy, departing this life on the 21st of October, in the following year. He had resigned in 1768, the rectory of Buxted to his son Edward. In Mr Nichols's Anecdotes of Bowyer, there are several letters and extracts of letters written to that learned printer by Mr Clarke, which display him to great advantage as a man of piety, a friend, and a scholar.

In a sketch of his character in the *Biographia Britannica*, furnished by Mr Hayley, who was his intimate acquaintance, he is represented as not only a man of extensive erudition, but as possessed of the pleasing talent of communicating his various knowledge in familiar conversation, without any appearance of pedantry or presumption. Antiquities were the favourite study of Mr Clarke, as his publications sufficiently show; but he was a secret, and by no means an unsuccessful, votary of the muses. He wrote English verse with ease, elegance, and spirit. Perhaps there are few better epigrams in our language than the following, which he composed on seeing the words *Domus ultima* inscribed on the vault belonging to the duke of Richmond in the cathedral of Chichester.

> Did he, who thus inscribed the wall,
> Not read, or not believe, St Paul,
> Who says there is, where'er it stands,
> Another house not made with hands?
> Or, may we gather from these words,
> That house is not a house of lords?

Among the happier little pieces of his sportive poetry, there were some animated stanzas, describing the character of the twelve English poets, whose portraits, engraved by Vertue, were the favourite ornament of his parlour: but he set so modest and humble a value on his poetical compositions, that they were seldom committed to paper, and are therefore very imperfectly preserved in the memory of those to whom he sometimes recited them. His taste and judgment in poetry appear indeed very striking in many parts of his learned and elaborate *Connexion of Coins*. His illustration of Nestor's cup, in particular, may be esteemed as one of the happiest examples of that light and beauty which the learning and spirit of an elegant antiquarian may throw on a cloudy and mistaken passage of an ancient poet. In strict attention to all the duties of his station, in the most active and unwearied charity, he might be regarded as a model to the ministers of God. Though his income was never large, it was his custom to devote a shilling in every guinea that he received to the service of the poor. As a master, as a husband, and a father, his conduct was amiable and endearing; and to close this imperfect sketch of him with his most striking features, he was a man of genuine unaffected piety.

CLARO-OBSCURO, or CLAIR-OBSCURE, in painting, the art of distributing to advantage the lights and shades of a piece, both with respect to the easing of the eye and the effect of the whole piece. See PAINTING.

CLARO-Obscuro, or *Chiaro-scuro*, is also used to signify a design consisting only of two colours, most usually black and white, but sometimes black and yellow; or it is a design washed only with one colour, the shadows being of a dusky brown, and the lights heightened up by white.

The word is also applied to prints of two colours taken off at twice; whereof there are volumes in the cabinets of those who are curious in prints.

CLARUS, or CLAROS, in *Ancient Geography*, a town of Ionia, famous for an oracle of Apollo. It was built by Manto, daughter of Tiresias, who fled from Thebes after it had been destroyed by the Epigoni. She was so afflicted with her misfortunes, that a lake was formed with her tears, where she first founded the oracle. Apollo was from thence surnamed *Clarius*. Also an island of the Ægean sea, between Tenedos and Scios.

CLARY. See SALVIA, BOTANY *Index*.

CLARY-Water, is composed of brandy, sugar, clary-flowers, and cinnamon, with a little ambergris dissolved in it. It helps digestion, and is cardiac. This water is rendered either purgative or emetic, by adding resin of jalap and scammony, or *crocus metallorum*. Some make clary-water of brandy, juice of cherries, strawberries, and gooseberries, sugar, cloves, white pepper, and coriander seeds; infused, sugared, and strained.

CLASMIUM, an old term in *Natural History*, applied to some fossils, of the class of gypsums; the characters of which are, that they are of a soft texture, and of a dull opaque look, being composed, as all the other gypsums, of irregularly arranged flat particles.

The word is derived from the Greek κλασμα, a fragrant or small particle; from the flaky small particles of which these bodies are composed. Of this genus there is only one known species: this is of a tolerably regular and even structure; though very coarse and harsh to the touch. It is of a very lively and beautiful red colour; and is found in thick roundish masses, which, when broken, are to be seen composed of irregular arrangements of flat particles; and emulate a striated texture. It will neither give fire with steel nor ferment with acids; but calcines very freely and easily, and affords a very valuable plaster of Paris, as do all the purer gypsums. It is common in Italy, and is greatly esteemed there; it is also found in some parts of England, particularly Derbyshire, but there it is not much regarded.

CLASPERS, or TENDRILS. See CIRRHUS.

CLASS, an appellation given to the most general subdivisions of any thing; thus, *animal* is subdivided into

into the classes quadrupeds, birds, fishes, &c. which are again subdivided into serieses or orders; and these last into genera. See BOTANY.

CLASS, is also used in schools, in a synonymous sense with *form*, for a number of boys all learning the same thing.

CLASSIC, or CLASSICAL, an epithet chiefly applied to authors read in the classes at schools.

This term seems to owe its origin to Tullius Servius, who, in order to make an estimate of every person's estate, divided the Roman people into six bands, which he called *classes*. The estate of the first class was not to be under 200l. and these by way of eminence were called *classici*, "classics:" hence authors of the first rank came to be called *classics*, all the rest being said to be *infra classem*: thus Aristotle is a classic author in philosophy; Aquinas in school divinity, &c.

CLASSICUM was the alarm for battle, given by the Roman generals, and sounded by trumpets and other martial music throughout the army.

CLATHRI, in antiquity, bars of wood or iron, used in securing doors and windows. There was a goddess called *Clathra*, that presided over the clathri.

CLAVARIA, CLUB-TOP. See BOTANY *Index*.

CLAVARIUM, in antiquity, an allowance the Roman soldiers had for furnishing nails to secure their shoes with. They raised frequent mutinies, demanding largesses of the emperors under this pretence.

CLAVATA VESTIMENTA, in antiquity, habits adorned with purple clavi, which were either broad or narrow. See CLAVUS.

CLAUBERG, JOHN, a learned professor of philosophy and divinity at Diusburgh, was born at Solingen in 1622. He travelled into Holland, France, and England, and in each country obtained the esteem of the learned. The elector of Brandenburgh gave him public testimonies of his esteem. He died in 1665. His works were printed at Amsterdam, in 2 vols 4to. The most celebrated of these is his treatise, entitled *Logica vetus et nova*, &c.

CLAUDE LE LORRAIN, or CLAUDE GELEE, a celebrated landscape painter, and a striking example of the efficacy of industry to supply, or at least to call forth genius. Claude was born in the diocese of Toul in Lorrain in 1600; and, being dull and heavy at school, was put an apprentice to a pastry-cook; he afterwards rambled to Rome to seek a livelihood; but, being very ill-bred, and unacquainted with the language, nobody cared to employ him. Chance threw him at last in the way of Augustin Tassi, a painter, who hired him to grind his colours, and to do all the household drudgery. His master hoping to make him serviceable to him in some of his greatest works, taught him by degrees the rules of perspective and the elements of design. Claude at first did not know what to make of those principles of art; but being encouraged, and not failing in application, he came at length to understand them. Then his mind began to expand, and he cultivated the art with wonderful eagerness. He exerted his utmost industry to explore the true principles of painting by an incessant examination of nature, that genuine source of excellence; for which purpose, he made his studies in the open fields; where he very frequently continued from sunrise till the dusk of the evening compelled him to withdraw himself from his contemplations. It was his custom to sketch whatever he thought beautiful or striking; and every curious tinge of light, on all kinds of objects, he marked in his sketches, with a similar colour; from which he perfected his landscapes with such a look of real nature, and gave them such an appearance of truth, as proved superior to any artist that had ever painted in that style.

The beauties of his paintings are derived from nature herself, which he examined with uncommon assiduity; and Sandrart relates, that Claude used to explain to him, as they walked through the fields, the causes of the different appearances of the same prospect at different hours of the day, from the reflections or refractions of light, from dews or vapours in the evening or morning, with all the precision of a philosopher. He worked on his pictures with great care, endeavouring to bring them to perfection, by touching them frequently over again; and if any performance did not answer his ideas, it was customary with him to alter, to deface, and repaint it several times over till it corresponded with the image pictured in his mind. But whatever struck his imagination, while he observed nature abroad, it was so strongly impressed on his memory, that on his return to his work, he never failed to make the happiest use of it.

His skies are warm and full of lustre, and every object is properly illumined. His distances are admirable, and in every part a delightful union and harmony not only excite our applause but our admiration. His invention is pleasing, his colouring delicate, and his tints have such an agreeable sweetness and variety, as have been but imperfectly imitated by the best subsequent artists, but were never equalled. He frequently gave an uncommon tenderness to his finished trees by glazing; and in his large compositions which he painted in fresco, he was so exact that the distinct species of every tree might readily be distinguished. As to his figures, when he painted them himself, they are very indifferent; but he was so conscious of his deficiency in this respect, that he usually engaged other artists who were eminent to paint them for him; of which number were Courtois and Philippo Laura. His pictures are now very rare, especially such as are undamaged; and those are at this time so valued, that no price, however great, is thought to be superior to their merit. In order to avoid a repetition of the same subject, and also to detect such copies of his works as might be injurious to his fame, by being sold for originals, it was his custom to draw (in a paper book prepared for this purpose) the designs of all those pictures which were transmitted to different countries; and on the back of the drawings, he wrote the name of the person who had been the purchaser. That book, which he titled *Libro di Verita*, is now in the possession of the duke of Devonshire.

CLAUDE, *John*, a Protestant divine, born in the province of Angenois in 1619. Mess. de Port Royal using their utmost endeavours to convert M. de Turenne to the Catholic faith, presented him with a piece calculated to that end, which his lady engaged Mr Claude to answer; and his performance gave rise to the most famous controversy that was ever carried on in France between the Roman Catholics and Protestants.

stants. On the revocation of the edict of Nantz, he retired to Holland, where he met with a kind reception, and was honoured with a considerable pension by the prince of Orange. He died in 1687; and left a son, Isaac Claude, whom he lived to see minister of the Walloon church at the Hague, and who published several excellent works of his deceased father.

CLAUDIA, a vestal virgin at Rome, who being suspected of unchastity, is said to have been cleared from that imputation in the following manner: the image of Cybele being brought out of Phrygia to Rome in a barge, and it happening to stick so fast in the river Tiber that it could not be moved, she tying her girdle, the badge of chastity, to the barge, drew it along to the city, which a thousand men were unable to do.

Claudia Aqua (Frontinus), water conveyed to Rome by a canal or aqueduct of eleven miles in length, the contrivance of Appius Claudius the Censor, and the first structure of the kind, in the year of Rome 441. Called also *Aqua Appia*.

Claudia Copia, (Inscriptions), a name of *Lugdunum*, or Lyons in France, the birthplace of the emperor Claudius: a Roman colony called *Claudia*, from its benefactor the emperor; and *Copia* from its plenty of all necessaries, especially corn. See LUGDUNUM.

CLAUDIA, or *Clodia Via* (Ovid,) was that road which, beginning at the Pons Milvius, joined the Flaminia, passing through Etruria on the south side of the Lacus Sabatinus, and striking off from the Cassia, and leading to Luca (Antonine): large remains of it are to be seen above Bracciano (Holstenius).

Claudia Lex, de Comitiis, was enacted by M. Cl. Marcellus in the year of Rome 702. It ordained, that at public elections of magistrates no notice should be taken of the votes of such as were absent. Another, *de Usura*, which forbade people to lend money to minors on condition of payment, after the decease of their parents. Another, *de Negotiatione*, by Q. Claudius the tribune, 535. It forbade any senator or father of a senator to have any vessel containing above 300 amphoræ, for fear of their engaging themselves in commercial schemes. The same law also forbade the same thing to the scribes and the attendants of the questors, as it was naturally supposed that people who had any commercial connexions could not be faithful to their trust, nor promote the interest of the state. Another, 576, to permit the allies to return to their respective cities, after their names were inrolled. Liv. 41. c. 8. Another, to take away the freedom of the city of Rome from the colonists which Cæsar had carried to Novicomum.

CLAUDIANUS, CLAUDIUS, a Latin poet, flourished in the 4th century, under the emperor Theodosius, and under his sons Arcadius and Honorius. It is not agreed of what country he was a native; but he came to Rome in the year of Christ 395, when he was about 20 years old; and there insinuated himself into Stilicho's favour; who, being a person of great abilities both for civil and military affairs, though a Goth by birth, was so considerable a person under Honorius, that he may be said for many years to have governed the western empire. Stilicho afterwards fell into disgrace, and was put to death; and it is more than probable that the poet was involved in the misfortunes of his patron, and severely persecuted in his person and fortunes by Hadrian, an Egyptian by birth, who was captain of the guards to Honorius, and succeeded Stilicho. There is reason, however, to think that he rose afterwards to great favour, and obtained several honours both civil and military. The princess Serena had a great esteem for Claudian, and recommended and married him to a lady of great quality and fortune in Libya. There are a few little poems on sacred subjects, which through mistake have been ascribed by some critics to Claudian; and so have made him be thought a Christian. But St Austin, who was cotemporary with him, expressly says that he was a Heathen. The time of Claudian's death is uncertain, nor do we know any farther particulars of his life than what are to be collected from his works, and which we have already related above. He is thought to have more of Virgil in his style than all the other imitators of him.

CLAUDIUS I. Roman emperor, A. D. 41. The beginning of his reign was very promising; but it was soon discovered that little better than an idiot filled the throne, who might easily be made a tyrant: accordingly he became a very cruel one, through the influence of his empress, the infamous Messalina: after her death, he married his niece Agrippina, who caused him to be poisoned to make room for Nero, A. D. 54. See (*History of*) ROME.

CLAUDIUS II. *Aurelius*, surnamed *Gothicus*, signalized himself by his courage and prudence under the reigns of Valerian and Julian; and on the death of the latter was declared emperor in 268. He put to death Aureolus, the murderer of Gallienus; defeated the Germans; and in 269 marched against the Goths, who ravaged the empire with an army of 300,000 men, which he at first harassed, and next year entirely defeated; but a contagious disease, which had spread through that vast army, was caught by the Romans and the emperor himself died of it a short time after, aged 56. Pollio says, that this prince had the moderation of Augustus, the virtue of Trajan, and the piety of Antoninus.

CLAVES INSULÆ, a term used in the Isle of Man, where all weighty and ambiguous causes are referred to a jury of twelve, who are called *claves insulæ*, the keys of the island.

CLAVICHORD, and CLAVICITHERIUM, two musical instruments used in the 16th century. They were of the nature of the spinet, but of an oblong figure. The first is still used by the nuns in convents; and that the practitioners may not disturb the sisters in the dormitory, the strings are muffled with small bits of fine woollen cloth.

CLAVICLE. See ANATOMY *Index*.

CLAVICYMBALUM, in antiquity, a musical instrument of 30 strings. Modern writers apply the name to our harpischords.

CLAVI VESTIUM, were flowers or studs of purple, interwoven with or sewed upon the garments of knights or senators; only, for distinction, the former used them narrow, the latter broad.

CLAVIS properly signifies a KEY; and is sometimes used in English to denote an explanation of some obscure passages of any book in writing.

CLAVIUS, CHRISTOPHER, a German Jesuit, born by one is a cave hewn in the rock, and affording water. A vaulted room with a chimney at one end, and a hovel or two made with stones piled, are all the present structures; and these are chiefly frequented by fishermen and by persons employed to watch and to drive away birds when the grain ripens. Referring to this confined situation of Clazomenæ, a famous sophist, when importuned to adorn his native city by residing in it rather than at Smyrna, replied, *The nightingale refuses to sing in a cage.*

CLEANTHES, a Stoic philosopher, disciple of Zeno, flourished 240 years before Christ. He maintained himself in the day by working in the night: being questioned by the magistrates how he subsisted, he brought a woman for whom he kneaded bread, and a gardener for whom he drew water; and refused a present from them. He composed several works, of which there are now only a few fragments remaining.

CLEAR, as a naval term, is variously applied to the weather, the sea-coasts, cordage, navigation, &c. The weather is said to be clear when it is fair and open, as opposed to cloudy or foggy. The sea coast is called clear when the navigation is not interrupted, or rendered dangerous by rocks, sands, or breakers, &c. It is expressed of cordage, cables, &c. when they are unembarrassed or disentangled, so as to be ready for immediate service. It is usually opposed to *foul* in all these senses.

CLEARCHUS, a tyrant of Heraclea in Pontus, who was killed by Chion and Leonidas, Plato's pupils, during the celebration of the festivals of Bacchus. He had enjoyed the sovereign power during 12 years. A Lacedæmonian sent to quiet the Byzantines. He was recalled, but refused to obey, and fled to Cyrus the younger, who made him captain of 13,000 Greek soldiers. He obtained a victory over Artaxerxes, who was so enraged at the defeat, that when Clearchus fell into his hands by the treachery of Tissaphernes, he put him immediately to death.

CLEATS, in naval affairs, pieces of wood having one or two projecting ends whereby to fasten the ropes: some of them are fastened to the shrouds below for this purpose, and others nailed to different places of the ship's deck or sides.

CLECHE, in *Heraldry*, a kind of cross, charged with another cross of the same figure, but of the colour of the field.

CLEDGE, among miners, denotes the upper stratum of fullers earth.

CLEDONISM, CLEDONISMUS, a kind of divination, in use among the ancients. The word is formed from κλῃδων, which signifies two things, *rumor*, "a report," and *avis*, "a bird." In the first sense, cledonism should denote a kind of divination drawn from words occasionally uttered. Cicero observes, that the Pythagoreans made observation not only of the words of the gods, but of those of men; and accordingly believed the pronouncing of certain words, e. g. *incendium*, at a meal, very unhappy. Thus, instead of prison, they used the word *domicilium;* and to avoid *erinnys*, furies, said *eumenides*. In the second sense, *cledonism* should seem a divination drawn from birds; the same with ornithomantia.

CLEEVERS. See CLIVERS.

CLEF, or CLIFF, in *Music*, derived from the Latin word *clavis*, "a key;" because by it is expressed the fundamental sound in the diatonic scale, which requires a determined succession of tones or semitones, whether major or minor, peculiar to the note from whence we set out, and resulting from its position in the scale. Hence, as it opens a way to this succession, and discovers it, the technical term *key* is used with great propriety. But clefs rather point out the position of different musical parts in the general system, and the relations which they bear one to another.

A clef, says Rousseau, is a character in music placed at the beginning of a stave, to determine the degree of elevation occupied by that stave in the general claviary or system, and to point out the names of all the notes which it contains in the line of that clef.

Anciently the letters by which the notes of the gamut were signified were called *clefs*. Thus the letter A was the clef of the note *la*, C the clef of *ut*, E the clef of *mi*, &c. In proportion as the system was extended, the embarrassment and superfluity of this multitude of clefs were felt.

Gui d'Arezzo, who had invented them, marked a letter or clef at the beginning of each line in the stave; for as yet he had placed no notes in the spaces. In process of time they marked no more than one of the seven clefs at the beginning of one of the lines only; and this was sufficient to fix the position of all the rest, according to their natural order: at last, of these seven lines or clefs they selected four, which were called *claves signatæ*, or *discriminating clefs*, because they satisfied themselves with marking one of them upon one of the lines, from which the powers of all the others might be recognized. Presently afterwards they even retrenched one of these four, viz. the gamma, of which they made use to mark the *sol* below, that is to say, the hypoproslambanome added to the system of the Greeks.

In reality Kircher asserts, that if we understood the characters in which ancient music was written, and examined minutely the forms of our clefs, we should find that each of them represents the letter a little altered in its form, by which the note was originally named. Thus the clef of *sol* was originally a G, the clef of *ut* a C, and the clef of *fa* an F.

We have then three clefs, one a fifth above the other: the clef of F, or *fa*, which is the lowest; the clef of *ut*, or C, which is the fifth above the former; and the clef of *sol*, or G, which is a fifth above that of *ut*. These clefs, both as marked by foreigners and in Britain, may be seen in art. 170 of MUSIC; upon which it is necessary to remark, that by a remain of ancient practice, the clef is always placed upon a line, and never in a space. It deserves notice, that the clef of *fa* is marked in three different manners: one in music which is printed; another in music which is written or engraved; and a third in the full harmony of the chorus.

Plate CXLIV. fig. 9. Vol. V.

By adding four lines above the clef of *sol*, and three lines beneath the clef of *fa*, which gives both above and below the greatest extent of permanent or established lines, it appears, that the whole scale of notes which can be placed upon the gradations relative to these clefs amounts to 24; that is to say, three octaves and

Clemency. CLEMENCY, denotes much the same with mercy, and implies a remission of severity towards offenders. The term is most generally used in speaking of the forgiveness exercised by princes or persons of high authority. It is the result, indeed, of a disposition which ought to be cultivated by all ranks, though its effects cannot be equally conspicuous or extensive. In praise of clemency joined with power, it is observed, that it is not only the privilege, the honour, and the duty of a prince, but it is also his security, and better than all his garrisons, forts, and guards, to preserve himself and his dominions in safety: That that prince is truly royal, who masters himself; looks upon all injuries as below him; and governs by equity and reason, not by passion or caprice. In illustration of this subject, the following examples are selected out of many recorded in history.

Sueton. c. 9. 1. Two patricians having conspired against Titus the Roman emperor, were discovered, convicted, and sentenced to death by the senate; but the good-natured prince sent for them, and in private admonished them, that in vain they aspired to the empire, which was given by destiny; exhorting them to be satisfied with the rank in which by Providence they had been placed, and offering them any thing else which was in his power to grant. At the same time he dispatched a messenger to the mother of one of them, who was then at a great distance, and under deep concern about the fate of her son, to assure her, that her son was not only alive, but forgiven.

Zos. ii. 674. 2. Licinius having raised a numerous army, Zosimus says 130,000 men, endeavoured to wrest the government out of the hands of his brother-in-law Constantine the emperor. But his army being defeated, Licinius fled with what forces he could rally to Nicomedia, whither Constantine pursued him, and immediately invested the place; but on the second day of the siege, the emperor's sister intreating him, with a flood of tears, by the tenderness he had ever shown for her, to forgive her husband, and grant him at least his life, he was prevailed upon to comply with her request; and the next day, Licinius, finding no means of making his escape, presented himself before the conqueror, and throwing himself at his feet, yielded to him the purple and the other ensigns of sovereignty. Constantine received him in a very friendly manner, entertained him at his table, and afterwards sent him to Thessalonica, assuring him, that he should live unmolested so long as he raised no new disturbances.

3. The council of thirty, established at Athens by Lysander, committed the most execrable cruelties. Upon pretence of restraining the multitude within their duty, and to prevent seditions, they had caused guards to be assigned them, had armed 3000 of the citizens for that purpose, and at the same time disarmed all the rest. The whole city was in the utmost terror and dismay. Whoever opposed their injustice and violence fell a victim to their resentment. Riches were a crime that never failed of drawing a sentence upon their owners, always followed with death and the confiscation of estates; which the thirty tyrants divided amongst themselves. They put more people to death (says Xenophon) in eight months of a peace, than their enemies had done in a war of thirty years. All the citizens of any consideration in Athens, and who retained a love of liberty, quitted a place reduced to so hard and shameful a slavery, and sought elsewhere an asylum and retreat where they might live in safety. At the head of these was Thrasybulus, a person of extraordinary merit, who beheld with the most lively affliction the miseries of his country.

The Lacedæmonians had the inhumanity to endeavour to deprive those unhappy fugitives of this last resource. They published an edict to prohibit the cities of Greece from giving them refuge, decreed that they should be delivered up to the thirty tyrants, and condemned all such as should contravene the execution of this edict to pay a fine of five talents. Only two cities rejected with disdain so unjust an ordinance, Megara and Thebes; the latter of which made a decree to punish all persons whatsoever that should see an Athenian attacked by his enemies without doing his utmost to assist him. Lysias, an orator of Syracuse who had been banished by the thirty, raised 500 soldiers at his own expence, and sent them to the aid of the common country of Eloquence. Thrasybulus lost no time. After having taken Phyla, a small fort in Attica, he marched to the Piræus, of which he made himself master. The thirty flew thither with their troops, and a battle ensued. The tyrants were overthrown. Critias, the most savage of them all, was killed on the spot: and as the army was taking to flight, Thrasybulus cried out, "Wherefore do you fly from me as from a victor, rather than assist me as the avenger of your liberty? We are not enemies, but fellow-citizens, nor have we declared war against the city, but against the thirty tyrants." He continued to remind them, that they had the same origin, country, laws, and religion: he exhorted them to compassionate their exiled brethren, to restore their country to them, and resume their own liberty. This discourse had the desired effect. The army, upon their return to Athens, expelled the thirty, and substituted ten persons to govern in their room, whose conduct proved no better than theirs; but King Pausanias, moved with compassion for the deplorable condition to which a city, once so flourishing, was reduced, had the generosity to favour the Athenians in secret, and at length obtained a peace for them. It was sealed with the blood of the tyrants, who having taken arms to reinstate themselves in the government, were all put to the sword, and left Athens in the full possession of its liberty. All the exiles were recalled. Thrasybulus at that time proposed the celebrated amnesty, by which the citizens engaged upon oath, that all past transactions should be buried in oblivion. The government was re-established upon its ancient footing, the laws were restored to their pristine vigour, and magistrates elected with the usual form.

This (says Rollin) is one of the finest events in ancient history, worthy the Athenian clemency and benevolence, and has served as a model to succeeding ages in all good governments. Never had tyranny been more cruel and bloody than that which the Athenians had lately thrown off. Every house was in mourning, every family bewailed the loss of some relation: it had been a series of public robbery and rapine, in which license and impunity had authorized all manner of crimes. The people seemed to have a right to demand the blood of all accomplices in such notorious malversations, the operators. It availed but little that the operators showed themselves alive and in good health, and that the surgeons and physicians proved the falsehood of every part of the report. Clement XIV. appears to have been a man of a virtuous character, and possessed of considerable abilities. He died much regretted by his subjects.

CLEMENTINE, a term used among the Augustins, who apply it to a person who, after having been nine years a superior, ceases to be so, and becomes a private monk, under the command of a superior. The word has its rise hence, that Pope Clement, by a bull, prohibited any superior among the Augustins from continuing above nine years in his office.

CLEMENTINES, in the canon law, are the constitutions of Pope Clement V. and the canons of the council of Vienne.

CLENARD, NICHOLAS, a celebrated grammarian in the 16th century, was born at Diest; and after having taught humanity at Louvain, travelled into France, Spain, Portugal, and Africa. He wrote in Latin, 1. Letters relating to his Travels, which are very curious and scarce. 2. A Greek Grammar, which has been revised and corrected by many grammarians; and other works. He died at Grenoble in 1542.

CLEOBIS and BITON, two youths, sons of Cydippe the priestess of Juno at Argos. When oxen could not be procured to draw their mother's chariot to the temple of Juno, they put themselves under the yoke, and drew it 45 stadia to the temple, amidst the acclamations of the multitude, who congratulated the mother on account of the piety of her sons. Cydippe intreated the goddess to reward the piety of her sons with the best gift that could be granted to a mortal. They went to rest and awoke no more; and by this the goddess showed that death is the only true happy event that can happen to a man. The Argives raised them statues at Delphi.

CLEOBULUS, son of Evagoras, and one of the Grecian sages; he was valiant, a lover of learning, and an enemy to vice. Flourished about 560 years before Christ.

CLEOMBROTUS, a king of Sparta, son of Anaxandrides. He was deterred from building a wall across the isthmus of Corinth against the approach of the Persians, by an eclipse of the sun. He died in the 75th Olympiad, and was succeeded by Plistarchus, son of Leonidas, a minor.

CLEOMBROTUS II. son of Pausanias king of Sparta, after his brother Agesipolis I. He made war against the Bœotians, and lest he should be suspected of treacherous communications with Epaminondas, he gave that general battle at Leuctra, in a very disadvantageous place. He was killed in the engagement, and his army destroyed, in the year of Rome 382.

CLEOMBROTUS III. a son-in-law of Leonidas king of Sparta, who for a while usurped the kingdom after the expulsion of his father-in-law. When Leonidas was recalled, Cleombrotus was banished, and his wife Chelonis, who had accompanied her father, now accompanied her husband in his exile.

CLEOME, in *Botany*, a genus of the siliquosa order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 25th order, *Putamineæ*. There are three nectariferous glandules, one at each sinus of the calyx except the lowest; the petals all rising upwards; the siliqua unilocular and bivalved. There are 15 species, all of them, except two, natives of warm climates. They are herbaceous plants, rising from one to two feet high; and are adorned with flowers of various colours, as red, yellow, flesh-colour, &c. They are propagated by seeds, and require no other care than what is common to other exotics which are natives of warm countries.

CLEOMENES, king of Sparta, conquered the Argives, and freed Athens from the tyranny of the Pisistratidæ. By bribing the oracle, he pronounced Demaratus, his colleague on the throne, illegitimate, because he refused to punish the people of Ægina, who had deserted the Greeks. He killed himself in a fit of madness.

CLEOMENES II. succeeded his brother Agesipolis II. He reigned 34 years in the greatest tranquillity, and was father to Acrotatus and Cleonymus. He was succeeded by Areus I. son of Acrotatus.

CLEOMENES III. succeeded his father Leonidas. He was of an enterprising spirit, and resolved to restore the ancient discipline of Lycurgus in its full force. He killed the Ephori, and removed by poison his royal colleague Eurydamidea, and made his own brother Euclidas king, against the laws of the state, which forbade more than one of the same family to sit on the throne. He made war against the Achæans, and attempted to destroy the Achæan league. Aratus the general of the Achæans, who supposed himself inferior to his enemy, called Antigonus to his assistance; and Cleomenes, when he had fought the unfortunate battle of Sellasia, retired into Egypt to the court of Ptolemy Euergetes, where his wife and children had gone before him. Ptolemy received him with great cordiality; but his successor, weak and suspicious, soon expressed his jealousy of this noble stranger, and imprisoned him. Cleomenes killed himself, and his body was flayed and exposed on a cross, 140 Olymp.

CLEON, the name of several noted men of antiquity. 1. Of an Athenian, who, though originally a tanner, became general of the armies of the state by his intrigues and eloquence. He took Thoron in Thrace, and was killed at Amphipolis in a battle with Brasidas the Spartan general, Olymp. 89th. 2. A general of Messenia, who disputed with Aristodemus for the sovereignty. 3. A statuary. 4. A poet, who wrote a poem on the Argonauts. 5. An orator of Halicarnassus who composed an oration for Lysander, in which he intimated the propriety of making the kingdom of Sparta elective. 6. A Magnesian who wrote some commentaries, in which he speaks of portentous events, &c.

CLEONÆ, in *Ancient Geography*, a town of Argolis, above Mycenæ, on the road which leads from Argos to Corinth; standing on an eminence, on every side occupied by houses. In the forest near this town was slain by Hercules the huge lion (Sil. Italicus, Seneca). *Cleonæus* the epithet. *Cleonæum Sidus*, the lion.——Another *Cleonæ* on Mount Athos in Chalcidice.

CLEOPATRA, the celebrated queen of Egypt, was daughter of Ptolemy Auletes. By her extraordinary beauty, she subdued the two renowned Roman generals Julius Cæsar and Mark Antony; the latter of whom, it is thought, lost the empire of Rome by his attachment

Clerc, Clergy.

and in his colouring he resembled his master. He died in 1633.

Clerc, *Sebastian le*, engraver, and designer in ordinary to the French king, was born at Metz in 1637. After having learnt designing, he applied himself to mathematics, and was engineer to the marshal de la Ferté. He went to Paris in 1665, where he applied himself to designing and engraving with such success, that M. Colbert gave him a pension of 600 crowns. In 1672 he was admitted into the royal academy of painting and sculpture; and in 1680 was made professor of geometry and perspective in the same academy. He published, besides a great number of designs and prints, 1. A Treatise on theoretical and practical Geometry. 2. A treatise on Architecture; and other works: and died in 1714.—He was an excellent artist, but chiefly in the petit style. His genius seldom exceeds the dimensions of six inches. Within those limits he could draw up 20,000 men with great dexterity. No artist except Callot and Della Bella could touch a small figure with so much spirit. His most esteemed prints are: 1. The *passion of our Saviour*, on 36 small plates, lengthwise, from his own compositions. The best impressions are without the borders. 2. The *miracle of the feeding five thousand*, a middling sized plate, lengthwise. In the first impressions, which are very rare, a town appears in the back-ground; in place of which a mountain is substituted in the common ones. 3. The *elevation of the large stones used in building the front of the Louvre*, a large plate, lengthwise. The first impressions are without the date 1677, which was afterwards added. 4. The *academy of the sciences*, a middling-sized plate, lengthwise. The first impressions are before the skeleton of the stag and tortoise were added. The second impressions are before the shadow was enlarged at the bottom, towards the right-hand side of the print. Both these impressions are very scarce. The first is rarely met with. This print was copied for Chambers's Dictionary. 5. The *May of the Gobelins*, a middle-sized plate, lengthwise. The first impression is before the woman was introduced, who covers the wheel of the coach. 6. The *four conquests*, large plates, lengthwise, representing the taking of Tournay, the taking of Douay, the defeat of the compte de Marsin, and the Switzerland alliance. 7. The *battles of Alexander*, from Le Brun, six small long plates, including the title, which represents the picture gallery at the Gobelins. The first impressions of the tent of Darius, which plate makes part of this set, is distinguished by the shoulder of the woman, who is seated in the front, being without the shadow, which was afterwards added; for which reason they are called the *prints with the naked shoulder*. 8. The *entry of Alexander into Babylon*, a middle-sized plate, lengthwise. In the first impressions, the face of Alexander is seen in profile; in the second, it is a three quarter face, and therefore called *the print with the head turned*.

Clerc, *George le*. See Buffon.

CLERGY, a general name given to the body of ecclesiastics of the Christian church, in contradistinction to the laity. See Laity.

The distinction of Christians into clergy and laity was derived from the Jewish church, and adopted into the Christian by the apostles themselves: whenever any number of converts was made, as soon as they were capable of being formed into a congregation or church, a bishop or presbyter, with a deacon, were ordained to minister to them. Of the bishops, priests, and deacons, the clergy originally consisted; but in the third century, many inferior orders were appointed, as subservient to the office of deacon, such as Acoluthists, Readers, &c.

This venerable body of men being separated and set apart from the rest of the people, in order to attend the more closely to the service of Almighty God, have therefore large privileges allowed them by our municipal laws; and had formerly much greater, which were abridged at the time of the reformation, on account of the ill use which the Popish clergy had endeavoured to make of them. For, the laws having exempted them from almost every personal duty, they attempted a total exemption from every secular tie. But it is observed by Sir Edward Cooke, that as the overflowing of waters doth many times make the river to lose its proper channel, so, in times past, ecclesiastical persons seeking to extend their liberties beyond their due bounds, either lost, or enjoyed not, those which of right belonged to them. The personal exemptions do indeed for the most part continue: a clergyman cannot be compelled to serve on a jury, nor to appear at a court-leet, or view of frank-pledge, which almost every other person is obliged to do; but if a layman is summoned on a jury, and before the trial takes orders, he shall notwithstanding appear and be sworn. Neither can he be chosen to any temporal office, as bailiff, reeve, constable, or the like; in regard of his own continual attendance on the sacred function. During his attendance on divine service, he is privileged from arrests in civil suits. In cases also of felony, a clerk in orders shall have the benefit of his clergy, without being branded in the hand; and may likewise have it more than once; in both which particulars he is distinguished from a laymen. But, as they have their privileges, so also they have their disabilities, on account of their spiritual avocations. Clergymen are incapable of sitting in the house of commons; and by statute 21 Hen. VIII. c. 13. are not in general allowed to take any lands or tenements to farm, upon pain of 10l. per month, and total avoidance of the lease; nor, upon like pain, to keep any tap-house or brew-house; nor engage in any manner of trade, nor sell any merchandise, under forfeiture of treble value. Which prohibition is consonant to the canon law.

Blackst. Comment.

Benefit of Clergy, is an ancient privilege, whereby one in orders claimed to be delivered to his ordinary to purge himself of felony.

After trial and conviction * of a criminal, the judgment of the court regularly follows, unless suspended or arrested by some intervening circumstances, of which the principal is *benefit of clergy*; a title of no small curiosity as well as use; and concerning which, therefore, it may not be improper to enquire, 1. Into its original, and the various mutations which this privilege of the clergy has sustained. 2. To what persons it is to be allowed at this day. 3. In what cases. 4. The consequences of allowing it.

* See the articles *Arraignment*, *Plea*, *Trial* and *Conviction*.

I. Clergy, the *privilegium clericale*, or (in common speech, the benefit of clergy) had its original from the pious

Blackst. Comment.

convicted clerk, *absque purgatione faciendo*; in which situation the clerk convict could not make purgation; but was to continue in prison during life, and was incapable of acquiring any personal property, or receiving the profits of his lands, unless the king should please to pardon him. Both these courses were in some degree exceptionable; the latter perhaps being too rigid, as the former was productive of the most abandoned perjury. As therefore these mock trials took their rise from factious and popish tenets, tending to exempt one part of the nation from the general municipal law, it became high time, when the reformation was thoroughly established, to abolish so vain and impious a ceremony.

Accordingly the statute 18 Eliz. c. 7. enacts, that, for the avoiding such perjuries and abuses, after the offender has been allowed his clergy, he shall not be delivered to the ordinary as formerly; but, upon such allowance, and burning of the hand, he shall forthwith be enlarged and delivered out of prison, with proviso, that the judge may, if he thinks fit, continue the offender in gaol for any time not exceeding a year. And thus the law continued unaltered for above a century; except only, that the statute 21 Jac. I. c. 6. allowed, that women convicted of simple larcenies under the value of 10s. should (not properly have the benefit of clergy, for they were not called upon to read; but) be burned in the hand, whipped, or stocked, or imprisoned for any time not exceeding a year. And a similar indulgence by the statutes 3 and 4 Will. and Mary, c. 9. and 4 and 5 Will. and Mary, c. 24. was extended to women guilty of any clergyable felony whatever; who were allowed once to claim the benefit of the statute, in like manner as men might claim the benefit of clergy, and to be discharged upon being burned in the hand, and imprisoned for any time not exceeding a year. All women, all peers, and all male commoners who could read, were therefore discharged in such felonies absolutely, if clerks in orders; and for the first offence upon burning in the hand, if lay; yet all liable (except peers), if the judge saw occasion, to imprisonment not exceeding a year. And those men who could not read, if under the degree of peerage, were hanged.

Afterwards, indeed, it was considered, that education and learning were not extenuations of guilt, but quite the reverse; and that if the punishment of death for simple felony was too severe for those who had been liberally instructed, it was, *à fortiori*, too severe for the ignorant also. And thereupon, by statute 5 Anne, c. 6. it was enacted that the benefit of clergy should be granted to all those who were entitled to ask it, without requiring them to read by way of conditional merit. And experience having shown that so universal a lenity was frequently inconvenient, and an encouragement to commit the lower degrees of felony; and that though capital punishments were too rigorous for these inferior offences, yet no punishment at all (or next to none, as branding or whipping), was as much too gentle; it was enacted by the same statute 5 Anne, c. 6. that when any person is convicted of any theft or larceny, and burnt in the hand for the same, he shall, at the discretion of the judge, be committed to the house of correction, or public work-house, to be there kept to hard labour for any time not less than six months, and not exceeding two years; with a power of inflicting a double confinement in case of the party's escape from the first. And it is also enacted by the statutes 4 Geo. I. c. 11. and 6 Geo. I. c. 23. that when any persons shall be convicted of any larceny, either grand or petit, or any felonious stealing or taking of money or goods and chattels, either from the person or the house of any other, or in any other manner, and who by the law shall be entitled to the benefit of clergy, and liable only to the penalties of burning in the hand, or whipping; the court in their discretion, instead of such burning in the hand, or whipping, may direct such offenders to be transported to America for seven years; and if they return, or are seen at large in this kingdom within that time, it shall be felony without benefit of clergy.

In this state does the benefit of clergy at present stand; very considerably different from its original institution; the wisdom of the English legislature having, in the course of a long and laborious process, extracted, by a noble alchemy, rich medicines out of poisonous ingredients; and converted, by gradual mutations, what was at first an unreasonable exemption of particular popish ecclesiastics, into a merciful mitigation of the general law with respect to capital punishments.

From the whole of this detail, we may collect, that however in times of ignorance and superstition, that monster in true policy may for a while subsist, of a body of men residing in a state, and yet independent of its laws; yet when learning and rational religion have a little enlightened men's minds, society can no longer endure an absurdity so gross, as must destroy its very fundamentals. For, by the original contract of government, the price of protection by the united force of individuals, is that of obedience to the united will of the community. This united will is declared in the laws of the land; and that united force is exerted in their due, and universal, execution.

II. We are next to inquire, to what persons the benefit of clergy is to be allowed at this day; and this must chiefly be collected from what has been observed in the preceding article. For, upon the whole, we may pronounce, that all clerks in orders are, without any branding, and of course without any transportation (for that is only substituted in lieu of the other), to be admitted to this privilege, and immediately discharged, or at most only confined for one year; and this as often as they offend. Again, all lords of parliament, and peers of the realm, by the statute 1 Edw. VI. c. 12. shall be discharged in all clergyable and other felonies provided for by the act without any burning in the hand, in the same manner as real clerks convict; but this is only for the first offence. Lastly, all the commons of the realm, not in orders, whether male or female, shall, for the first offence, be discharged of the punishment of felonies, within the benefit of clergy, upon being burnt in the hand, and suffering discretionary imprisonment; or, in case of larceny, upon being transported for seven years, if the court shall think proper.

III. The third point to be considered is, for what crimes the *privilegium clericale*, or benefit of clergy, is to be allowed. And it is to be observed, that nei-

ther

Clergy. ther in high treason, nor in petit larceny, nor in any mere misdemeanors, it was indulged at the common law; and therefore we may lay it down as a rule, that it was allowable only in petit treason and capital felonies; which for the most part became legally entitled to this indulgence by the statute *de clero*, 25 Edw. III. stat. 3. c. 4. which provides, that clerks convict for treason or felonies, touching other persons than the king himself or his royal majesty, shall have the privilege of holy church. But yet it was not allowed in all cases whatsoever; for in some it was denied even in common law, viz. *insidatio viarum*, or lying in wait for one on the highway; *depopulatio agrorum*, or destroying and ravaging a country; *combustio domorum*, or arson, that is, burning of houses; all which are a kind of hostile acts, and in some degree border upon treason. And farther, all these identical crimes, together with petit treason, and very many other acts of felony, are ousted of clergy by particular acts of parliament.

Upon the whole, we may observe the following rules. 1. That in all felonies, whether new created, or by common law, clergy is now allowable, unless taken away by act of parliament. 2. That where clergy is taken away from the principal, it is not of course taken away from the accessory, unless he be also particularly included in the words of the statute. 3. That when the benefit of clergy is taken away from the offence (as in case of murder, buggery, robbery, rape, and burglary), a principal in the second degree, being present, aiding and abetting the crime, is as well excluded from his clergy, as he that is a principal in the first degree: but, 4. That where it is only taken away from the person committing the offence (as in the case of stabbing, or committing larceny in a dwelling-house), his aiders and abettors are not excluded, through the tenderness of the law, which hath determined that such statutes shall not be taken literally.

IV. Lastly, We are to inquire what the consequences are to the party, of allowing him this benefit of clergy. We speak not of the branding, imprisonment, or transportation; which are rather concomitant conditions, than consequences, of receiving this indulgence. The consequences are such as affect his present interest, and future credit and capacity; as having been once a felon, but now purged from that guilt by the privilege of clergy; which operates as a kind of statute pardon. And we may observe, 1. That, by his conviction, he forfeits all his goods to the king; which, being once vested in the crown, shall not afterwards be restored to the offender. 2. That, after conviction, and till he receives the judgment of the law by branding or the like, or else is pardoned by the king, he is, to all intents and purposes, a felon; and subject to all the disabilities and other incidents of a felon. 3. That, after burning or pardon, he is discharged for ever of that, and all other felonies before committed, within the benefit of clergy; but not of felonies from which such benefit is excluded; and this by statutes 8 Eliz. c. 4. and 18 Eliz. c. 7. 4. That by the burning, or pardon of it, he is restored to all capacities and credits, and the possession of his lands, as if he had never been convicted. 5. That what is said with regard to the advantages of commoners and laymen, subsequent to the burning in the hand, is equally applicable to all peers and clergymen, although never branded at all. For they have the same privileges, without any burning, to which others are entitled after it.

Clergy, Clerk.

CLERK (*clericus*), a word formerly used to signify a learned man, or man of letters. The word comes from the Greek κληρος, used for *clergy*; but more properly signifying *lot* or *heritage*, in regard the lot and portion of clerks or ecclesiastics is to serve God. Accordingly *clerus* was at first used to signify those who had a particular attachment to the service of God. The origin of the expression is derived from the Old Testament, where the tribe of Levi is called the *lot*, *heritage*, κληρος; and God is reciprocally called *their portion*; by reason that tribe was consecrated to the service of God, and lived on the offerings made to God, without any other settled provision as the rest had. Thus Pasquier observes, the officers of the counts (*comites*) were anciently created under the title of *clerks of accompts*; and secretaries of state were called *clerks of the secret*. So *clericus domini regis*, in the time of Edward I. was Englished, *the king's secretary*, or *clerk of his council*. The term was applied indifferently to all who made any profession of learning; or who knew how to manage the pen; though originally it was appropriated to ecclesiastics. As the nobility and gentry were usually brought up to the exercise of arms, there were none but the clergy left to cultivate the sciences: hence, as it was the clergy alone who had made any profession of letters, a very learned man came to be called a *great clerk*, and a stupid ignorant man a *bad clerk*.

CLERK is also applied to such as by their course of life exercise their pens in any court or office; of which there are various kinds: thus,

CLERK of the Bails, an officer in the court of king's bench, whose business is to file all bail-pieces taken in that court, where he always attends.

CLERK of the Check, an officer belonging to the king's court; so called, because he has the check and controulment of the yeomen that belong to the king, queen, or prince. He likewise, by himself or deputy, sets the watch in the court. There is also an officer in the navy of the same name, belonging to the king's yards.

CLERK of the Crown, an officer in the king's bench, who frames, reads, and records all indictments against offenders, there arraigned or indicted of any public crime. He is likewise termed *clerk of the crown-office*, in which capacity he exhibits information by order of the court for divers offences.

CLERK of the Crown, in chancery, an officer whose business it is constantly to attend the lord chancellor in person or by deputy; to write and prepare for the great seal special matters of state by commission, both ordinary and extraordinary, viz. commissions of lieutenancy, of justices of assize, oyer and terminer, gaol-delivery, and of the peace; all general pardons, granted either at the king's coronation, or in parliament; the writs of parliament, with the names of the knights, citizens, and burgesses, are also returned into his office. He also makes out special pardons and writs of execution on bonds of statute-staple forfeited.

CLERK of the Deliveries of the Ordnance. See ORDNANCE.

Clerk.

Clerk of the Errors, in the court of common pleas, an officer who transcribes and certifies into the king's bench the tenor of the record of the action on which the writ of error, made out by the cursitor, is brought there to be determined. In the king's bench, the clerk of the errors transcribes and certifies the records of causes, by bill, in that court, into the exchequer. And the business of the clerk of the errors in the exchequer, is to transcribe the records certified thither out of the king's bench, and to prepare them for judgment in the exchequer chamber.

Clerk of the Essoins, in the court of common pleas, keeps the essoin roll, or enters essoins: he also provides parchment, cuts it into rolls, marks the numbers on them, delivers out all the rolls to every officer, and receives them again when written. See Essoin.

Clerk of the Estreats, an officer in the exchequer, who every term receives the estreats out of the lord-treasurer's remembrancer's office, and writes them out to be levied for the crown.

Clerk of the Green Cloth, formerly an officer in chancery, but now abolished.

Clerk of the Hamper or *Hanaper*, an officer in chancery, whose business is to receive all money due to the king for the seals of charters, letters patent, commissions, and writs; also the fees due to the officers for enrolling and examining them.

Clerk-Comptroller of the King's Household, an officer of the king's court, authorised to allow or disallow the charges of pursuivants, messengers of the green-cloth, &c. to inspect and controul all defects of any of the inferior officers; and to sit in the counting-house with the lord-steward and other officers of the household for regulating such matters.

Clerk of the King's Silver, an officer of the common pleas, to whom every fine is brought, after it has passed the office of the *custos brevium*; and who enters the effect of writs of covenant, into a book kept for that purpose, according to which all the fines of that term are recorded in the rolls of the court.

Clerk of the Market, an officer of the king's house, to whom is given the charge of the king's measure and weights, the standards of those that ought to be used all over England.

Clerk of the Nichils or *Nihils*, an officer of the exchequer, who makes a roll of all such sums as are nichilled by the sheriffs upon their estreats of green wax, and delivers them into the remembrancer of the treasury, to have execution done upon them for the king. See Nihil.

Clerk of the Ordnance. See Ordnance.

Clerk of the Outlawries, an officer of the common pleas, and deputy to the attorney-general, for making out all writs of *capias utlegatum*, after outlawry, to which there must be the king's attorney's name.

Clerk of the Paper-office, an officer belonging to the king's bench, whose business is to make up the paper-books of special pleadings in that court.

Clerk of the Peace, an officer belonging to the sessions of the peace, whose business is to read indictments, inrol the proceedings, and draw the process: he likewise certifies into the king's bench transcripts of indictments. outlawries, attainders, and convictions had before the justices of peace, within the time limited by statute, under a certain penalty. This office is in the gift of the *custos rotulorum*, and may be executed by deputy.

Clerk of the Pells, an officer that belongs to the exchequer, whose business is to enter every teller's bill into a parchment roll called *pellis receptorum*; and to make another roll of payments called *pellis exituum*.

Clerk of the Petty Bag, an officer of the court of chancery, whereof there are three, the master of the rolls being the chief: their business is to record the return of all inquisitions out of every shire; to make out patents of customers, gauger, comptrollers, &c.; liberates upon extent of statutes-staple; *conge d'elires* for bishops; summons of the nobility, clergy, and burgesses to parliament; and commissions directed to knights and others of every shire, for assessing subsidies and taxes.

Clerk of the Pipe, an officer of the exchequer, who having the account of all debts due to the king, delivered out of the remembrancer's office, charges them in a great roll folded up like a pipe. He writes out warrants to sheriffs, to levy the said debts on the goods and chattels of the debtors; and if they have no goods, then he draws them down to the treasurer's remembrancer to write estreats against their lands.

Clerk of the Pleas, an officer of the exchequer, in whose office all the officers of the court, having special privilege, ought to sue or to be sued in any action. In this office also actions at law may be prosecuted by other persons, but the plaintiff ought to be tenant or debtor to the king, or some way accountable to him. The under clerks are attorneys in all suits.

Clerks of the Privy-seal, four officers that attend the lord privy seal, for writing and making out all things that are sent by warrant from the signet to the privy seal, and to be passed the great seal; and likewise to make out privy seals, upon special occasions of his majesty's affairs, as for loan of money or the like.

Clerk of the Rolls, an officer of the chancery, whose business is to make searches after, and copies of deeds, officers, &c.

Clerk of the Signet, an officer continually attending upon his majesty's principal secretary, who has the custody of the privy signet, as well for sealing the king's private letters as those grants which pass the king's hand by bill signed. There are four of these officers who have their diet at the secretary's table.

Six Clerks, officers in chancery next in degree below the twelve masters, whose business is to inrol commissions, pardons, patents, warrants, &c. which pass the great seal. They were anciently *clerici*, and forfeited their places if they married. These are also attorneys for parties in suits depending in the court of chancery.

Clerk of the Treasury, an officer belonging to the court of common pleas, who has the charge of keeping the records of the court, makes out all records of *nisi prius*, and likewise all exemplifications of records being in the treasury. He has the fees due for all searches; and has under him an under keeper, who always keeps one key of the treasury-door.

Clerk of the Warrants, an officer of the common pleas, whose business is to enter all warrants of attorney for plaintiffs and defendants in suit; and to inrol deeds of bargain and sale, that are acknowledged in court, or before a judge. His office is likewise to

3 estreat

5000 inhabitants. Calvinists, Lutherans, and Roman Catholics, are all tolerated in this city. E. Long. 5. 50. N. Lat. 51. 45.

CLIENT, among the Romans, a citizen who put himself under the protection of some great man, who in respect of that relation was called *patron*.

This patron assisted his client with his protection, interest, and goods; and the client gave his vote for his patron, when he sought any office for himself or his friends. Clients owed respect to their patrons, as these owed them their protection.

The right of patronage was appointed by Romulus, to unite the rich and poor together, in such a manner as that one might live without contempt and the other without envy; but the condition of a client, in course of time, became little else than a moderate slavery.

CLIENT is now used for a party in a law-suit, who has turned over his cause into the hands of a counsellor or solicitor.

CLIFFORTIA. See BOTANY *Index*.

CLIMACTERIC, among physicians, (from *climacter*, "a ladder"), a critical year in a person's life.

According to some, this is every seventh year; but others allow only these years produced by multiplying 7 by the odd number 3, 5, 7, and 9, to be climacterical. These years, they say, bring with them some remarkable change with respect to health, life, or fortune: the grand climacteric is the 63d year; but some, making two, add to this the 81st: the other remarkable climacterics are the 7th, 21st, 35th, 49th, and 56th.

CLIMATE, or CLIME, in *Geography*, a part of the surface of the earth, bounded by two circles parallel to the equator, and of such a breadth, as that the longest day in the parallel nearest the pole exceeds the longest day in that next the equator by some certain spaces, viz. half an hour. The word comes from the Greek κλιμα, *inclinamentum*, "an inclination."

The *beginning* of the climate is a parallel circle wherein the day is the shortest. The *end* of the climate, is that wherein the day is the longest. The climates therefore are reckoned from the equator to the pole; and are so many bands, or zones, terminated by lines parallel to the equator; though, in strictness, there are several climates in the breadth of one zone. Each climate only differs from its contiguous ones, in that the longest day in summer is longer or shorter by half an hour in the one place than in the other. As the climates commence from the equator, the first climate at its beginning has its longest day precisely 12 hours long; at its end, 12 hours and a half: the second, which begins where the first ends, viz. at twelve hours and a half, ends at 13 hours; and so of the rest, as far as the polar circles, where, what the geographers call *hour-climates* terminate, and *month-climates* commence. An hour climate is a space comprised between two parallels of the equator, in the first of which the longest day exceeds that in the latter by half an hour; so the month-climate is a space terminated between two circles parallel to the polar circles, whose longest day is longer or shorter than that of its contiguous one by a month or 30 days.

The ancients who confined the climates to what they imagined the habitable parts of the earth, only allowed of seven. The first they made to pass through Meroë, the second through Sienna, the third through Alexandria, the fourth through Rhodes, the fifth through Rome, the sixth through Pontus, and the seventh through the mouth of the Borysthenes. The moderns, who have sailed further toward the poles, make 30 climates on each side; and, in regard the obliquity of the sphere makes a little difference in the length of the longest day; instead of half an hour, some only make the difference of climates a quarter.

Vulgarly the term *climate* is bestowed on any country or region differing from another either in respect of the seasons, the quality of the soil, or even the manners of the inhabitants; without any regard to the length of the longest day. Abulfeda, an Arabian author, distinguishes the first kind of climates by the term *real climates*, and the latter by that of *apparent climates*. Varenius gives us a table of 30 climates; but without any regard to the refraction. Ricciolus furnishes a more accurate one, wherein the refractions are allowed for; an abstract of which follows. See this subject fully treated in the article CLIMATE in the SUPPLEMENT.

Middle of *Clim.*	Longest Day.	Latit.	Middle of *Clim.*	Longest Day.	Latit.	Middle of *Clim.*	Latit.	Cont. Light.	North Night.	Cont. Light.	South Night.
I	12th 30	7° 18	VIII	16th 0	48 15	XV	66 53	31d	27d	30d	28d
II	13 0	15 36	IX	17 0	53 46	XVI	69 30	62	58	60	59
III	13 30	23 8	X	18 0	57 44	XVII	73 0	93	87	89	88
IV	14 0	29 49	XI	19 0	60 39	XVIII	78 6	124	117	120	118
V	14 30	35 35	XII	20 0	62 44	XIX	84 0	156	148	150	149
VI	15 0	40 32	XIII	22 0	65 10	XX	90 0	188	180	178	177
VII	15 30	44 42	XIV	24 0	65 54						

CLIMAX, or GRADATION, in *Rhetoric*, a figure wherein the word or expression which ends the first member of a period begins the second, and so on; so that every member will make a distinct sentence, taking its rise from the next foregoing, till the argument and period be beautifully finished; as in the following gradation of Dr Tillotson. "After we have practised good actions a while, they become easy; and when they are easy, we begin to take pleasure in them; and when they please us we do them frequently; and by frequency of acts, a thing grows into a habit; and confirmed habit is a kind of second nature: and so far as any was honoured by the Mogul with the dignity of an omrah of the empire; and was rewarded by the new soubah with a grant of lands, or a jaghire, producing 27,000l. a-year. In 1760, he returned to England, where he received the unanimous thanks of the company, was elected member of parliament for Shrewsbury, and was raised to an Irish peerage by the title of Lord Clive, Baron of Plassey. In 1764, fresh disturbances taking place in Bengal, Lord Clive was esteemed the only man qualified to settle them, and was accordingly again appointed to that presidency; after being honoured with the order of the Bath, and with the rank of major-general. When he arrived in India, he exceeded the most sanguine expectation, in restoring tranquillity to the province without striking a blow, and fixed the highest ideas of the British power in the minds of the natives. He returned home in 1767; and in 1772, when a parliamentary inquiry into the conduct of the East India Company was agitated, he entered into an able justification of himself in a masterly speech in the house of commons. He died *suddenly* towards the close of the year 1774.

CLOACÆ, in antiquity, the common sewers of Rome, to carry off the dirt and soil of the city into the Tiber; justly reckoned among the grand works of the Romans. The first common sewer, called *Cloaca Maxima*, was built by Tarquinius, some say Priscus, others Superbus, of huge blocks of stone joined together without any cement, in the manner of the edifices of those early times, consisting of three rows of arches one above another, which at length conjoin and unite together; measuring in the clear 18 palms in height, and as many in width. Under these arches, they rowed in boats, which made Pliny say that the city was suspended in air, and that they sailed beneath the houses. Under these arches also were ways through which carts loaded with hay could pass with ease. It began in the Forum Romanum; measured 300 paces in length; and emptied itself between the temple of Vesta and the Pons Senatorius. There were as many principal sewers as there were hills. Pliny concludes their firmness and strength from their standing for so many ages the shocks of earthquakes, the fall of houses, and the vast loads and weights moved over them.

CLOACINA, the goddess of jakes and common sewers, among the Romans.

CLOCK, a machine constructed in such a manner, and regulated so by the uniform motion of a pendulum (A), as to measure time, and all its subdivisions, with great exactness.

The invention of clocks with wheels is referred to Pacificus, archdeacon of Verona, who lived in the time of Lotharius son of Louis the Debonnair, on the credit of an epitaph quoted by Ughelli, and borrowed by him from Panvinius. They were at first called *nocturnal dials*, to distinguish them from sun-dials, which showed the hour by the sun's shadow. Others ascribe the invention to Boethius, about the year 510. Mr Derham makes clock-work of a much older standing; and ranks Archimedes's sphere mentioned by Claudian, and that of Posidonius mentioned by Cicero, among the machines of this kind: not that either their form or use was the same with those of ours, but that they had their motion from some hidden weights or springs, with wheels or pulleys, or some such clock-work principle. But be this as it will, it is certain the art of making clocks, such as are now in use, was either first invented, or at least retrieved, in Germany, about 200 years ago. The water-clocks, or clepsydræ, and sun-dials, have both a much better claim to antiquity. The French annals mention one of the former kind sent by Aaron, king of Persia, to Charlemagne, about the year 807, which seemed to bear some resemblance to the modern clocks: it was of brass, and showed the hours by twelve little balls of the same metal, which fell at the end of each hour, and in falling struck a bell and made it sound. There were also figures of 12 cavaliers, which at the end of each hour came forth at certain apertures or windows in the side of the clock, and shut them again, &c.

The invention of pendulum clocks is owing to the happy industry of the last age: the honour of it is disputed by Huygens and Galileo. The former, who has written a volume on the subject, declares it was first put in practice in the year 1657, and the description thereof printed in 1657. Becker, *de Nova Temporis dimetiendi Theoria*, *anno* 1680, contends for Galileo; and relates, though at second-hand, the whole history of the invention; adding, that one Tresler, at that time clock-maker to the father of the Grand Duke of Tuscany, made the first pendulum-clock at Florence, by direction of Galileo Galilei; a pattern of which was brought into Holland. The Academy del' Cimenta say expressly, that the application of the pendulum to the movement of a clock was first proposed by Galileo, and first put in practice by his son Vincenzo Galilei, in 1649. Be the inventor who he will, it is certain the invention never flourished till it came into Huygen's hands, who insists on it, that if ever Galileo thought of such a thing, he never brought it to any degree of perfection. The first pendulum-clock made in England was in the year 1662, by Mr Fromantil, a Dutchman.

Among the modern clocks, those of Strasburg and Lyons are very eminent for the richness of their furniture, and the variety of their motions and figures. In the first, a cock claps his wings, and proclaims the hour; the angel opens a door and salutes the virgin; and the Holy Spirit descends on her, &c. In the second, two horsemen encounter, and beat the hour on each other; a door opens, and there appears on the theatre the Virgin, with Jesus Christ in her arms; the Magi with their retinue, marching in order, and presenting their gifts; two trumpeters sounding all the while to proclaim the procession. These, however, are excelled by two lately made by English artists, and intended as a present from the East India Company to the emperor of China. The clocks we speak of are in the form of chariots, in which are placed, in a fine altitude,

(A) A balance not unlike the fly of a kitchen-jack was formerly used in place of the pendulum.

Clock.

attitude, a lady, leaning her right hand upon a part of the chariot, under which is a clock of curious workmanship, little larger than a shilling, that strikes and repeats, and goes eight days. Upon her finger sits a bird finely modelled, and set with diamonds and rubies, with its wings expanded in a flying posture, and actually flutters for a considerable time on touching a diamond button below it; the body of the bird (which contains part of the wheels that in a manner give life to it) is not the bigness of the 16th part of an inch. The lady holds in her left hand a gold tube not much thicker than a large pin, on the top of which is a small round box, to which a circular ornament set with diamonds not larger than a sixpence is fixed, which goes round near three hours in a constant regular motion. Over the lady's head, supported by a small fluted pillar no bigger than a quill, is a double umbrella, under the largest of which a bell is fixed at a considerable distance from the clock, and seems to have no connection with it; but from which a communication is secretly conveyed to a hammer, that regularly strikes the hour and repeats the same at pleasure, by touching a diamond button fixed to the clock below. At the feet of the lady is a gold dog; before which from the point of the chariot are two birds fixed on spiral springs; the wings and feathers of which are set with stones of various colours, and appear as if flying away with the chariot, which, from another secret motion, is contrived to run in a straight, circular, or any other direction; a boy that lays hold of the chariot behind, seems also to push it forward. Above the umbrella are flowers and ornaments of precious stones; and it terminates with a flying dragon set in the same manner. The whole is of gold, most curiously executed, and embellished with rubies and pearls.

Plate CXLVI. fig. 1.

Of the general Mechanism of Clocks, *and how they measure Time.* The first figure of Plate CXLVI. is a profile of a clock: P is a weight that is suspended by a rope that winds about the cylinder or barrel C, which is fixed upon the axis *a a*; the pivots *b b* go into holes made in the plates TS, TS, in which they turn freely. These plates are made of brass or iron, and are connected by means of *four pillars* ZZ; and the whole together is called the *frame*.

The weight P, if not restrained, would necessarily turn the barrel C with an uniformly accelerated motion, in the same manner as if the weight was falling freely from a height. But the barrel is furnished with a ratchet-wheel KK, the right side of whose teeth strikes against the click, which is fixed with a screw to the wheel DD, as represented in fig. 2. so that the action of the weight is communicated to the wheel DD, the teeth of which act upon the teeth of the small wheel *d*, which turns upon the pivots *c c*. The communication or action of one wheel with another is called the *pitching*; a small wheel like *d* is called a *pinion*, and its teeth are leaves of the pinion. Several things are requisite to form a good pitching, the advantages of which are obvious in all machinery where teeth and pinions are employed. The teeth and pinion leaves should be of a proper shape, and perfectly equal among themselves; the size also of the pinion should be of a just proportion to the wheel acting into it; and its place must be at a certain distance from the wheel, beyond or within which it will make a bad pitching.

The wheel EE is fixed upon the axis of the pinion *d*; and the motion communicated to the wheel DD by the weight is transmitted to the pinion *d*, consequently to the wheel E E, as likewise to the pinion *e* and wheel FF, which moves the pinion *f*, upon the axis of which the crown or balance wheel GH is fixed. The pivots of the pinion *f* play in holes of the plates LM, which are fixed horizontally to the plates TS. In a word, the motion begun by the weight is transmitted from the wheel GH to the palettes IK, and, by means of the fork UX rivetted on the palettes, communicates motion to the pendulum AB, which is suspended upon the hook A. The pendulum AB describes, round the point A, an arc of a circle alternately going and returning. If then the pendulum be once put in motion by a push of the hand, the weight of the pendulum at B will make it return upon itself and it will continue to go alternately backward and forward, till the resistance of the air upon the pendulum, and the friction at the point of suspension at A, destroy the originally impressed force. But as, at every vibration of the pendulum, the teeth of the balance-wheel GH, act so upon the palettes IK (the pivots upon the axis of these palettes play in two holes of the potence *s t*), that after one tooth H has communicated motion to the palette K, that tooth escapes; then the opposite tooth G acts upon the palette I, and escapes in the same manner; and thus each tooth of the wheel escapes the palettes IK, after having communicated their motion to the palettes in such a manner that the pendulum, instead of being stopt, continues to move.

The wheel EE revolves in an hour; the pivot *c* of the wheel passes through the plate, and is continued to *r*; upon the pivot is a wheel NN with a long socket fastened in the centre; upon the extremity of this socket *r* the minute-hand is fixed. The wheel NN acts upon the wheel O; the pinion of which *p* acts upon the wheel *g g*, fixed upon a socket which turns along with the wheel N. This wheel *gg* makes its revolution in 12 hours, upon the socket of which the hour-hand is fixed.

From the above description it is easy to see, 1. That the weight *p* turns all the wheels, and at the same time continues the motion of the pendulum. 2. That the quickness of the motion of the wheel is determined by that of the pendulum. 3. That the wheels point out the parts of time divided by the uniform motion of the pendulum.

When the cord from which the weight is suspended is entirely run down from off the barrel, it is wound up again by means of a key, which goes on the square end of the arbor at Q by turning it in a contrary direction from that in which the weight descends. For this purpose, the inclined side of the teeth of the wheel R (fig. 2.) removes the click C, so that the ratchet-wheel R turns while the wheel D is at rest; but as soon as the cord is wound up, the click falls in between the teeth of the wheel D, and the right side of the teeth again act upon the end of the click, which obliges the wheel D to turn along with the barrel; and the spring A keeps the click between the teeth of the ratchet-wheel R. Fig. 2.

We shall now explain how time is measured by the motion of the pendulum; and how the wheel E, upon the

Clock. the axis of which the minute-hand is fixed, makes but one precise revolution in an hour. The vibrations of a pendulum are performed in a shorter or longer time in proportion to the length of the pendulum itself. A pendulum of 3 feet $8\frac{5}{7}$ French lines in length, makes 3600 vibrations in an hour, *i. e.* each vibration is performed in a second of time, and for that reason it is called a *second pendulum*. But a pendulum of 9 inches $2\frac{1}{4}$ French lines makes 7200 vibrations in an hour, or two vibrations in a second of time, and is called *a half-second pendulum*. Hence, in constructing a wheel whose revolution must be performed in a given time, the time of the vibrations of the pendulum which regulates its motion must be considered. Supposing, then, that the pendulum A B makes 7200 vibrations in an hour, let us consider how the wheel E shall take up a hour in making one revolution. This entirely depends on the number of teeth in the wheels and pinions. If the balance wheel consists of 30 teeth, it will turn once in the time that the pendulum makes 60 vibrations; for at every turn of the wheel, the same tooth acts once on the palette I, and once on the palette K, which occasions two separate vibrations in the pendulum; and the wheel having 30 teeth, it occasions twice 30, or 60 vibrations. Consequently, this wheel must perform 120 revolutions in an hour; because 60 vibrations, which it occasions at every revolution, are contained 120 times in 7200, the number of vibrations performed by the pendulum in an hour. Now, in order to determine the number of teeth for the wheels EF, and the pinions *ef*, it must be remarked, that one revolution of the wheel E must turn the pinion *e* as many times as the number of teeth in the pinions is contained in the number of teeth in the wheel. Thus, if the wheel E contains 72 teeth, and the pinion *e* 6, the pinion will make 12 revolutions in the time that the wheel makes 1; for each tooth of the wheel drives forward a tooth of the pinion, and when the 6 teeth of the pinion are moved, a complete revolution is performed; but the wheel E has by that time only advanced 6 teeth, and has still 66 to advance before its revolution be completed, which will occasion 11 more revolutions of the pinion. For the same reason, the wheel F having 60 teeth, and the pinion *f* 6, the pinion will make 10 revolutions while the wheel performs one. Now, the wheel F being turned by the pinion *e*, makes 12 revolutions for one of the wheel E; and the pinion *f* makes 10 revolutions for one of the wheel F; consequently, the pinion *f* performs 10 times 12 or 120 revolutions in the time the wheel E performs one. But the wheel G, which is turned by the pinion *f*, occasions 60 vibrations in the pendulum each time it turns round; consequently the wheel G occasions 60 times 120 or 7200 vibrations of the pendulum while the wheel E performs one revolution; but 7200 is the number of vibrations made by the pendulum in an hour, and consequently the wheel E performs but one revolution in an hour; and so of the rest.

From this reasoning, it is easy to discover how a clock may be made to go for any length of time without being wound up: 1. By increasing the number of teeth in the wheels; 2. By diminishing the number of teeth in the pinions; 3. By increasing the length of the cord that suspends the weight; 4. By increasing the length of the pendulum; and, 5. By adding to the number of wheels and pinions. But in proportion as the time is augmented, if the weight continues the same, the force which it communicates to the last wheel GH will be diminished.

It only remains to take notice of the number of teeth in the wheels which turn the hour and minute-hands.

The wheel E performs one revolution in an hour; the wheel NN, which is turned by the axis of the wheel E, must likewise make only one revolution in the same time; and the minute-hand is fixed to the socket of this wheel. The wheel N has 30 teeth, and acts upon the wheel O, which has likewise 30 teeth, and the same diameter; consequently the wheel O takes one hour to a revolution: now the wheel O carries the pinion *p*, which has 6 teeth, and which acts upon the wheel *q q* of 72 teeth; consequently the pinion *p* makes 12 revolutions while the wheel *q q* makes one, and of course the wheel *q q* takes 12 hours to one revolution; and upon the socket of this wheel the hour hand is fixed. All that has been said here concerning the revolutions of the wheels, &c. is equally applicable to watches as to clocks.

The ingenious Dr Franklin contrived a clock to show the hours, minutes, and seconds, with only three wheels and two pinions in the whole movement. The dial-plate (fig. 3.) has the hours engraven upon it in spiral spaces along two diameters of a circle containing four times 60 minutes. The index A goes round in four hours, and counts the minutes from any hour by which it has passed to the next following hour. The time, therefore, in the position of the index shown in the figure is either $32\frac{1}{2}$ minutes past XII. III. or VIII.; and so in every other quarter of the circle it points to the number of minutes after the hours which the index last left in its motion. The small hand B, in the arch at top, goes round once in a minute, and shows the seconds. The wheel-work of this clock may be seen in fig. 4. A is the first or great wheel, containing 160 teeth, and going round in four hours with the index A in fig. 3. let down by a hole on its axis. This wheel turns a pinion B of 10 leaves, which therefore goes round in a quarter of an hour. On the axis of this pinion is the wheel C of 120 teeth; which goes round in the same time, and turns a pinion D of eight leaves round in a minute, with the second hand B of fig. 3. fixed on its axis, and also the common wheel E of 30 teeth for moving a pendulum (by palettes) that vibrates seconds, as in a common clock. This clock is wound up by a line going over a pulley on the axis of the great wheel, like a common thirty-hour clock. Many of these admirably simple machines have been constructed, which measure time exceedingly well. It is subject, however, to the inconvenience of requiring frequent winding by drawing up the weight, and likewise to some uncertainty as to the particular hour shown by the index A. Mr Ferguson has proposed to remedy these inconveniences by the following construction. In the dial-plate of his clock (fig. 5.) there is an opening, *a b c d*, below the centre, through which appears part of a flat plate, on which the 12 hours, with their divisions into quarters, are engraved. This plate turns round in 12 hours; and the index A points out the true hour, &c. B is the

Fig. 3. Fig. 4. Fig. 5.

Clock.

the minute-hand, which goes round the large circle of 60 minutes whilst the plate *a b c d* shifts its place one hour under the fixed index A. There is another opening, *e f g*, through which the seconds are seen on a flat moveable ring at the extremity of a fleur-de-lis engraved on the dial-plate. A in fig. 6. is the great wheel of this clock, containing 120 teeth, and turning round in 12 hours. The axis of this wheel bears the plate of hours, which may be moved by a pin passing through small holes drilled in the plate, without affecting the wheel-work. The great wheel A turns a pinion B of ten leaves round in an hour, and carries the minute hand B on its axis round the dial-plate in the same time. On this axis is a wheel C of 120 teeth, turning round a pinion D of six leaves in three minutes; on the axis of which there is a wheel E of 90 teeth, that keeps a pendulum in motion, vibrating seconds by palettes, as in a common clock, when the pendulum-wheel has only 30 teeth, and goes round in a minute. In order to show the seconds by this clock, a thin plate must be divided into three times sixty, or 180 equal parts, and numbered 10, 20, 30, 40, 50, 60, three times successively; and fixed on the same axis with the wheel of 90 teeth, so as to turn round near the back of the dial-plate; and these divisions will show the seconds through the opening *e f g h*, fig. 5. This clock will go a week without winding, and always show the precise hour; but this clock, as Mr Ferguson candidly acknowledges, has two disadvantages of which Dr Franklin's clock is free. When the minute-hand B is adjusted, the hour-plate must also be set right by means of a pin; and the smallness of the teeth in the pendulum-wheel will cause the pendulum-ball to describe but small arcs in its vibrations; and therefore the momentum of the ball will be less, and the times of the vibrations will be more affected by any unequal impulse of the pendulum-wheel on the palettes. Besides, the weight of the flat ring on which the seconds are engraved will load the pivots of the axis of the pendulum-wheel with a great deal of friction, which ought by all possible means to be avoided. To remedy this inconvenience, the second plate might be omitted.

Fig. 6.

A clock similar to Dr Franklin's was made in Lincolnshire about the end of the 17th century or beginning of the 18th; and is said to be in London in the possession of a grandson of the person who made it.

A clock, showing the apparent diurnal motions of the sun and moon, the age and phases of the moon, with the time of her coming to the meridian, and the times of high and low water, by having only two wheels and a pinion added to the common movement, was contrived by Mr Ferguson, and described in his Select Exercises. The dial-plate of this clock (fig. 7.) contains all the twenty-four hours, of the day and night. S is the sun, which serves as an hour index by going round the dial-plate in twenty-four hours; and M is the moon, which goes round in twenty-four hours fifty minutes and a half, the time of her going round in the heavens from one meridian to the same meridian again. The sun is fixed to a circular plate (see fig. 8.) and carried round by the motion of that plate on which the twenty-four hours are engraven; and within them is a circle divided into twenty-nine and a half equal parts for the days of the moon's age, reckoning from new moon to new moon; and each day stands directly under the time, in the twenty-four hour circle, of the moon's coming to the meridian; the XII under the sun standing for noon, and the opposite XII for midnight. The moon M is fixed to another circular plate (fig. 6.) of the same diameter with that which carries the sun, part of which may be seen through the opening, over which the small wires *r* and *b* pass in the moon-plate. The wire *a* shows the moon's age and time of her coming to the meridian, and *b* shows the time of high-water for that day in the sun-plate. The distance of these wires answers to the difference of time between the moon's coming to the meridian and high-water at the place for which the clock is made. At London their difference is two hours and a half. Above the moon-plate there is a fixed plate N, supported by a wire A, joined to it at one end, and fixed at right angles into the dial plate at the midnight XII. This plate may represent the earth, and the dot L London, or the place to which the clock is adapted. Around this plate there is an elliptic shade on the moon-plate, the highest points of which are marked high-water, and the lowest low-water. As this plate turns round below the plate N, these points come successively even with L, and stand over it at the times when it is high or low water at the given place; which times are pointed by the sun S on the dial-plate; and the plate H above XII at noon rises or falls with the tide. As the sun S goes round the dial-plate in twenty-four hours, and the moon M in twenty-four hours fifty minutes and a half, it is plain that the moon makes only twenty-eight revolutions and a half, whilst the sun makes twenty-nine and a half; so that it will be twenty-nine days and a half from conjunction to conjunction. And thus the wire *a* shifts over one day of the moon's age on the sun-plate in twenty-four hours. The phases of the moon for every day of her age may be seen through a round hole *m* in the moon-plate: thus at conjunction or new-moon, the whole space seen through *m* is black; at opposition or full moon this space is white; at either quadrature half black and half white; and at every position the white part resembles the visible part of the moon for every day of her age. The black-shaded space N *f* F *l* (fig. 8.) on the sun-plate serves for these appearances. N represents the new moon, F the full moon, and *f* her first quarter, and *l* her last quarter, &c. The wheel-work and tide-work of this clock are represented in fig. 9. A and B are two wheels of equal diameters; A has fifty-seven teeth, with a hollow axis that passes through the dial of the clock, and carries the sun-plate with the sun S. B has fifty-nine teeth, with a solid spindle for its axis, which turns within the hollow axis of A, and carries the moon-plate with the moon M: both wheels are turned round by a pinion C of nineteen leaves, and this pinion is turned round by the common clock-work in eight hours; and as nineteen is the third part of fifty-seven, the wheel A will go round in twenty-four hours; and the wheel B in twenty-four hours fifty minutes and a half; fifty-seven being to twenty-four as fifty-nine to twenty-four hours fifty minutes and a half very nearly. On the back of the wheel B is fixed an elliptical ring D, which, in its revolution, raises and lets down a lever EF, whose centre of motion is on a pin at F; and this, by the upright

Plate CXLVII. fig. 7.

Fig. 8.

Fig. 9.

right bar G, raises and lets down the tide-plate H twice in the time of the moon's revolving from the meridian to the meridian again: this plate moves between four rollers R, R, R, R. A clock of this kind was adapted by Mr Ferguson to the movement of an old watch: the great wheel of a watch goes round in four hours; on the axis of this he fixed a wheel of twenty teeth, to turn a wheel of forty teeth on the axis of the pinion C; by which means that pinion was turned round in eight hours, the wheel A in twenty-four, and the wheel B in twenty-four hours fifty minutes and a half.

To this article we shall subjoin a brief account of two curious contrivances. The first, for giving motion to the parts of a clock by making it to descend along an inclined plane, is the invention of Mr Maurice Wheeler; the clock itself was formerly seen in Don Saltero's coffee-house at Chelsea. DE, fig. 10. is the inclined plane on which the clock ABC descends; this consists externally of a hoop about an inch broad, and two sides or plates standing out beyond the hoop about one-eighth of an inch all round, with indented edges, that the clock may not slide, but turn round whilst it moves down. One of these plates is inscribed with the twenty-four hours, which pass successively under the index LP, fig. 11. which is always in a position perpendicular to the horizon, and shows the hour on the top of the machine: for this reason the lower part of the index, or HL, is heaviest, that it may preponderate the other HP, and always keep it pendulous, with its point to the vertical hour, as the movement goes on. Instead of this index, an image may be fixed for ornament on the axis *g*, which with an erected finger performs the office of an index. In order to describe the internal part or mechanism of this clock, let LETQ be the external circumference of the hoop, and *ff* the same plate, on which is placed the train of wheel work 1, 2, 3, 4, which is much the same as in other clocks, and is governed by a balance and regulator as in them. But there is no need of a spring and fusee in this clock: their effects being otherwise answered as we shall see. In this machine the great wheel of 1 is placed in the centre, or upon the axis of the movement, and the other wheels and parts towards one side, which would therefore prove a bias to the body of the clock, and cause it to move, even on a horizontal plane, for some short distance: this makes it necessary to fix a thin plate of lead at C, on the opposite part of the hoop, to restore the equilibrium of the movement. This being done, the machine will abide at rest in any position on the horizontal plane HH; but if that plane be changed into the inclined plane DE, it will touch it in the point D; but it cannot rest there, because the centre of gravity at M acting in the direction MI, and the point T having nothing to support it, must continually descend, and carry the body down the plane. But now if any weight P be fixed on the other side of the machine, such as shall remove the centre of gravity from M to the point V in the line LD which passes through the point D, it will then rest upon the inclined plane, as in the case of the rolling cylinder. If this weight P be supposed not fixed, but suspended at the end of an arm, or vectis, which arm or lever is at the same time fastened to a centrical wheel 1, moving on the axis M of the machine, which wheel by its teeth shall communicate with the train of wheels, &c. on the other side, and the power of the weight be just equal to the friction or resistance of the train, it will remain motionless as it did before when it was fixed; and consequently the clock also will be at rest on the inclined plane. But supposing the power of the weight P to be superior to the resistance of the train, it will then put it into motion, and of course the clock likewise; which will then commence a motion down the plane; while the weight P, its vectis PM, and the wheel 1, all constantly retain the same position which they have at first when the clock begins to move. Hence it is easy to understand, that the weight P may have such an intrinsic gravity as shall cause it to act upon the train with any required force, so as to produce a motion in the machine of any required velocity; such, for instance, as shall carry it once round in twenty-four hours: then, if the diameters of the plates ABC be four inches, it will describe the length of their circumference, viz. 12.56 inches, in one natural day; and therefore, if the plane be of a sufficient breadth, such a clock may go several days, and would furnish a perpetual motion, if the plane were infinitely extended. Let SD be drawn through M perpendicular to the inclined plane in the point D; also let LD be perpendicular to the horizontal line HH, passing through D; then is the angle HDE=LDS=DMT; whence it follows that the greater the angle of the plane's elevation is, the greater will be the arch DT; and consequently the further will the common centre of gravity be removed from M; therefore the power of P will be augmented, and of course the motion of the whole machine accelerated. Thus it appears, that by duly adjusting the intrinsic weight of P, at first to produce a motion showing the mean time as near as possible, the time may be afterwards corrected, or the clock made to go faster or slower by raising or depressing the plane, by means of the screw at S. The angle to which the plane is first raised is about ten degrees. The marquis of Worcester is also said to have contrived a watch that moved on a declivity. See farther *Phil. Trans. Abr.* vol. i. p. 468, &c. or N° 161.

Plate CXLVIII. Fig. 10.

Fig. 11.

The other contrivance is that of M. de Gennes for making a clock ascend on an inclined plane. To this end let ABC (fig. 12.) be the machine on the inclined plane EDE, and let it be kept at rest upon it, or in equilibrio, by the weight P at the end of the level PM. The circular area CF is one end of a spring barrel in the middle of the movement, in which is included a spring as in a common watch. To this end of the barrel the arm or lever PM is fixed upon the centre M; and thus, when the clock is wound up, the spring moves the barrel, and therefore the lever and weight P in the situation PM. In doing this, the centre of gravity is constantly removed farther from the centre of the machine, and therefore it must determine the clock to move upwards, which it will continue to do as long as the spring is unbending itself; and thus the weight and its lever PM will preserve the situation they first have, and to do the office of a chain and fusee. *Phil. Trans.* N° 140. or Abridg. vol. i. p. 467.

Fig. 12.

By stat. 9 and 10 W. III. cap. 28. § 2. no person shall export, or endeavour to export, out of this kingdom,

Clock.

dom, any outward or inward box-case or dial-plate, of gold, silver, brass, or other metal, for clock or watch, without the movement in or with every such box, &c. made up fit for use, with the maker's name engraven thereon; nor shall any person make up any clock or watch without putting his name and place of abode or freedom, and no other name or place, on every clock or watch; on penalty of forfeiting every such box, case, and dial-plate, clock and watch, not made up and engraven as aforesaid; and 20l. one moiety to the king, the other to those that shall sue for the same.

CLOCKS, *Portable*, or *Pocket*, commonly denominated *Watches*. See the article WATCH.

CLOCK-Work, properly so called, is that part of the movement which strikes the hours, &c. on a bell; in contradistinction to that part of the movement of a clock or watch which is designed to measure and exhibit the time on a dial-plate, and which is termed *Watch-work*.

Plate CLVIII. fig. 3.

I. Of the *Clock* part. The wheels composing this part are: The great or first wheel H, which is moved by the weight or spring at the barrel G: in sixteen or thirty-hour clocks, this has usually pins, and is called the *pin-wheel*; in eight day pieces, the second wheel I is commonly the pin-wheel, or striking wheel, which is moved by the former. Next the striking wheel is the detent-wheel, or hoop-wheel K, having a hoop almost round it, wherein is a vacancy at which the clock locks. The next is the third or fourth wheel, according to its distance from the first, called the *warning-wheel* L. The last is the flying pinion Q, with a fly or fan, to gather air, and so bridle the rapidity of the clock's motion. To these must be added the pinion of report, which drives round the locking-wheel, called also the *count-wheel*; ordinarily with eleven notches in it, unequally distant, to make the clock strike the hours.

Besides the wheels, to the clock part belongs the rash or ratch; a kind of wheel with twelve large fangs, running concentrical to the dial wheel, and serving to lift up the detents every hour, and make the clock strike: the detents or stops, which being lifted up and let fall, lock and unlock the clock in striking the hammer, as S, which strikes the bell R; the hammer-tails, as T, by which the striking pins draw back the hammers; latches, whereby the work is lifted up and unlocked; and lifting-pieces, as P, which lift up and unlock the detents.

The method of calculating the numbers of a piece of clock-work having something in it very entertaining, and at the same time very easy and useful, we shall give our readers the rules relating thereto: 1. Regard here needs only be had to the counting-wheel, striking-wheel, and detent-wheel, which move round in this proportion: the count-wheel commonly goes round once in 12 or 24 hours; the detent-wheel moves round every stroke the clock strikes, or sometimes but once in two strokes: wherefore it follows, that, 2. As many pins as are in the pin-wheel, so many turns hath the detent-wheel in one turn of the pin-wheel; or, which is the same, the pins of the pin-wheel are the quotients of that wheel divided by the pinion of the detent-wheel. But if the detent-wheel moves but once round in two strokes of the clock, then the said quotient is but half the number of pins. 3. As many turns of the pin-wheel as are required to perform the strokes of 12 hours (which are 78), so many turns must the pinion of report have to turn round the count-wheel once; or thus the quotient of 78, divided by the number of striking-pins, shall be the quotient for the pinion of report and the count-wheel; and this is in case the pinion of report be fixed to the arbor of the pin-wheel, which is commonly done.

An example will make all plain: The locking-wheel being 48, the pinion of report 8, the pin-wheel 78, the striking pins are 13, and so of the rest. Note also, that 78 divided by 13 gives 6, the quotient of the pinion of report. As for the warning-wheel and fly-wheel, it matters little what numbers they have; their use being only to bridle the rapidity of the motion of the other wheels.

8) 48 (6
———
6) 78 (13
6) 60 (10
6) 48 (8

The following rules will be of great service in this calculation. 1. *To find how many strokes a clock strikes in one turn of the fusee or barrel:* As the turns of the great wheel or fusee are to the days of the clock's continuance; so is the number of strokes in 24 hours, viz. 156, to the strokes of one turn of the fusee.

2. *To find how many days a clock will go*: As the strokes in 24 hours are to those in one turn of the fusee; so are the turns of the fusee to the days of the clock's going.

3. *To find the number of turns of the fusee or barrel:* As the strokes in one turn of the fusee are to those of 24 hours; so is the clock's continuance to the turns of the fusee or great wheel.

4. *To find the number of leaves in the pinion of report on the axis of the great wheel:* As the number of strokes in the clock's continuance is to the turns of the fusee; so are the strokes in 12 hours, viz. 78, to the quotient of the pinion of report fixed on the arbor of the great wheel.

5. *To find the strokes in the clock's continuance:* As 12 is to 78; so are the hours of the clock's continuance to the number of strokes in that time.

By means of the following table, clocks and watches may be so regulated as to measure true equal time.

The stars make 366 revolutions from any point of the compass to the same point again in 365 days and one minute; and therefore they gain a 365th of a revolution every 24 hours of mean solar time, near enough for regulating any clock or watch.

This acceleration is at the rate of 3 min. 55 sec. 53 thirds, 59 fourths in 24 hours; or in the nearest round numbers, 3 minutes, 56 seconds; by which quantity of time every star comes round sooner than it did on the day before.

Therefore, if you mark the precise moment shown by a clock or watch when any star vanishes behind a chimney, or any other object, as seen through a small hole in a thin plate of metal, fixed in a window-shutter;

Days.	H.	M.	S.
1	0	3	56
2	0	7	52
3	0	11	48
4	0	15	44
5	0	19	40
6	0	23	36
7	0	27	32
8	0	31	28
9	0	35	24
10	0	39	20
11	0	43	16
12	0	47	12
13	0	51	8
14	0	55	4
15	0	59	0
16	1	2	56
17	1	6	52

18

Days.	H. M. S.
18	1 10 48
19	1 14 44
20	1 18 40
21	1 22 36
22	1 26 32
23	1 30 28
24	1 34 24
25	1 38 20
26	1 42 16
27	1 46 12
28	1 50 8
29	1 54 4
30	1 58 0

and do this for several nights successively (as suppose twenty); if, at the end of that time, the star vanishes as much sooner than it did the first night, by the clock, as answers to the time denoted in the table for so many days, the clock goes true; otherwise not. If the difference between the clock and star be less than the table shows, the clock goes too fast; if greater, it goes too slow; and must be regulated accordingly, by letting down or raising up the ball of the pendulum, by little and little, by turning the screw-nut under the ball, till you find it keeps true equal time.

Thus supposing the star should disappear behind a chimney, any night when it is XII. by the clock; and that, on the 20th night afterward, the same star should disappear when the time is 41 minutes 22 seconds past X, by the clock; which being subtracted from 12 hours 0 min. 0 sec. leaves remaining 1 hour 18 minutes 40 seconds for the time the star is then faster than the clock: look in the table, and against 20, in the left-hand column, you will find the acceleration of the star to be 1 hour 18 min. 40 sec. agreeing exactly with what the difference ought to be between the clock and star; which shows that the clock measures true equal time, and agrees with the mean solar time, as it ought to do.

II. Of the *Watch* part of a clock or watch. This is that part of the movement which is designed to measure and exhibit the time on a dial-plate; in contradistinction to that part which contributes to the striking of the hour, &c.

The several members of the watch part are, 1. The balance, consisting of the rim, which is its circular part; and the verge, which is its spindle; to which belong two palettes or leaves, that play in the teeth of the crown-wheel. 2. The potence, or pottance, which is the strong stud in pocket watches, whereon the lower pivot of the verge plays, and in the middle of which one pivot of the balance-wheel plays; the bottom of the pottance is called the foot, the middle part the nose, and the upper part the shoulder. 3. The cock, which is the piece covering the balance. 4. The regulator, or pendulum spring, which is the small spring, in the new pocket-watches, underneath the balance. 5. The pendulum (fig. 13.); whose parts are, the verge *x*, palettes 5, 5, cocks *y y y*, the rod, the fork, *z*, the flatt 2, the bob or great ball 3, and the corrector or regulator, 4, being a contrivance of Dr Derham for bringing the pendulum to its nice vibrations. 6. The wheels, which are the crown-wheel F in pocket-pieces, and swing-wheel in pendulums; serving to drive the balance or pendulum. 7. The contrate-wheel E, which is that next the crown-wheel, &c. and whose teeth and hoop lie contrary to those of other wheels; whence the name. 8. The great, or first wheel C; which is that the fusee B, &c. immediately drives, by means of the chain or string of the spring-box or barrel A; after which are the second wheel D, third wheel, &c. Lastly, between the frame and dial-plate, is the pinion of report, which is that fixed on the arbor of the great wheel; and serves to drive the dial-wheel, as that serves to carry the hand.

For the illustration of this part of the work which lies concealed, let ABC (fig. 14.) represent the uppermost side of the frame-plate, as it appears when detached from the dial-plate; the middle of this plate is perforated with a hole, receiving that end of the arbor of the centre wheel which carries the minute hand; near the plate is fixed the pinion of report *a b* of 10 teeth; this drives a wheel *c d* of 40 teeth; this wheel carries a pinion *e f* of 12 teeth; and this again drives a wheel *g h* with 36 teeth. Fig. 14.

As in the body of the watch the wheels everywhere divide the pinions; here, on the contrary, the pinions divide the wheels, and by that means diminish the motion, which is here necessary; for the hour hand, which is carried on a socket fixed on the wheel *g h*, is required to move but once round, while the pinion *a b* moves twelve times round. For this purpose the motion of the wheel *c d* is $\frac{1}{4}$ of the pinion *a b*. Again, while the wheel *c d*, or the pinion *e f*, goes once round, it turns the wheel *g h* but $\frac{1}{3}$ part round; consequently the motion of *g h* is but $\frac{1}{3}$ of $\frac{1}{4}$ of the motion of *a b*; but $\frac{1}{3}$ of $\frac{1}{4}$ is $\frac{1}{12}$; *i. e.* the hour-wheel *g h* moves once round in the time that the pinion of report, on the arbor of the centre of the minute wheel, makes 12 revolutions, as required. Hence the structure of that part of a clock or watch which shows the time may be easily understood.

The cylinder A (fig. 13.) put into motion by a weight or inclosed spring moves the fusee B, and the great wheel C, to which it is fixed by the line or cord that goes round each, and answers to the chain of a watch.

The method of calculation is easily understood by the sequel of this article; for, suppose the great wheel C goes round once in 12 hours, then if it be a royal pendulum clock, vibrating seconds, we have $60 \times 60 \times 12 = 43200$ seconds or beats in one turn of the great wheel. But because there are 60 swings or seconds in one minute, and the seconds are shown by an index on the end of the arbor of the swing-wheel, which in those clocks is in an horizontal position; therefore it is necessary that the swing-wheel F should have 30 teeth; whence $\frac{43200}{60} = 720$, the number to be broken into quotients for finding the number of teeth for the other wheels and pinions.

In spring-clocks, the disposition of the wheels in the watch part is such as is here represented in the figure, where the crown-wheel F is in an horizontal position; the seconds not being shown there by an index, as is done in the large pendulum clocks. Whence in these clocks the wheels are disposed in a different manner, as represented in fig. 15. where C is the great wheel, and D the centre or minute wheel, as before: but the contrate wheel E is placed on one side, and F the swing-wheel is placed with its centre in the same perpendicular line GH with the minute-wheel, and with its plane perpendicular to the horizon, as are all the others. Thus the minute and hour hands turn on the end of the arbor of the minute wheel at *a*, and the second hand on the arbor of the swing-wheel at *b*. Fig. 15.

Theory and calculation of the Watch-part, as laid down is the same, in a manner, as in the last example: and consequently thus: as 12 : 170 :: 10000 : 141666, which fourth number is the beats in one turn of the fusee; its half, 70833, being divided by 17, gives 4167 for the quotient; and because this number is too big for three quotients, therefore choose four, as 10, 8, 8, 6 $\frac{1}{3}$; whose product into 17 makes 71808, nearly equal to half the true beats in one turn of the fusee. Then say, as 170 : 12 :: 71808 : 5069, which is half the true train of your watch. And again, 170 : 12 :: 12$\frac{144}{170}$, the denominator of which expresses the pinion of report, and the numerator is the number of the dial-wheel. But these numbers being too big to be cut in small wheels, they must be varied by the fourth rule above. Thus:

As 144 : 170 :: 360 : 425;
Or 170 : 144 :: 360 : 305.

24) 20 ($\frac{20}{24}$
———
6) 60 (10
6) 48 (8
5) 40 (8
5) 33 (6$\frac{1}{3}$
———
17

Then dividing 360, and either of these two fourth proportionals (as directed by the rule), suppose by 15; you will have $\frac{24}{48}$ or $\frac{20}{24}$; then the numbers of the whole movements will stand as in the margin.

Such is the calculation of ordinary watches, to show the hour of the day: in such as show minutes, and seconds, the process is thus:

1. Having resolved on the beats in an hour, by dividing the designed train by 60, find the beats in a minute; and accordingly, find proper numbers for the crown-wheel and quotients, so as that the minute-wheel shall go round once in an hour, and the second wheel once in a minute.

Suppose, you shall choose a pendulum of seven inches, which vibrates 142 strokes in a minute, and 8520 in an hour. Half these sums are 71, and 4260. Now, the first work is to break this 71 into a good proportion, which will fall into one quotient, and the crown-wheel. Let the crown-wheel have 15 notches; then 71, divided by 15, gives nearly 5; so a crown-wheel of 15, and a wheel and pinion whose quotient is 5, will go round in a minute to carry a hand to show seconds. For a hand to go round in an hour to show minutes, because there are 60 minutes in an hour, it is but breaking 60 into good quotients (suppose 10 and 6, or 8 and 7$\frac{1}{2}$, &c.: and it is done. Thus, 4260 is broken as near as can be into proper numbers. But since it does not fall out exactly into the above mentioned numbers, you must correct (as before directed), and find the true number of beats in an hour, by multiplying 15 by 5, which makes 75; and 75 by 60 makes 4500, which is half the true train. Then find the beats in one turn of the fusee; thus, 16 : 192 :: 4500 : 54000; which last is half the beats in one turn of the fusee. This 54000 being divided by 4500 (the true numbers already pitched on), the quotient will be 10; which, not being too big for a single quotient, needs not be divided into more: and the work will stand as in the margin. As to the hour-hand, the great wheel, which performs only one revolution in 12 turns of the minute-wheel, will show the hour; or it may be done by the minute-wheel.

8) 40 (5
———
15

8) 64 (8
8) 60 (7$\frac{1}{2}$
8) 40 (5
———
15

9) 108 (12
8) 64 (8
8) 60 (7$\frac{1}{2}$
8) 40 (5
———
15

It is requisite for those who make nice astronomical observations, to have watches that make some exact number of beats per second, without any fraction; but we seldom find a watch that does. As four beats per second would be a very convenient number, we shall here give the train for such a watch, which would (like most others) go 30 hours, but is to be wound up once in 24 hours.

The fusee and first wheel to go round in four hours. This wheel has 48 teeth, and it turns a pinion of 12 leaves, on whose axis is the second wheel, which goes round in one hour, and carries the minute-band. This wheel has 60 teeth, and turns a pinion of 10 leaves; on whose axis is the third wheel of 60 teeth, turning a pinion of 6 leaves; on whose axis is the fourth (or contrate) wheel, turning round in a minute, and carrying the small hand that shows the seconds, on a small circle on the dial-plate, divided into 60 parts: this contrate wheel has 48 teeth, and turns a pinion of 6 leaves; on whose axis is the crown or balance-wheel of 15 teeth, which makes 30 beats in each revolution.

The crown-wheel goes 480 times round in an hour, and 30 times 480 make 14400, the number of beats in an hour. But one hour contains 3600 seconds; and 14400 divided by 3600 quotes 4, the required number of beats in a second.

The fusee must have 7$\frac{1}{2}$ turns, to let the chain go so many times round it. Then, as 1 turn is to 4 hours, so is 7$\frac{1}{2}$ turns to 30 hours, the time the watch would go after it is wound up.

See further the articles MOVEMENT, TURN, &c. And for the history and particular construction of *Watches*, properly so called, see the article WATCH.

CLODIA LEX, *de Cypro*, was enacted by the tribune Clodius, in the year of Rome 607, to reduce Cyprus into a Roman province, and expose Ptolemy king of Egypt to sale in his regal ornaments. It empowered Cato to go with the prætorian power and see the auction of the king's goods, and commissioned him to return the money to Rome. Another, *de Magistratibus*, 695, by Clodius the tribune. It forbade the censors to put a stigma or mark of infamy upon any person who had not been actually accused and condemned by both the censors. Another, *de Religione*, by the same, 696, to deprive the priest of Cybele, a native of Pessinuns, of his office, and confer the priesthood upon Brotigonus, a Gallogrecian. Another, *de Provinciis*, 695, which nominated the provinces of Syria, Babylon, and Persia, to the consul Gabinius, and Achaia, Thessaly, Macedon, and Greece, to his colleague Piso, with proconsular power. It empowered them to defray the expences of their march from the public treasury. Another, 695, which required the same distribution of corn among the people gratis, as had been given them before at six ases and a triens the bushel. Another, 695, by the same, *de Judiciis*. It called to an account such as had executed a Roman citizen without a judgment of the people and all the formalities of a trial. Another, by the same, to pay no attention to the appearances of the heavens while any affair was before

fore the people. Another, to make the power of the tribunes free in making and proposing laws. Another, to re-establish the companies of artists which had been instituted by Numa, but since his time abolished.

CLODIUS, Publius, a Roman descended of an illustrious family. He made himself famous for his licentiousness, avarice, and ambition. He committed incest with his three sisters, and introduced himself in women's clothes into the house of Julius Cæsar, whilst Pompeia, Cæsar's wife, of whom he was enamoured, was celebrating the mysteries of Ceres, where no man was permitted to appear. He was accused for this violation of human and divine laws; but he made himself tribune, and by that means screened himself from justice. He descended from a patrician into a plebeian family to become a tribune. He was such an enemy to Cato, that he made him go with prætorian power, in an expedition against Ptolemy king of Cyprus, that by the difficulty of the campaign he might ruin his reputation, and destroy his interest at Rome during his absence. Cato, however, by his uncommon success, frustrated the designs of Clodius. He was also an inveterate enemy to Cicero, and by his influence he banished him from Rome, partly on pretence that he had punished with death and without trial the adherents of Catiline. He wreaked his vengeance upon Cicero's house, which he burnt, and set all his goods to sale; which, however, to his great mortification, no one offered to buy. In spite of Clodius, Cicero was recalled, and all his goods restored to him. Clodius was some time after murdered by Milo, whose defence Cicero took upon himself.

CLOGHER, an episcopal town of Ireland, in the county of Tyrone, and province of Ulster. It sent two members to the Irish parliament. In a very early age an abbey of regular canons, dedicated to the Virgin Mary, was founded here. St Patrick is said to have presided over the church of Clogher; and having appointed St Kertenn to be his successor, he resigned this government, and went to Armagh, where he founded his celebrated abbey. On the 20th of April 1396, a dreadful fire burnt to the ground the church, the two chapels, the abbey, the court of the bishops, and thirty-two other buildings, with all the sacerdotal vestments, utensils, &c. belonging to the bishop's chapter and church. In the year 1610, on the 24th of July whilst George Montgomery was bishop of Clogher, King James annexed this abbey and its revenues to that see. The see (valued in the king's books at 350l. *per annum* by extent returned 15th James I.) is reputed to be worth 4000l. annually. W. Long. 6. 50. N. Lat. 54. 30.

CLOISTER (*Claustrum*), a habitation surrounded with walls, and inhabited by canons or religious, &c. In a more general sense, cloister is used for a monastery of religious of either sex. In a more restrained sense, cloister is used for the principal part of a regular monastery, consisting of a square built around; ordinarily between the church, the chapter-house, and the refectory; and over which is the dormitory. The cloisters served for several purposes in the ancient monasteries. Petrus Blesensis observes that it was here the monks held their lectures: the lecture of morality at the north side, next the church; the school on the west, and the chapter on the east; spiritual meditation, &c. being reserved for the church. Lanfranc observes, that the proper use of the cloister was for the monks to meet in, and converse together, at certain hours of the day.

The form of the cloister was square; and it had its name *claustrum*, from *claudo*, "I shut or close;" as being inclosed on its four sides with buildings. Hence in architecture, a building is still said to be in form of a cloister, when there are buildings on each of the four sides of the court.

CLONMELL, the assize town of the county of Tipperary in Ireland, is situated on the river Suir, hath a barrack for two troops of horse, and is governed by a mayor, recorder, bailiffs, and town-clerk. The river is navigable from this town to Carrick and Waterford; and there is some trade carried on here in the woollen branch, particularly by the Quakers, who are very numerous in this neighbourhood. Near this place is a spring of Spa water, that issues from the side of a rising ground, and is overlooked by a pretty steep hill, on that side of the river Suir, which is in the county of Waterford. The cures performed by drinking this water in the scurvy, and other chronic ditempers, drew thither, some years ago, a great resort of people; but fashion, which reigns with an absolute authority, has brought other waters of late into higher credit. It was in this town that the celebrated and reverend Laurence Sterne was born, on the 24th of November 1713. The town consists of four cross streets, and has a spacious bridge of 20 arches over the river Suir; the market-house is strong and well built, and there is a charter-school here for forty children, to which the late John Dawson, Esq. and Sir Charles Moore, Bart. were considerable benefactors. A Dominican friary was founded at Clonmell, in 1269, and dedicated to St Dominick. In the same year Otho de Grandison erected one of the most magnificent in Ireland. In it was kept an image of St Francis respecting the miracles wrought by which, many marvellous stories are circulated. This town is very ancient, being built before the invasion of the Danes: it was formerly defended by a square wall. Oliver Cromwell, who found more resistance from this place than any other of his conquests in the kingdom, demolished the castles and fortifications, of which now only the ruins remain. The town sends one member to the imperial parliament. W. Long. 7. 42. N. Lat. 52. 15.

CLOSE, in *Heraldry*. When any bird is drawn in a coat of arms with its wings close down about it, (i. e. not displayed), and in a standing posture, they blazon it by this word *close*; but if it be flying, they call it *volant*. See Volant.

Close, in *Music*. See Cadence.

Close-hauled, in *Navigation*, the general arrangement or trim of a ship's sails when she endeavours to make a progress in the nearest direction possible towards that point of the compass from which the wind blows. In this manner of sailing, the keel commonly makes an angle of six points with the line of the wind; but sloops and some other small vessels are said to sail almost a point nearer. All vessels, however, are supposed to make nearly a point of leeway when close-hauled, even when they have the advantage of a good sailing

Close-hauled ‖ Cloth.

sailing breeze and smooth water. The angle of lee-way, however, increases in proportion to the increase of the wind and sea. In this disposition of the sails, they are all extended sidewise on the ship, so that the wind as it crosses the ship obliquely toward the stern from forwards, may fill their cavities. But as the current of wind also enters the sails in an oblique direction, the effort of it to make the ship advance is considerably diminished: she will therefore make the least progress when sailing in this manner. The ship is said to be close-hauled, because at this time her *tacks*, or lower corners of the principal sails, are drawn close down to her side to windward, the sheets hauled close-aft, and all the bow-lines drawn to their greatest extension to keep the sails steady.

Close-Quarters, certain strong barriers of wood, stretching across a merchant-ship in several places. They are used as places of retreat when a ship is boarded by her adversary, and are therefore fitted with several small loop-holes through which to fire the small arms, and thereby annoy the enemy, and defend themselves. They are likewise furnished with several caisons called *powder-chests*, which are fixed upon the deck, and filled with powder, old sails, &c. and may be fired at any time from the close-quarters upon the boarders.

Falconer's Dict. of the Marine. We have known an English merchant-ship of 16 guns, and properly fitted with close-quarters, defeat the united efforts of three French privateers who boarded her in the last war, after having engaged at some distance nearly a day and a half, with very few intervals of rest. Two of the cruisers were equipped with twelve guns each, and the other with eight. The French sailors were, after boarding, so much exposed to continued fire of musquetry and cohorns charged with granadoes, that a dreadful scene of carnage ensued, in which the decks were soon covered with the dead bodies of the enemy, several of which the boarders, in their hurry to escape, had left behind.

CLOT-BIRD: a species of FRINGILLA. See ORNITHOLOGY *Index*.

CLOTH, in commerce, a manufacture made of wool, wove in the loom.

Cloths are of divers qualities, fine or coarse. The goodness of cloth, according to some, consists in the following particulars: 1. That the wool be of a good quality, and well dressed. 2. It must be equally spun, carefully observing that the thread of the warp be finer and better twisted than that of the woof. 3. The cloth must be well wrought, and beaten on the loom, so as to be everywhere equally compact. 4. The wool must not be finer at one end of the piece than in the rest. 5. The lists must be sufficiently strong, of the same length with the stuff, and must consist of good wool, hair, or ostrich-feathers; or, what is still better, of Danish dog's hair. 6. The cloth must be free from knots and other imperfections. 7. It must be well scoured with fullers earth, well fulled with the best white soap, and afterwards washed in clear water. 8. The hair or nap must be well drawn out with the teazel, without being too much opened. 9. It must be shorn close without making it thread-bare. 10. It must be well-dried. 11. It must not be tenter-stretched, to force it to its just dimensions. 12. It must be pressed cold, not hot-pressed, the latter being very injurious to woollen cloth.

Manufacturing of white Cloths which are intended for dyeing. The best wools for the manufacturing of cloths are those of England and Spain, especially those of Lincolnshire and Segovia. To use those wools to the best advantage, they must be scoured, by putting them into a liquor somewhat more than luke-warm, composed of three parts of fair water and one of urine. After the wool has continued long enough in the liquor to soak, and dissolve the grease, it is drained and well washed in running water. When it feels dry, and has no smell but the natural one of the sheep, it is said to be duly scoured.

After this, it is hung to dry in the shade; the heat of the sun making it harsh and inflexible: when dry, it is beat with rods upon hurdles of wood, or on cords, to cleanse it from dust and the grosser filth; the more it is thus beat and cleansed, the softer it becomes, and the better for spinning. After beating, it must be well picked, to free it from the rest of the filth that had escaped the rods.

It is now in a proper condition to be oiled, and carded on large iron cards placed slopewise. Olive oil is esteemed the best for this purpose; one-fifth of which should be used for the wool intended for the woof, and a ninth for that designed for the warp. After the wool has been well oiled, it is given to the spinners, who first card it on the knee, with small fine cards, and then spin it on the wheel, observing to make the thread of the warp smaller by one-third than that of the woof, and much compacter twisted.

The thread thus spun, is reeled, and made into skeins. That designed for the woof is wound on little tubes, pieces of paper, or rushes, so disposed as that they may be easily put in the eye of the shuttle. That for the warp is wound on a kind of large wooden bobbins, to dispose of it for warping. When warped, it is stiffened with size; the best of which is that made of shreds of parchment; and when dry, is given to the weavers, who mount it on the loom.

The warp thus mounted, the weavers, who are two to each loom, one on each side, tread alternately on the treddle, first on the right step, and then on the left, which raises and lowers the threads of the warp equally; between which they throw transversely the shuttle from the one to the other; and every time that the shuttle is thus thrown, and a thread of the woof inserted within the warp, they strike it conjunctly with the same frame, wherein is fastened the comb or reed, between whose teeth the threads of the warp are passed, repeating the stroke as often as is necessary.

The weavers having continued their work till the whole warp is filled with the woof, the cloth is finished; it is then taken off the loom, by unrolling it from the beam whereon it had been rolled in proportion as it was wove; and now given to be cleansed of the knots, ends of threads, straws, and other filth, which is done with iron nippers.

In this condition it is carried to the fullery, to be scoured with urine, or a kind of potters clay, well steeped in water, put along with the cloth in the trough wherein it is fulled. The cloth being again cleared

Cloud.

prodigious and inconceivable quantities, and many very terrible and destructive phenomena have been occasioned by clouds very highly electrified. The most extraordinary instance of this kind perhaps on record happened in the island of Java, in the East Indies, in August 1772. On the 11th of that month, at midnight, a bright cloud was observed covering a mountain in the district called *Chcribon*, at the same time several reports were heard like those of a gun. The people who dwelt upon the upper parts of the mountain not being able to fly fast enough, a great part of the cloud, almost three leagues in circumference, detached itself under them, and was seen at a distance rising and falling like the waves of the sea, and emitting globes of fire so luminous, that the night became as clear as day. The effects of it were astonishing; every thing was destroyed for seven leagues round; the houses were demolished; plantations were buried in the earth; and 2140 people lost their lives, besides 1500 head of cattle, and a vast number of horses, goats, &c.

5 Terrible destruction by an electrified cloud in Java.

6 By another in the island of Malta.

Another instance of a very destructive cloud, the electric quality of which will at present scarcely be doubted, is related by Mr Brydone, in his Tour through Malta. It appeared on the 29th of October 1757. About three quarters of an hour after midnight, there was seen to the south-west of the city of Melita, a great black cloud, which, as it approached, changed its colour, till at last it became like a flame of fire mixed with black smoke. A dreadful noise was heard on its approach, which alarmed the whole city. It passed over the port, and came first on an English ship, which in an instant was torn in pieces, and nothing left but the hulk; part of the masts, sails, and cordage, were carried to a considerable distance along with the cloud. The small boats and felloques that fell in its way were all broken to pieces and sunk. The noise increased, and became more frightful. A sentinel, terrified at its approach, ran into his box; but both he and it were lifted up and carried into the sea, where he perished. It then traversed a considerable part of the city, and laid in ruins almost every thing that stood in its way. Several houses were laid level with the ground, and it did not leave one steeple in its passage. The bells of some of them, together with the spires, were carried to a considerable distance; the roofs of the churches demolished, and beat down, &c. It went off at the north-east point of the city, and demolishing the light-house, is said to have mounted up into the air with a frightful noise; and passed over the sea to Sicily, where it tore up some trees, and did other damage; but nothing considerable, as its fury had been mostly spent at Malta. The number of killed and wounded amounted to near 200; and the loss of shipping, &c. was very considerable.

The effects of thunder-storms, and the vast quantity of electricity collected in the clouds which produce these storms, are so well known, that it is superfluous to mention them. It appears, however, that even the clouds are not so highly electrified as to produce their fatal effects on those who are immersed in them. It is only the discharge of part of their electricity upon such bodies as are either not electrified at all, or not so highly electrified as the cloud, that does all the mischief. We have, however, only the following instance on record, of any person being immersed in the body of a thunder-cloud. Professor Saussure and young Mr Jalabert, when travelling over one of the high Alps, were caught among clouds of this kind; and, to their astonishment, found their bodies so full of electrical fire, that spontaneous flashes darted from their fingers with a crackling noise, and the same kind of sensation as when strongly electrified by art.

7 Instance of two people involved in a thunder-cloud.

8 Height of the clouds.

The height of clouds in general is not great; the summits of very high mountains being commonly quite free from them, as Mr Brydone experienced in his journey up Mount Ætna; but those which are most highly electrified descend lowest, their height being often not above seven or eight hundred yards above the ground; nay, sometimes thunder-clouds appear actually to touch the ground with one of their edges *: but the generality of clouds are suspended at the height of a mile, or little more, above the earth. Some, however, have imagined them to rise to a most incredible and extravagant height. Maignan of Thoulouse, in his Treatise of Perspective, p. 93, gives an account of an exceeding bright little cloud that appeared at midnight in the month of August, which spread itself almost as far as the zenith. He says that the same thing was also observed at Rome; and from thence concludes that the cloud was a collection of vapours raised beyond the projection of the earth's shadow, and of consequence illuminated by means of the sea. This, however, can by no means be credited; and it is much more probable that this cloud owed its splendor to electricity, than to the reflection of the solar beams.

* See *Thunder*.

9 Their various colours accounted for.

In the evenings after sunset, and mornings before sunrise, we often observe the clouds tinged with beautiful colours. They are mostly red; sometimes orange, yellow, or purple; more rarely bluish; and seldom or never green. The reason of this variety of colours, according to Sir Isaac Newton, is the different size of the globules into which the vapours are condensed. This is controverted by Mr Melville, who thinks that the clouds reflect the sun's light precisely as it is transmitted to them through the atmosphere. This reflects the most refrangible rays in the greatest quantity; and therefore ought to transmit the least refrangible ones, red, orange, and yellow to the clouds, which accordingly appear most usually of those colours. In this opinion he was greatly confirmed by observing, when he was in Switzerland, that the snowy summits of the Alps turned more and more reddish after sunset, in the same manner as the clouds, and he imagines that the semitransparency of the clouds; and the obliquity of their situation, tend to make the colours in them much more rich and copious than those on the tops of snowy mountains.

10 Of the motions of clouds.

The motions of the clouds, though sometimes directed by the wind, are not always so, especially when thunder is about to ensue. In this case they seem to move very slowly, and often to be absolutely stationary for some time. The reason of this most probably is, that they are impelled by two opposite streams of air nearly of equal strength; by which means their velocity is greatly retarded. In such cases both the aerial currents seem to ascend to a very considerable height; for Mess. Charles and Roberts, when endeavouring to avoid a thunder-cloud in one of their aerial voyages, could ed on that part of the axle-tree of a gun-carriage which comes through the nave, and through which the linspin goes.

CLOYNE, a town of Ireland, in the county of Cork and province of Munster. W. Long. 8. 5. N. Lat. 51. 52. It is but a small place, though an episcopal residence. A church was built, and a bishopric erected here, by St Colman, who died on the 4th of November 604; and in 707 an abbey was also founded here. In 1430, the bishopric was united to that of Cork; and the union continued till the 11th of November 1638, when Dr George Synge was consecrated bishop of Cloyne; since which time this see has been governed by its own prelates, one of whom was the celebrated Berkeley. This see is not taxed in the king's books; but is now reputed to be worth 2500l. a-year. The chapter of Cloyne is composed of a dean, chapter, chancellor, treasurer, an archdeacon, and fourteen prebendaries. The diocese is divided into four rural deaneries, and the collegiate church of St Mary of Youghal is united to the bishopric. The cathedral is a decent Gothic building. The nave is about 120 feet long; having lateral aisles, besides the cross aisles, divided by Gothic arches, five on each side. In the choir there is an excellent organ. The bishop's palace, which was rebuilt at the beginning of the present century, is large and convenient. To the north-west of Cloyne is a reputed holy well, dedicated to St Colman, which is much frequented on the 24th of November, being the patron day.

CLUE OF A SAIL, the lower corner; and hence

Clue-Garnets are a sort of tackles fastened to the clues, or lower corners of the mainsail or foresail to truss them up to the yard as occasion requires, which is usually termed *clueing up the sails*.

Clue-Lines are for the same purpose as clue-garnets; only that the latter are confined to the courses, whereas the former are common to all the square sails. See these ropes as represented in the article SHIP.

CLUNIA, in *Ancient Geography*, a principal town of the Hither Spain, a Roman colony, with a conventus juridicus, on the Durius, to the west of Numantia. Now *Corunna del Conde*.

CLUNIUM, in *Ancient Geography*, a town of Corsica, near Bastia. Now *St Catharine*.

CLUNY, or CLUGNY, a town in Burgundy, with a celebrated abbey of Benedictine monks, who were dispersed at the commencement of the French revolution.

The town contains about 4200 inhabitants, and is situated on the river Grône. The abbey was founded by William duke of Berry and Aquitain; or, as others say, by the abbot Bernon, supported by that duke, in the year 910.

This abbey was anciently so very spacious and magnificent, that in 1245, after the holding of the first council of Lyons, Pope Innocent IV. went to Cluny, accompanied with the two patriarchs of Antioch and Constantinople, 12 cardinals, 3 archbishops, 15 bishops, and a great number of abbots; who were all entertained, without one of the monks being put out of their place; though S. Louis Q. Blanche his mother, the duke of Artois his brother, and his sister, the emperor of Constantinople, the sons of the kings of Arragon and Castile, the duke of Burgundy, six counts, and a great number of lords, with all their retinues, were there at the same time.

Cluny, at its first erection, was put under the immediate protection of the apostolic see, with express prohibition to all secular and ecclesiastic powers, to disturb the monks in the possession of their effects, or the election of their abbot. By this they pretended to be exempted from the jurisdiction of bishops; which at length gave the hint to other abbeys to insist on the same.

Cluny was the head of a very numerous and extensive congregation: in effect, it was the first congregation of divers monasteries united under one chief, so as only to constitute one body, or, as they call it, one order, that ever arose.

This order of monks was brought into England by William, earl of Warren, son-in-law to William the Conqueror, who built a house for them at Lewes in Sussex about the year 1077. There were 27 priories and cells of this order in England, which were governed by foreigners, afterwards made denizens.

CLUPEA, or HERRING, in *Ichthyology*, a genus belonging to the order of abdominales. The upper jaw is furnished with a serrated mystache; the branchiostege membrane has eight rays; a scaly serrated line runs along the belly from the head to the tail; and the belly-fins have frequently nine rays. There are 11 species, viz.

1. The *harengus*, or common herring, has no spots, and the under jaw is longer than the upper one. A herring dies immediately after it is taken out of the water; whence arises the proverb, *As dead as a herring*. The meat is everywhere in great esteem, being fat, soft, and delicate; especially if it is dressed as soon as caught, for then it is incomparably better than on the next day.

The herring was unknown to the ancients. Notwithstanding the words χαλκις and μαινις are by translators rendered *halec*, the characters given to those fish are common to such numbers of different species as renders it impossible to say which they intended.

1 Herrings where found.

Herrings are found from the highest northern latitudes yet known, as low as the northern coasts of France; and except one instance, brought by Dod, of a few being once taken in the bay of Tangier, none are ever found more southerly. They are met with in vast shoals on the coast of America, as low as Carolina. In Chesapeak-bay is an annual inundation of those fish, which cover the shore in such quantities as to become a nuisance. We find them again in the seas of Kamtschatka, and probably they reach Japan; for Kempfer mentions, in his account of the fish of that country, some that are congenerous. The great winter rendezvous of the herring is within the arctic circle: there they continue for many months in order to recruit themselves after the fatigue of spawning; the seas within that space swarming with insect food in a far greater degree than those of our warmer latitudes.

2 Immense shoals of them.

This mighty army begins to put itself in motion in the spring; we distinguish this vast body by that name; for the word *herring* comes from the German *heer*, "an army," to express their numbers. They begin to appear off the Shetland isles in April and May; these are only the forerunners of the grand shoal which comes

Clupea.

comes in June; and their appearance is marked by certain signs, by the number of birds, such as gannets and others, which follow to prey on them; but when the main body approaches, its breadth and depth is such as to alter the appearance of the very ocean. It is divided into distinct columns of five or six miles in length, and three or four in breadth, and they drive the water before them with a kind of rippling: sometimes they sink for the space of ten or fifteen minutes, and then rise again to the surface; and in fine weather reflect a variety of splendid colours like a field of the most precious gems; in which, or rather in a much more valuable, light should this stupendous gift of Providence be considered by the inhabitants of the British isles.

The first check this army meets in its march southward is from the Shetland isles, which divide it into two parts; one wing takes to the east, the other to the western shores of Great Britain, and fill every bay and creek with their numbers; others pass on towards Yarmouth, the great and ancient mart of herrings: they then pass through the British Channel, and after that, in a manner disappear. Those which take towards the west, after offering themselves to the Hebrides, where the great stationary fishery is, proceed to the north of Ireland, where they meet with a second interruption, and are obliged to make a second division: the one takes to the western side, and is scarce perceived, being soon lost in the immensity of the Atlantic; but the other, that passes into the Irish sea, rejoices and feeds the inhabitants of most of the coasts that border on it. These brigades, as we may call them, which are thus separated from the greater columns, are often capricious in their motions, and do not show an invariable attachment to their haunts.

3 Wonderful instinct of these creatures.

Were we inclined to consider this partial migration in a moral light, we might reflect with veneration and awe on the mighty power which originally impressed on this most useful body of his creatures the instinct that directs and points out the course, that blesses and enriches these islands, which causes them at certain and invariable times to quit the vast polar deeps, and offer themselves to our expecting fleets. That benevolent Being has never been known, from the earliest account of time, once to withdraw this blessing from the whole; though he often thinks proper to deny it to particulars, yet this partial failure (for which we see no natural reason) should fill us with the most exalted and grateful sense of his providence for impressing such an invariable and general instinct on these fish towards a southward migration when the whole is to be benefited, and to withdraw it when only a minute part is to suffer.

This instinct was given them, that they might remove for the sake of depositing their spawn in warmer seas, that would mature and vivify it more assuredly than those of the frozen zone. It is not from defect of food that they set themselves in motion; for they come to us full of fat, and on their return are almost universally observed to be lean and miserable. What their food is near the pole we are not yet informed; but in our seas they feed much on the *oniscus marinus*, a crustaceous insect, and sometimes on their own fry.

They are full of roe in the end of June, and continue in perfection till the beginning of winter, when they deposit their spawn. The young herrings begin to approach the shores in July and August, and are then from half an inch to two inches long; these in Yorkshire are called *herring sile*. Though we have no particular authority for it, yet as very few young herrings are found in our seas during winter, it seems most certain that they must return to their parental haunts beneath the ice, to repair the vast destruction of their race during summer by men, fowl, and fish. Some of the old herrings continue on our coast the whole year: the Scarborough fishermen never put down their nets but they catch a few; but the numbers that remain are not worth comparison with those that return. See *Herring*-FISHERY.

4 Young ones probably retire with their parents.

The Dutch are most extravagantly fond of this fish when it is pickled. A premium is given to the first buss that arrives in Holland with a lading of this their ambrosia, and a vast price given for each keg. There is as much joy among the inhabitants on its arrival, as the Egyptians show on the first overflowing of the Nile. Flanders had the honour of inventing the art of pickling herrings. One William Beauklen of Biverlet, near Sluys, hit on this useful expedient; from him was derived the name *pickle*, which we borrow from the Dutch and German. Beauklen died in 1397. The emperor Charles V. held his memory in such veneration for the service he did to mankind, as to do his tomb the honour of a visit. It is very singular that most nations give the name of their favourite dish to the facetious attendant on every mountebank. Thus the Dutch call him *pickle herring*; the Italians *macaroni*; the French, *jean pottage*; the Germans *hans wurst*, that is, *jack sausage*; and the English dignify him with the name of *jack pudding*.

5 Pickling of herrings when invented.

6 Sprattus, where found.

2. The *sprattus* has 13 rays in the back fin. It is a native of the European seas, and has a great resemblance to the herring, only it is of a less size. They come into the river Thames below bridge in the beginning of November, and leave it in March; and are, during that season, a great relief to the poor of the capital. At Gravesend and at Yarmouth they are cured like red-herrings; they are sometimes pickled, and are little inferior in flavour to the anchovy, but the bones will not dissolve like those of the latter.

7 Alosa, or shad, where found.

3. The *alosa*, or *shad*, has a forked snout, and black spots on the sides. According to Belonius and Hasselquist, this is a fish of passage in the Nile. The last says, it is found in the Mediterranean near Smyrna, and on the coast of Egypt near Rosetta; and that in the months of December and January it ascends the Nile as high as Cairo, where the people stuff it with pot marjoram; and when dressed in that manner, it will very nearly intoxicate the eater. In Great Britain the Severn affords this fish in higher perfection than any other river. It makes its first appearance there in May, but in very warm seasons in April; for its arrival sooner or later depends much on the temper of the air. It continues in the river about two months, and then is succeeded by a variety which we shall have occasion to mention hereafter.

8 The finest inhabit the Severn.

The Severn shad is esteemed a very delicate fish about the time of its first appearance, especially in that part of the river that flows by Gloucester, where they are taken in nets, and usually sell dearer than salmon: some are sent to London, where the fishmongers distinguish

stinguish them from those of the Thames by the French name *alose*. Whether they spawn in this river and the Wye is not determined, for their fry has not yet been discovered. The old fish come from the sea into the river in full roe. In the months of July and August, multitudes of bleak frequent the river near Gloucester; some of them are as big as a small herring, and these the fishermen erroneonsly suppose to be the fry of the shad. Numbers of these are taken near Gloucester, in those months only, but none of the emaciated shad are ever caught in their return.

The Thames shad does not frequent that river till the latter end of May or beginning of June, and is esteemed a very coarse and insipid sort of fish. The Severn shad is sometimes caught in the Thames, though rarely, and called *allis* (no doubt *alose*, the French name) by the fishermen in that river. About the same time, and rather earlier, the variety called, near Gloucester, the *twaite*, makes its appearance, is taken in great numbers in the Severn, and is held in as great disrepute as the shad of the Thames. The differences between each variety are as follow: the true shad weighs sometimes eight pounds; but their general size is from four to five. The *twaite*, on the contrary, weighs from half a pound to two pounds, which it never exceeds. The *twaite* differs from a shad only in having one or more round black spots on the sides; if only one, it is always near the gill; but commonly there are three or four, placed one under the other.

9 Twaite described.

10 Anchovy described.

4. The *encrasicolus*, or *anchovy*, has its upper jaw longer than the under one, and is about three inches long. They are taken in vast quantities in the Mediterranean, and are brought over here pickled. The great fishery is at Georgia, a small isle west of Leghorn. See *Anchovy-Fishery*.

The other species are, 5. The atherinoides has a shining line on each side, and small belly-fins. It is a native of Surinam. 6. The thrissa has 28 rays in the fin at the anus. It is found in the Indian ocean. 7. The sima has yellow fins, those of the belly being very small. The mouth is flat; the upper jaw is very short; the body is of a shining silver colour, and the fins are yellow. It is a native of Asia. 8. The sternicla has no belly-fins, and the body is broad. It is a native of Surinam. 9. The mystus is shaped like a sword, and the fins at the anus are united. It is found in the Indian ocean. 10. The tropica has a wedge-like tail, and a white, broad, compressed body. It is found at Ascension island. 11. The sinensis is very like the common herring, but broader. It has no teeth, and is a native of China.

CLUSIA, the Balsam-tree. See Botany *Index*.

CLUSINA palus, in *Ancient Geography*, a lake of Tuscany, extending north-west between Clusium and Arretium, and communicating with the Arnus and Clanis. Now *Chiana Palude*.

CLUSINI fontes, (Horace), baths in Tuscany, in the territory of Clusium, between this last to the north, and Acula to the south, at the distance of eight miles from each. Now *Bagni di S. Casciana*.

CLUSIUM, anciently called *Camars*, (Virgil, Livy); a town of Tuscany, at the south end of the Palus Clusina, where it forms the Clanis; the royal residence of Porsenna, three days journey from Rome to the north, (Polybius). *Clusinus* the epithet. *Clusini Veteres* the people. Now *Chiusi*. E. Long. 13°, Lat. 43°.—*Clusium Novum*, was a town of Tuscany, near the springs of the Tiber, in the territory of Arretium; where lies the Ager Clusinus: now called *Casentino*. *Clusini Novi*, the people, (Pliny).

CLUTIA. See Botany *Index*.

CLUVIER, Philip, in Latin *Cluverius*, a celebrated geographer, born at Dantzic in 1580. He travelled into Poland, Germany, and the Netherlands, in order to study law; but, being at Leyden, Joseph Scaliger persuaded him to give way to his genius for geography. Cluvier followed his advice, and for this purpose visited the greatest part of the European states. He was well versed in many languages; and wherever he went, obtained illustrious friends and protectors. At his return to Leyden, he taught there with great applause; and died in 1623, aged 43. He wrote, 1. *De tribus Rheni alveis*. 2. *Germania antiqua*. 3. *Sicilia antiqua*. 4. *Italia antiqua*. 5. *Introductio in universam Geographiam*. All justly esteemed.

CLYDE, a large river of Scotland, which, with the rivers Tweed and Annan, has its source at the south corner of Lanarkshire, and joins the sea at Greenock, where it forms the Frith of Clyde. It is navigable for small vessels up to Glasgow. The canal, which joins the Forth, falls into it ten miles below that city. The cataract called the *Falls of the Clyde*, opposite to Lanark, is a great natural curiosity, and the first scene of the kind in Great Britain. This tremendous sheet of water for about a mile falls from rock to rock. At Stone-byres, the first fall is about 60 feet; the next at Cora-Lynn, is over solid rock, and is still higher. At both these places this great body of water exhibits a grander and more interesting spectacle than imagination can possibly conceive.

At Cora-Lynn, the falls are seen to most advantage from a pavilion placed in a lofty situation, and which is furnished with mirrors which produce a fine effect. The cataract is full in view, seen over the tops of trees and bushes, precipitating itself, for an amazing way, from rock to rock, with short interruptions, forming a rude slope of furious foam. The sides are bounded by vast rocks, clothed on their tops with trees: on the summit and very verge of one is a ruined tower, and in front a wood overtopt by a verdant hill. A path conducts the traveller down to the beginning of the fall, into which projects a high rock, in floods insulated by the water; and from the top is a tremendous view of the furious stream. In the cliffs of this savage retreat the brave Wallace is said to have concealed himself, meditating revenge for his injured country.

On regaining the top, the walk is formed near the verge of the rocks, which on both sides are perfectly mural and equidistant, except where they overhang: the river is pent up between them at a distance far beneath; not running, but rather sliding along a stony bottom sloping, the whole way. The summits of the rock are wooded; the sides smooth and naked; the strata narrow and regular, forming a stupendous natural masonry. After a walk of above half a mile on the edge of this great chasm, on a sudden appears the great and bold fall of Boniton, in a foaming sheet, far projecting into a hollow, in which the water shows a violent *rial coaches*. The harness was ornamented with fringes of red silk on days of festivity. The imperial coaches were only distinguished by having leather traces, while the ladies in the emperor's suite were contented with traces made of ropes. Fifty gilt coaches having six horses each, were to be seen in 1681 at the court of Ernest Augustus of Hanover. The first time that plenipotentiaries appeared in coaches, was at the imperial commission in 1613, held at Erfurth.

We meet with ample proof in the history of France, that the monarchs rode on horses, the servants on mules, and ladies of distinction sometimes on asses, at Paris, in the 14th, 15th, and even 16th centuries. Yet carriages of some kind seem to have been used in France at an early period, since there is still preserved a statute of Philip the Fair, issued in 1294, for the suppression of luxury, and in which the wives of citizens were prohibited the use of carriages.

The oldest coaches used by the ladies of England were denominated *whirlicotes*, a name now sunk in oblivion. About the end of the 14th century, when Richard II. was forced to fly before his rebellious subjects, he and all his attendants travelled on horseback, his mother alone riding in a coach, as she was indisposed. This became afterwards unfashionable, the daughter of Charles IV. having showed the ladies of England how conveniently she could ride on a side-saddle.

According to Stow, coaches first came to be used in England about the middle of the 16th century, having been introduced from Germany by the earl of Arundel. The English plenipotentiary came to Scotland in a coach in the year 1598, and they were generally used about the year 1605.

Authors observe, as a thing very singular, that there were at first no more than three coaches in Paris; the first that of the queen; the second that of Diana mistress of Henry II.; and the third belonging to Jean de Lava de Bois Dauphin; whose enormous bulk disabled him from travelling on horseback. One may hence judge how much vanity, luxury, and idleness, have grown upon our hands in latter days; there being now computed in that same city no less than 15,000 coaches.

Coaches have had the fate of all other inventions, to be brought by degrees to their perfection; at present they seem to want nothing, either with regard to ease or magnificence. Louis XIV. of France made several sumptuary laws for restraining the excessive richness of coaches, prohibiting the use of gold, silver, &c. therein; but they have had the fate to be neglected.

The following are the duties payable on carriages of this description in Britain (1804).

For one carriage, with four wheels, the annual sum of - - - -	L. 10	0	0
For two - - - -	11	0	0
three - - - -	12	0	0
four - - - -	12	10	0
five - - - -	13	0	0
six - - - - -	13	10	0
seven - - - -	14	0	0
eight - - - - -	14	10	0
nine and upwards - -	15	0	0
And for every additional body successively used on the same carriage or number of wheels, the further sum of -	L. 5	0	0
For carriages with less than four wheels, drawn by one horse - -	5	5	0
For carriages drawn by two or more horses - - -	7	7	0
For every additional body -	2	10	0
For carriages with four wheels let out to hire - - - - -	8	8	0

Every maker of coaches, chaises, chariots, &c. must, from and after the 5th day of July 1785, take out at the excise office in London, or of their agents in the country, a license, to be renewed annually at least ten days before the expiration of the former, for which they must pay 20s. They must also pay 20s. duty for every four-wheeled carriage newly built for sale, and 10s. for every two-wheeled carriage. These duties are also payable to the commissioners of the excise in town, or their agents in the country.

Coach-makers in Scotland are to take out their licenses and pay the duties to the commissioners of excise in Edinburgh, or their agents in the country of that part of Great Britain.

Every coach-maker neglecting to take out a license, and renew the same annually, forfeits 10l.; and neglecting or refusing to settle every six weeks, in the manner particularly directed by the act, is a forfeiture of 20l. See COACH, SUPPLEMENT.

Hackney-COACHES, those exposed to hire, in the streets of London, and some other great cities, at rates fixed by authority.

One thousand hackney-coaches are allowed in London and Westminster: which are to be licensed by commissioners, and to pay a duty to the crown. They are all numbered, having their numbers engraved on tin plates fixed on the coach-doors. Their fares or rates are fixed by act of parliament; and by a late act have been increased in consequence of a new weekly tax.

Stage-COACHES are those appointed for the conveyance of travellers from one city or town to another. The masters of stage coaches are not liable to an action for things lost by their coachmen, who have money given them to carry the goods, unless where such master takes a price for the same.

Persons keeping any coach, berlin, landau, or other carriage with four wheels, or any calash, chaise, chair, or other carriage with two wheels, to be employed as public stage-coaches or carriages, for the purpose of conveying passengers for hire to and from different places, shall pay annually 5s. for a license; and no person so licensed shall by virtue of one license keep more than one carriage, under the penalty of 10l.

Mail-COACHES are stage-coaches of a particular construction to prevent overturns; and for a certain consideration carry his majesty's mails, which are protected by a guard, and subject to the regulations of the post-office. They are punctual as to their time of arrival and departure, are restricted to four inside passengers, and from experience have proved very beneficial to the commerce and correspondence of this country. The late John Palmer, Esq. who had the merit of the invention, and was indefatigable in bringing the establishment to a permanent footing, was greatly pa-

tronized

oily substances and soot, which is a kind of coal raised during inflammation, are as difficultly reduced to ashes as animal coals. These coals contain very little saline matter, and their ashes yield no alkali. The coals which are so difficultly burnt, are also less capable of inflaming with nitre than others more combustible; and some of them even in a great measure resist the action of nitre.

Coal, in *Mineralogy*, a kind of solid inflammable substance, supposed to be of a bituminous nature, and commonly used for fuel. Of this substance there are various species.

1. *Pit-coal* (*Lithanthrax*), is a black, solid, compact, brittle mass, of moderate hardness, lamellated structure, more or less shining, but seldom capable of a good polish; and does not melt when heated. According to Kirwan, it consists of petrol or asphaltum, intimately mixed with a small portion of earth, chiefly argillaceous, seldom calcareous, and frequently mixed with pyrites. A red tincture is extracted from it by spirit of wine, but caustic alkali attacks the bituminous part. From some sorts of it a varnish may be made by means of fat oils. Fixed alkali has never been found in any kind of it, nor sulphur, unless when it happens to be mixed with pyrites.—None of the various kinds are found to be electrics *per se* (A).

The varieties of lithanthrax, enumerated by Cronstedt, are, 1. With a small quantity of argillaceous earth and sulphuric acid. It is of a black colour, and shining texture; it burns, and is mostly consumed in the fire, but leaves, however, a small quantity of ashes. 2. Slaty coal.

2. *Culm coal*, called *kolm*, by the Swedes, has a greater proportion of argillaceous earth and sulphuric acid, with a moderate proportion of petrol. It has the same appearance with the foregoing, though its texture is more dull: it burns with a flame without being consumed, but leaves behind it a slag of the same bulk with the original volume of the coal. The following is Mr Kirwan's description of it, from the memoirs of the Stockholm academy. "Its fracture has a rougher section than the cannel coal; its specific gravity from 1.300 to 1.370. The best kind affords, by distillation, at first fixed air, then an acid liquor, afterwards inflammable air, and a light oil of the nature of petrol; then a volatile alkali; and lastly pitch-oil. The residuum is nearly three quarters of the whole; and being slowly burnt, affords 13 per cent. of ashes, which consist mostly of argillaceous earth; and about three hundredth parts of them are magnetic. It is found in England, and among some aluminous ores in Sweden."

3. *Slate-coal* contains such a quantity of argillaceous earth, that it looks like common slate; however, it burns by itself like a flame. M. Magellan is of opinion that this is the bituminous substance already described. This schistus is of a dark bluish rusty colour; when thrown on the fire it burns with a lively flame, and almost as readily as the oily wood of dry olive-tree, or lignum vitæ; emitting the very disagreeable smell of petrol. Such large quarries of it are found near Purbeck in Dorsetshire, that the poorer part of the inhabitants are thence supplied with fuel. From the appearance of this slaty coal, Cronstedt has been induced to suppose that the earth of all kinds of coal is argillaceous, though it is not so easy to distinguish it after being burnt. The pit-coals, he says, contain more or less of the sulphuric acid; for which reason the smoke arising from them attacks silver in the same manner as sulphur does, let the coals be ever so free from marcasite, which, however, is often imbibed or mixed with them.

4. *Cannel coal* (*Ampelites*), is of a dull black colour; breaks easily in all directions; and, if broken transversely, presents a smooth conchoidal surface. It burns with a light lively flame, but is very apt to fly in pieces in the fire; however, it is said to be entirely deprived of this property by immersion in water for some hours previous to its being used. It contains a considerable quantity of petrol in a less condensed state than other coal. Its specific gravity is about 1.270. This kind of coal being of an uniform hard texture, is easily turned on a lathe, and takes a good polish. Hence it is used for making various toys, which appear almost as well as if made of the finest jet.

5. *Kilkenny coal* has a specific gravity equal to 1.400. It contains the largest quantity of asphaltum; burns with less smoke and flame, and more intensely, though more slowly, than the cannel coal. The quantity of earth it contains does not exceed one-twentieth part of its weight; but this kind of coal is frequently mixed with pyrites. It is found in the county of Kilkenny,

(A) "The varieties of this coal (says M. Magellan) are very numerous, according to the different substances with which it is mixed; but in regard to their economical uses, only two kinds are taken notice of by the British legislature, viz. culm and caking coals. The caking coals, in burning, show an incipient fusion, so that their smallest pieces unite in the fire into one mass; by which means the smallest pieces, and even the mere dust of this kind, are almost equally valuable with the largest pieces. The other sort, called *culm*, does not fuse or unite in the fiercest fire; so that the small coal, being unfit for domestic purposes, can only be used in burning limestone.

"It should be an easy matter for any person to distinguish culm from small caking coal, either by trying to make fire with it in a common grate, without interposing any other fuel between it; when if it kindles, it is a caking coal; if not, it is culm: Or by putting some of these small fragments of coal on an ignited iron shovel; if they melt and run together, they belong to the caking kinds; if not, they are culm. But it seems that coal merchants are now in the custom of calling *culm* the powdery parts of pit-coal, of whatsoever kind they may happen to be. The reason of this is, that there is a difference in the duty payable by culm and by caking coals, There never was any difficulty, however, on the subject; nor would there be any difficulty in collecting the tax, were it not for the insufferable ignorance and love of despotic oppression which generally pervades the underling officers of the revenue."

Coal, Coalery.

Small Coal, a sort of charcoal prepared from the spray and brushwood, stripped off from the branches of coppice wood, sometimes bound in bairns for that purpose, and sometimes charred without binding, in which case it is called "coming together."

1 History of coals.

COALERY, Coaliery, or Colliery; a coal-work, or place where Coals are dug.

It is generally agreed, that our cannel coal * is the lapis ampelites of the Romans, though it seems to have been used by them only for making toys, bracelets, &c. But of that common fuel which we denominate *coals*, the native Romans were entirely ignorant. It is certain that they are not, as some have imagined, the lapis obsidianus of Pliny, about which there have been great disputes †: nor the Gagates or Jet, which others, again, have taken for the *lapis obsidianus*: though the lightness and texture show plainly that it is not either stone or coal. In fact, there are no beds of it in the compass of Italy. The great line of that fuel seems to sweep away round the globe, from north-east to south-west; not ranging at a distance even from the south-easterly parts of our island, as is generally imagined, but actually visiting Brabant and France, and yet avoiding Italy.

* See *Ampelites*.

† L. xxxvi. cap. 26. Augustus placed the statues of four elephants made of it in the temple of Concord.

But the primæval Britons appear to have used it. And in the precincts of Manchester particularly, which are furnished with an inexhaustible abundance of it, they could not have remained unapprised of the agreeable combustible around them. The currents there frequently bring down fragments of coal from the mountains: and in the long and winding course of them through the parish, the Britons would soon mark the shining stones in the channels; and by the aid of accident, or the force of reflection, find out the utility of them. But we can advance still nearer to a certainty. Several pieces of coal were discovered some years ago in the sand under the Roman way to Ribchester, when both were dug up at the construction of a house in Quay-street. The number of pieces, several of them as large as eggs, was not less than 40; and a quantity of slack was dug up with them. These circumstances show the coals to have been lodged upon the spot before the road of the Romans covered it. That ground being in the neighbourhood of *Mancenion* ‡, the Britons had there reposited a quantity of coals, probably for the use of the garrison; and many of the smaller fragments, and some of the slack were buried in the sand upon which they were laid. And that the Britons in general were acquainted with this fuel, is evident from its appellation amongst us at present, which is not Saxon, but British; and subsists among the Irish in their *O gual*, and among the Cornish in their *kolan*, to this day.

Whitaker's History of Manchester.

‡ *i. e.* "the place of tents." An ancient British town, the site of which was the present Castlefield at Manchester.

The extensive beds of fuel, therefore, with which the kingdom of England, and the precincts of Manchester, are so happily stored, were first noticed by the skill, and first opened by the labour of the Britons; and some time before the arrival of the Romans among us. And the nearer quarries in the confines of Bradford, Newton, and Manchester, would naturally attract the notice, and invite the inquiries of the Britons, before any others. The current of the Medlock, which washes the sides of them, would bring down specimens of the riches within, lodge many of them about the Castlefield, and allure the Britons successively to a collection of the one, and a search after the other.

Coalery.

But, even for ages after the discovery, wood continued to compose the general fuel of the nation. In 852, a grant was made of some lands by the abbey of Peterborough, under the reservation of certain boons and payments in kind to the monastery; as, one night's entertainment; 10 vessels of Welsh, and two of common ale; 60 cart-loads of wood, and 12 of pit-coal; where we see the quantity of coal was only one cart-load to five of wood. The latter naturally continued the principal article of our fuel as long as the forests and thickets presented themselves so ready to the hand; and such it continued to a very late period. The first public notice of the former is mentioned by Mr Hume to have been in the time of Henry III. who, in the year 1272, granted a charter to the town of Newcastle, giving the inhabitants a license to dig coals; and the first statute relating to this article was the 9th Henry V. c. 10. ordaining all keels in the port of Newcastle to be measured by commissioners, before carriage of coals, on pain of forfeiture. They were not brought into common use till the reign of Charles I.; and were then sold for about 17s. a chaldron. In some years after the Restoration, there were about 200,000 chaldrons burnt in London; in 1670, about 270,000 chaldrons; at the Revolution upwards of 300,000 chaldrons; and at present, full 600,000 are annually consumed there. There is, besides, an immense consumption in other parts of Britain, and in Ireland. In Scotland, they supply their own consumption, and also export. In Ireland, though they have coal, yet they take annually to the value of 30,000l. from England, and 12,000l. from Scotland.

Campbell's Political Survey.

The most remarkable coalery, or coal-work, that we have ever had in this island, was that wrought at Borrowstounness, under the sea. The veins of coal were found to continue under the bed of the sea in this place, and the colliers had the courage to work the vein near half way over; there being a mote half a mile from the shore, where there was an entry that went down into the coal-pit, under the sea. This was made into a kind of round quay or mote, as they call it, built so as to keep out the sea, which flowed there twelve feet. Here the coals were laid, and a ship of that draught of water could lay her side to the mote, and take in the coal.—This famous coalery belonged to the earl of Kincardine's family. The fresh water which sprung from the bottom and sides of the coal-pit was always drawn out upon the shore by an engine moved by water, that drew it forty fathoms. This coal-pit continued to be wrought many years to the great profit of the owners, and the wonder of all that saw it; but, at last, an unexpected high tide drowned the whole at once: the labourers had not time to escape, but perished in it.

There are several other countries in Europe which possess considerable coal-mines; as France, Liege, Germany, and Sweden. Also on the other side of the Atlantic ocean, there has been coal discovered, and wrought: in Newfoundland, Cape-Breton, Canada, and some of the New England provinces. But in all these countries, the coal is of a quality much inferior to the British, and entirely unfit to be used in many manufactures;

2 Excellence of the British.

Coalery. manufactures; so that they import coal from Britain for various manufactures. For a fuller account of the coal in different countries of the world, see *Williams's Mineral Kingdom*, 2d edition, by James Millar, M. D. Edinburgh, 1810.

3 Importance of the coal-trade. Our inland coal-trade, that is, carrying coals from Newcastle, Sunderland, Blith, and other adjacent places in the north of England, as also from the frith of Edinburgh in Scotland, and other places adjacent, to the city of London, and to the port towns on the coast all the way, as well on this side of Newcastle, north, as up the channel as high as Portsmouth west, is a prodigious article, and employs abundance of shipping and seamen; insomuch that, in a time of urgent necessity, the coalery navigation alone has been able to supply the government with a body of seamen for the royal navy, able to man a considerable fleet at a very short warning, and that without difficulty, when no other branch of trade could do the like. Likewise the Whitehaven coaleries in Cumberland, belonging to Lord Lonsdale, furnish several counties in Ireland with coals, and constantly employ upwards of 2000 seamen; which also is a noble nursery for the navy of this kingdom. And not only do the pit-coal sufficiently supply all the ports, but, by means of those ports and the navigable rivers, all the adjacent counties very far inland.

In short, coals, though not an exclusive, yet may, with propriety, be styled a peculiar blessing to Britain, from their great plenty, their acknowledged excellence, and their being found in such places as are conveniently situated for exportation. Nor is there any danger of the export trade being lessened even by the several duties that have been laid upon them; for the foreign consumpt being founded in necessity with regard to manufactures, and in economy where they are used for convenience (wood and turf being dearer than coals with the duty), we need be in no fear of the markets declining. There is as little room to be alarmed from an apprehension of their being exhausted; as the present works are capable of supplying us for a long series of years, and there are many other mines ready to be opened when these shall fail. Besides, there are known to be coals in many parts of the three kingdoms, which hitherto they have had no encouragement to work.

Besides the value of this commodity as a conveniency of life, as an article of commerce, and as giving rise to a nursery of seamen for the increase of the marine; other important advantages deserve to be noticed. Coals are in many respects, and in a very high degree useful to the landed interest; not only by raising exceedingly the real value, and of course the purchase, of those lands in which they are found, and those through which it is necessary to pass * from the works to the places where they are embarked, but from the general improvements they have occasioned; so that very few counties are now better cultivated than Northumberland, and the same effects they have had in a greater or less degree in other places. Thousands of laborious people are employed in and about the mines; thousands more in conveying them to the ports, and on board the ships; to say nothing of those that draw their subsistence from the carriage of them by land to supply families, &c. There are also great numbers that live in a superior station; as stewards, directors, factors, agents, book-keepers, &c. To these we may add the extraordinary encouragement given to ingenious artists who have invented, and the numerous workmen continually employed about those several curious and costly machines which, for a variety of purposes in this business, are in continual use, and of course in continual wear; we may join to these the multitudes that obtain their living from the many manufactures in which they are employed, and which could not be carried on but by the help and cheapness of coals. Lastly, the produce of coals exported, which amounts to a very considerable sum, besides being profitable to the owners, merchants, and mariners, is so much clear gain to the nation.

* These are emphatically styled *way-leaves*, and are let at as high rents as any landed property in Britain.

It might be expected, that a trade so beneficial to individuals, and to the nation in general, and which has been gradually increasing for several centuries past, would have been advanced by this time to very great perfection, and reduced to a regular system. But, in one very essential respect, it is found to be quite otherwise. The art of working coal-mines in the most profitable manner is indeed highly improved; but the fundamental of the art, that of searching for and discovering coal in any district of country where it has not yet been found, has never, that we know of, been treated in a systematic manner. The reader, therefore, will not be displeased to find this defect supplied in the course of the present article, together with a detail of all the other operations in the business of coaleries.

4 Situation of the strata. The terrestrial matters which compose the solid parts of the earth are disposed in strata, beds, or layers, the under surface of one bearing against or lying upon the upper surface of that below it, which last bears or lies on the next below in the same manner.

These strata consist of very different kinds of matter, such as free-stone, lime-stone, metal-stone or whin-stone, coal, &c. as will be particularly specified in the sequel.

Some of these strata are of considerable thickness, being often found from 100 to 200 feet or upwards, nearly of the same kind of matter from the superior to the inferior surface; and others are found of the least thickness imaginable, one inch or less.

All these strata are divided or parted from each other laterally, either by their even, smooth, polished surfaces, with very thin lamina of soft or dusty matter betwixt them, called *the parting*, which renders them easy to separate; or else only by the surfaces closely conjoined to each other, without any visible matter interposed betwixt them: yet the different substance of each stratum is not in the least intermixed, though sometimes they adhere so strongly together, that it is very difficult to part or disjoin them: in this last case they are said to have a *bad parting*.

Besides this principal division or parting laterally, there are, in some strata, secondary divisions or partings also laterally, separating or approaching towards a separation, of the same stratum, into parts of different thicknesses, nearly parallel to each other, in the same manner as the principal partings divide the different strata from each other: but these secondary ones are not so strong or visible, nor make so effectual a parting, as the principal ones do; and are only met with

with in such strata, as are not of an uniform hardness, texture, or colour, from the upper to the under surface.

There are other divisions or partings, called *backs*, in almost every stratum, which cross the former lateral ones longitudinally, and cut the whole stratum through its two surfaces into long rhomboidal figures. These again are crossed by others called *cutters*, running either in an oblique or perpendicular direction to the last-mentioned backs, and also cut the stratum through its two surfaces. Both these backs and cutters generally extend from the upper or superior stratum down through several of the lower ones; so that these backs and cutters, together with the lateral partings before mentioned, divide every stratum into innumerable cubic, prismatic, and rhomboidal figures, according to the thickness of the stratum, and the position and number of the backs and cutters. They sometimes have a kind of thin partition of dusty or soft matter in them, and sometimes none, like the first-mentioned partings; but the softer kind of strata generally have more backs and cutters than the harder kind, and they do not extend or penetrate through the others.

Plate CXLIX. fig. 1. To explain this a little farther, let A, B, C, D, E, F, G, (fig. 1.) represent the principal partings before mentioned, or the upper and under surfaces of any stratum; then *a*, *b*, *c*, *d*, *e*, *f*, will represent the secondary lateral partings nearly parallel to the principal ones; *g*, *h*, *i*, *k*, *l*, *m*, the longitudinal partings called *backs*; *n*, *o*, *p*, *q*, *r*, *s*, the cross partings called *cutters*, crossing the last-mentioned ones either obliquely or perpendicular.

In all places where the strata lie regular, they are divided and subdivided in the manner above mentioned; and sometimes in this manner extend through a pretty large district of country; though it is often otherwise; for their regularity is frequently interrupted, and the strata broken and disordered, by sundry chasms, breaches, or fissures, which are differently denominated according to their various dimensions, and the matters with which they are filled, viz. dikes, hitches, and troubles, which shall be explained in order.

5 Dikes. *Dikes* are the largest kind of fissures. They seem to be nothing but a crack or breach of the solid strata, occasioned by one part of them being broken away and fallen from the other. They generally run in a straight line for a considerable length, and penetrate from the surface to the greatest depth ever yet tried, in a direction sometimes perpendicular to the horizon, and sometimes obliquely. The same kind of strata are found lying upon each other in the same order, but the whole of them greatly elevated or depressed, on the one side of the dike as on the other. These fissures are sometimes two or three feet wide, and sometimes many fathoms. If the fissure or dike be of any considerable width, it is generally filled with heterogeneous matter, different from that of the solid strata on each side of it. It is sometimes found filled with clay, gravel, or sand; sometimes with a confused mass of different kinds of stone lying edgeways; and at other times with a solid body of free-stone, or even whin-stone. When the fissure is of no great width, as suppose two or three feet only, it is then usually found filled with a confused mixture of the different matters which compose the adjoining strata, consolidated into one mass. If the dike runs or stretches north and south, and the same kind of strata are found on the east side of the dike, in a situation with respect to the horizon 10 or 20 fathoms lower than on the other side, it is then said to be a *dip-dike*, or *downcast-dike* of 10 or 20 fathoms to the eastward; or counting from the east side, it is then said to be a *rise-dike*, or *upcast* of so many fathoms westward. If the strata on one side are not much higher or lower with respect to the horizontal line, than those on the other, but only broken off and removed to a certain distance, it is then said to be a dike of so many fathoms thick, and from the matter contained between the two sides of the fissure or dike, it is denominated a *clay-dike*, *stone-dike*, &c.

6 Hitches. A *hitch* is only a dike or fissure of a smaller degree, by which the strata on one side are not elevated or separated from those on the other side above one fathom. These hitches are denominated in the same manner as dikes, according to the number of feet they elevate or depress the strata.

There are dikes (though they are not often met with in the coal-countries) whose cavities ore filled with sparr, the ores of iron, lead, vitriol, or other metallic or mineral matters; and it is pretty well known, that all metallic veins are nothing else than what in the coal countries are called *dikes*.

The strata are generally found lying upon each other in the same order on one side of the dike as on the other, as mentioned above, and nearly of the same thicknesses, appearing to have been originally a continuation of the same regular strata, and the dike only a breach by some later accident, perpendicularly or obliquely down through them, by which one part is removed to a small distance, and depressed to a lower situation than the other. But this is not the only alteration made in the strata by dikes; for generally, to a considerable distance on each side of the dike, all the strata are in a kind of shattered condition, very tender, easily pervious to water, and debased greatly in their quality, and their inclination to the horizon often altered.

7 Troubles. *Troubles* may be denominated dikes of the smallest degree; for they are not a real breach, but only a tendency towards it, which has not taken a full effect. The strata are generally altered by a trouble from their regular site to a different position. When the regular course of the strata is nearly level, a trouble will cause a sudden and considerable ascent or descent; where they have, in their regular situation, a certain degree of ascent or descent, a trouble either increases or alters it to a contrary position: and a trouble has these effects upon the strata in common with dikes, that it greatly debases them from their original quality; the partings are separated; the backs and cutters disjoined, and their regularity disordered; the original cubic and prismatic figures, of which the strata were composed, are broken, the dislocation filled with heterogeneous matter, and the whole strata are reduced to a softer and more friable state.

The strata are seldom or never found to lie in a true horizontal situation; but generally have an inclination or descent, called the *dip*, to some particular part of the horizon. If this inclination be to the eastward,

3

tioned appear like small clouds composed of particles of coal.

Brown or yellow post is often met with of different degrees of colour; most commonly of the colour of light ochre or yellow sand. It is as hard as the rest, and sometimes variegated with white and black streaks.

Red post is generally of a dull red colour; this is but rarely met with; it is often streaked with white or black.

All these lie in strata of different thicknesses; but commonly thicker than any other strata whatever: they are separated from each other, and from other kinds of strata, by partings of coal, sand, or soft matter of different colours which are very distinguishable.

3. *Of Sand-Stone.*] This is a freestone of a coarser texture than post, and not so hard; is so lax as to be easily pervious to water; when broken, is apparently of a coarse sandy substance; is friable and moulders to sand when exposed to the wind and rain; has frequently white shining spangles in it, and pebbles or other small stones inclosed in its mass. Of this, there are two kinds commonly met with, distinguished by their colours, gray and brown, which are of different shades, lighter or darker in proportion to the mixture of white in them. It is most generally found in strata of considerable thickness, without many secondary partings; and sometimes, though rarely, it is subdivided into layers as thin as the common gray slate. It has generally sandy or soft partings.

4. *Of Metal-stone.*] This is a tolerably hard stratum, being in point of hardness next to sand-stone; generally solid, compact, of considerable weight and of an argillaceous substance, containing many nodules or balls of iron ore, and yellow or white pyrites; its partings, or the surfaces of its strata, are hard, polished, and smooth as glass. When broken, it has a dull dusky appearance (though of a fine texture), like hard dried clay mixed with particles of coal. Though hard in the mine or quarry, when exposed to the fresh air it falls into very small pieces. The most usual colour of this stone is black; but there are several other lighter colours, down to a light brown or gray. It is easily distinguished from freestone by its texture and colour, as well as by its other characteristics. It lies in strata of various thicknesses, though seldom so thick as the two last-mentioned kinds of stone.

5. *Of Shiver.*] This stratum is more frequently met with in coaleries than any other. There are many varieties of it, both in hardness and colour; but they all agree in one general characteristic. The black colour is most common; it is called by the miners *black shiver*, *black metal*, or *bleas*. It is softer than metal-stone, and in the mine is rather a tough than a hard substance, is not of a solid or compact matter, being easily separable by the multitude of its partings, &c. into very small parts, and readily absorbing water. The substance of this stratum is an indurated bole, commonly divided into thin laminæ of unequal thicknesses, which break into long small pieces when struck with force; and, on examination, they appear to be small irregular rhomboids: each of these small pieces has a polished glassy surface; and, when broken cross the grain, appears of a dry, leafy, or laminated texture, like exceeding fine clay: it is very friable; feels to the touch like an unctuous substance; and dissolves in air or water to a fine pinguid black clay. There are almost constantly found inclosed in its strata lumps or nodules of iron ore, often real beds of the same.

There are other colours of this stratum besides black. The brown or dun shiver is very frequently met with; it agrees with the above description in every thing but colour. Gray shiver is also very common: it seems to be only a mixture of the black and dun; and by the different degrees of mixture of these colours others are produced. It lies in strata sometimes of considerable thickness, at other times not exceeding a few feet: they are commonly parted from each other by laminæ of spar, coal, or soft matter.

6. *Of Coal.*] Referring the reader, for the scientific division of coals, to MINERALOGY, and the preceding articles, we shall here consider them as distinguishable into three kinds, according to their degrees of inflammability. For a full view of the natural history of coal, see *Williams's Mineral Kingdom* by Dr Millar.

1. The least inflammable kinds are those known by the name of *Welsh coal*, which is found in Wales; Kilkenny coal, which is found near Kilkenny in Ireland; and *blind* or *deaf coal*, which is found in many parts of Scotland and England. This coal takes a considerable degree of heat to kindle it, but when once thoroughly ignited will burn a long time; it remains in the fire in separate pieces without sticking together or caking; it produces neither flame, nor smoke, and makes no cinders, but burns to a white stony slag: it makes a hot glowing fire like charcoal or cinders, and emits effluvia of a suffocating nature, which renders it unfit for burning in dwelling-houses, its chief use being among maltsters, dyers, &c. for drying their commodities. 2. *Open burning coal*, soon kindles, making a hot pleasant fire, but is soon consumed; it produces both smoke and flame in abundance; but lies open in the fire, and does not cake together so as to form cinders, its surface being burnt to ashes before it is thoroughly calcined in the midst; from this it has its name of an *open burning coal;* it burns to white or brown ashes very light. Of this kind are cannel-coal, jett, parrot, splint, and most of the coals in Scotland. 3. *Close burning coal*; kindles very quickly, makes a very hot fire, melts and runs together like bitumen, the very smallest culm making the finest cinders, which being thoroughly burnt, are porous and light as a pumice stone, and when broken are of a shining lead colour; it makes a more durable fire than any other coal, and finally burns to brown or reddish coloured heavy ashes. Of this kind are the Newcastle and several other of the English coals, and the smithy coals of Scotland. The open and the close burning coal mixed together, make a more profitable fire for domestic uses than either of them separate.

In all those districts of country where coal is found, there are generally several strata of it; perhaps all the different kinds above mentioned will be found in some, and only one of the kinds in others; yet this one kind may be divided into many different seams or strata, by beds of shiver or other kinds of matter interposing, so as to give it the appearance of so many separate strata.

Coalery.

10 The order in which they lie.

All these strata above described, with their several varieties, do not lie or bear upon each other in the order in which they are described, nor in any certain or invariable order. Though there be found the same kinds of strata in one coalery or district as in another, yet they may be of very different thicknesses. In some places there are most of the hard kinds, in others most of the softer; and in any one district it rarely happens that all the various kinds are found: for some kinds, perhaps, occur only once or twice, whilst others occur 10 or 20 times before we reach the principal stratum of coal.

Plate CXLIX. fig. 3.

In order to explain this, suppose the strata in the pit at A (fig. 3.) lie in the order *a*, *b*, *c*, *d*, &c. they may be so much altered in their thicknesses, by reason of some of them increasing and others diminishing, at the distance of B, that they may be found there of very different thicknesses; or if they are examined in a pit at D, by reason of its lower situation, and the strata there not being a continuation of those in the other places, they may be very different both in their order and thicknesses, and yet of the same kinds.

Though they be thus found very different in one coalery or district from what they are found to be in another, with respect to their thicknesses, and the order in which they lie upon each other, yet we never meet with a stratum of any kind of matter but what belongs to some of those above described.

To illustrate how the various strata lie in some places, and how often the same stratum may occur betwixt the surface and the coal, we shall give the following example. The numbers in the left-hand column refer to the classes of strata before described, to which each belongs. The second column contains the names of the strata; and the four numeral columns, to the right hand, express the thickness of each stratum, in fathoms, yards, feet, and inches.

EXAMPLE.

No		Fa.	Yds	Ft.	Ins.
	Soil and gravel - -	0	1	1	0
	Clay mixed with loose stones	1	1	0	0
3	Coarse brown sand-stone, with soft partings - - - - - -	3	0	2	6
2	White post, with shivery partings	1	1	0	5
5	Black shiver or bleas, with iron-stone balls	2	0	2	0
6	Coarse splinty coal - - -	0	0	2	6
5	Soft gray shiver - - - -	0	1	0	7
2	Brown and gray post, streaked with black	1	0	2	0
5	Black shiver, with beds and balls of iron-stone - - - -	0	1	2	6
4	Gray and black metal stone -	0	1	1	9
2	White and brown post - -	1	1	0	0
5	Black and gray shiver, streaked with white	0	1	0	6
3	Soft gray sand-stone, with shivery partings	0	1	1	0
2	Yellow and white post, with sandy partings	1	0	2	0
5	Black and dun shiver, with iron-stone balls	0	1	2	6
2	White post streaked with black, and black partings - - - - -	1	0	0	6
5	Gray shiver, with iron-stone balls	0	1	0	9
4	Brown and black metal-stone -	1	1	2	6
5	Hard slaty black shiver - -	1	1	0	0
6	Coal, hard and fine splint - -	0	0	3	6
5	Soft black shiver - - - -	0	0	0	3
6	Coal, fine and clear - - -	0	0	3	3
5	Hard black shiver - - -	0	0	1	0
	Total Fathoms	25	0	0	0

In this instance the species of sand-stone only occurs twice, post five times, whilst the shiver occurs no less than nine times.

To apply the foregoing observations to practice.

Suppose it was required to examine whether there was coal in a piece of ground adjoining to, or in the neighbourhood of, other coaleries.

11 Methods of searching for coal.

In the first place, it is proper to be informed, at some of the adjacent coaleries, of the number and kinds of strata, the order in which they lie upon each other; to what point of the horizon, and in what quantity, they dip; if any dikes, hitches, or troubles, and the course they stretch. Having learnt these circumstances, search in the ground under examination where the strata are exposed to view, and compare these with the other. If they be of the same kinds, and nearly correspond in order and thickness, and be lying in a regular manner, and agree by computation with the dip and rise, it may safely be concluded the coal is there; and the depth of it may be judged from the depth of the coal in the other coalery, below any particular stratum which is visible in this. Rule 1st.

If the solid strata are not exposed to view, neither in the hills nor valleys of the ground under examination, then search in the adjoining grounds, and if the same kind of strata are found there as in the adjacent coalery, and there is reason, from the dip and other circumstances, to believe that they stretched through the ground to be examined; it may then be concluded the coal is there, as well as these other strata. Rule 2d.

Plate CXLIX. fig. 3.

Suppose a coalery is on the side of a hill at A, fig. 3. and you would search for a coal at B, on the other side of the hill, but in a much lower situation; by observing the several strata lying above the coal at A, and the point to which they dip, which is directly towards B (if clear of dikes), you may expect to find the same kind of strata on the other side of the hill, but much lower down. Accordingly, if some of the strata are visible in the face of the precipice C, they may be compared with some of those in the pit at A. Or, if they are not to be seen there, by searching in the opposite hill, they may perhaps be discovered at the place F; where, if they be found in the manner before mentioned, and there be reason to believe they extend regularly from the first place to this, it is more than probable the coal, as well as these strata, will be found in the intermediate ground.

If the ground to be examined lie more to the rise of the coal, as at E, which being supposed to be on a flat, perhaps the solid strata there may be wholly covered by the gravel, clay, &c. of the outward surface lying upon them. In this case, by measuring the horizontal distance and the descent of ground from A to E, and computing the quantity of ascent or rise of the coal in that distance; by comparing these together, it may be judged at what depth the coal will be found there, allowing that it lie regular. Thus, suppose the coal at A 80 yards deep, the distance from A to E 500 yards, and that the coal rises one yard in 10 of horizontal distance: Rule 3d.

Then, from the depth of the pit	80
Deduct the descent of ground from A to E, suppose - - -	24

 This

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This remainder would be the depth, if the coal was level - - - - - 56
But as the coal rises 1 in 10 yards, then deduct what it rises in 500 yards, which is - - - - - - - - - 50

And the remainder is the depth of that coal at E - - - - - - - - - 6 yards.

Rule 4th. Or suppose that the place at B is 500 yards the contrary way, or to the full dip of the coal at A; if a view of the solid strata cannot be obtained, then by proceeding in the same manner as before, the depth of the coal at that place may be computed. Thus,

To the depth of the coal at the pit A 80
Add the descent or inclination of the coal in 500 yards, which, as before, is - - - - - - - - - - - 50

This sum would be the depth, if the ground was level - - - - - 130
But as the ground descends towards B, deduct the quantity of that, which suppose - - - - - - - - - 80

Remains the depth of the coal at B - 50 yards.

If the place to be examined be neither to the full dip nor full rise, but in some proportion towards either, the same method may be pursued, computing how much the coal rises or dips in a certain distance in that direction.

If there is known to be a dike in the workings of the pit at A, which elevates or depresses the strata towards the place under examination, then the quantity of the elevation or depression must be accordingly added to or deducted from the computed depth of the coal at that place. Suppose there is an upcast dike of 10 fathoms or 20 yards towards B, then deduct 20 from 50, the depth before computed, there will remain 30 yards or 15 fathoms for the depth of the coal at B.

But it often happens that coal is to be searched for in a part of the country, at such a considerable distance from all other coaleries, that by reason of the intervention of hills, valleys, unknown dikes, &c. the connexion or relation of the strata with those of any other coalery cannot be traced by the methods last mentioned; in which case a more extensive view must be taken of all circumstances than was necessary in the former; and a few general rules founded on the foregoing observations, and on conclusions drawn from them, will greatly assist in determining, sometimes with a great degree of probability, and sometimes with absolute certainty, whether coal be in any particular district of country or not.

Rule 5th. The first proper step to be taken in such a case, is to take a general view of that district of country intended to be searched, in order to judge, from the outward appearance or face of the country, which particular part out of the whole is the most likely to contain those kind of strata favourable to the production of coal; and consequently such particular part being found, is the most adviseable to be begun with in the examination.

Though the appearance of the outward surface gives no certain or infallible rule to judge of the kinds of strata lying beneath, yet it gives a probable one; for it is generally found, that a chain of mountains or hills rising to a great height, and very steep on the sides, are commonly composed of strata much harder and of different kinds from those before described wherein coal is found to lie, and therefore unfavourable to the production of coal; and these mountainous situations are also more subject to dikes and troubles than the lower grounds; so that if the solid strata composing them gave even favourable symptoms of coal, yet the last circumstance would render the quality bad, and the quantity precarious. And, on the whole it may be observed, that mountainous situations are found more favourable to the production of metals than of coal. It is likewise generally found that those districts abounding with valleys, moderately rising hills, and interspersed with plains, sometimes of considerable extent, do more commonly contain coal, and those kinds of strata favourable to its production, than either the mountainous or champaign countries; and a country so situated as this last described, especially if at some considerable distance from the mountains, ought to be the first part appointed for particular examination. Plains, or level grounds of great extent, generally situated by the sides of rivers, or betwixt such moderate rising grounds as last described, are also very favourable to the production of coal, if the solid strata, and other circumstances in the higher grounds adjoining, be conformable; for it will scarcely be found, in such a situation, that the strata are favourable in the rising grounds, on both sides of the plain, and not so in the space betwixt them. Though plains be so favourable, in such circumstances, to the production of coal, yet it is often more difficult to be discovered in such a situation, than in that before described; because the clay, soil, and other lax matter, brought off the higher grounds by rains and other accidents, have generally covered the surfaces of such plains to a considerable depth, which prevents the exploration of the solid strata there, unless they be exposed to view by digging, quarrying, or some such operation.

12 Mountainous situations.

13 Hills and valleys.

14 Plains.

That part of the district being fixed upon which abounds with moderate hills and valleys as properest to begin the examination at, the first step to be taken is to examine all places where the solid strata are exposed to view (which are called the *crops* of the strata), as in precipices, hollows, &c. tracing them as accurately and gradually as the circumstances will allow, from the uppermost stratum or highest part of the ground to the very undermost: and if they appear to be of the kinds before described, it will be proper to note in a memorandum book their different thicknesses; the order in which they lie upon each other; the point of the horizon to which they dip or incline, the quantity of that inclination, and whether they lie in a regular state. This should be done in every part of the ground where they can be seen, observing at the same time, that if a stratum can be found in one place, which has a connexion with some other in a second place, and if this other has a connexion with another in a third place, &c.; then, from these separate connexions, the joint correspondence of the whole may be be traced, and the strata, which in some places are covered, may be known by their correspondence with those which are exposed to view.

If by this means the crops of all the strata cannot be seen (which is often the case), and if no coal be discovered by its crop appearing at the surface: yet if the strata that have been viewed consist of those kinds before described, and are found lying in a regular order, it is sufficiently probable that coal may be in that part of the district, although it be concealed from sight by the surface of the earth or other matter.

Rule 6th. Therefore, at the same time that the crops of the strata are under examination, it will be proper to take notice of all such springs of water as seem to be of a mineral nature, particularly those known by the name of iron water, which bear a mud or sediment of the colour of rust or iron, having a strong astringent taste. Springs of this kind proceed originally from those strata which contain beds or balls of iron-ore; but by reason of the tenacity of the matter of those strata, the water only disengages itself slowly from them, descending into some more porous or open stratum below, where, gathering in a body, it runs out to the surface in small streams or rills. The stratum of coal is the most general reservoir of this water; for the iron-stone being lodged in different kinds of shiver, and the coal commonly connected with some of them, it therefore descends into the coal, where it finds a ready passage through the open backs and cutters. Sometimes, indeed, it finds some other stratum than coal to collect and transmit it to the surface; but the difference is easily distinguishable; for the ochrey matter in the water, when it comes from a stratum of coal, is of a darker rusty colour than when it proceeds from any other, and often brings with it particles and small pieces of coal; therefore, wherever these two circumstances concur in a number of these kind of springs, situated in a direction from each other answerable to the stretch or to the inclination of the strata, it may be certain the water comes off coal, and that the coal lies in a somewhat higher situation than the apertures of the springs.

There are other springs also which come off coal, and are not distinguishable from common water, otherwise than by their astringency, and their having a blue scum of an oily or glutinous nature swimming upon the surface of the water. These, in common with the others, bring out particles of coal, more especially in rainy seasons when the springs flow with rapidity. When a number of these kinds are situated from each other in the direction of the strata, as above described; or if the water does not run forth as in springs, but only forms a swamp, or an extension of stagnant water beneath the turf; in either case, it may be depended upon that this water proceeds from a stratum of coal.

Rule 7th. If the stratum of coal is not exposed to view, or cannot be discovered by the first method of searching for the crop, although the appearance of the other strata be very favourable, and afford a strong probability of coal being there; and if the last-mentioned method of judging of the particular place where the crop of the coal may lie, by the springs of water issuing from it, should, from the deficiency of those springs or other circumstances, be thought equivocal, and not give a satisfactory indication of the coal; then a further search may be made in all places where the outward surface, or the stratum of clay or earth, is turned up by ploughing, ditching, or digging, particularly in the lower grounds, in hollows, and by the sides of streams. These places should be strictly examined, to see if any pieces of coal be intermixed with the substance of the superior last strata; if any such be found, and if they be pretty numerous and in detached pieces, of a firm substance, the angles perfect or not much worn, and the texture of the coal distinguishable, it may be concluded, that the stratum of coal to which they originally did belong, is at no great distance, but in a situation higher with respect to the horizon; and if there be also found along with the pieces of coal other mineral matter, such as pieces of shiver or freestone, this is a concurrent proof that it has come only from a small distance. Though the two fore-mentioned methods should only have produced a strong probability, yet if this last-mentioned place, where the pieces of coal, &c. are found in the clay, be in a situation lower than the springs; when this circumstance is joined to the other two, it amounts to little less than a moral certainty of the stratum of coal being a very little above the level of the springs. But if, on the contrary, these pieces of coal are found more sparingly interspersed in the superior stratum, and if the angles are much fretted or worn off, and very little of other kinds of mineral matter connected with them; it may then be concluded, that they have come from a stratum of coal situated at a greater distance than in the former case; and by a strict search and an accurate comparison of other circumstances, that particular place may be discovered with as much certainty as the other.

After the place is thus discovered where the stratum of coal is expected to lie concealed, the next proper step to be taken, is to begin digging a pit or hole there perpendicularly down to find the coal. If the coal has no solid strata above and beneath it, but be found only embodied in the clay or other lax matter, it will not be there of its full thickness, nor so hard and pure as in its perfect state when enclosed betwixt two solid strata, the uppermost called the *roof*, and the undermost called the *pavement* of the coal: in such situation therefore it becomes necessary, either to dig a new pit, or to work a mine forward until the stratum of coal be found included betwixt a solid roof and pavement, after which it need not be expected to increase much in its thickness: yet as it goes deeper or farther to the dip, it most likely will improve in its quality; for that part of the stratum of coal which lies near the surface, or only at a small depth, is often debased by a mixture of earth and sundry other impurities washed down from the surface, through the backs and cutters, by the rains; whilst the other part of the stratum which lies at a greater depth is preserved pure, by the other solid strata above it intercepting all the mud washed from the surface.

The above methods of investigation admit of many different cases, according to the greater or less number of favourable circumstances attending each of the modes of inquiry; and the result accordingly admits every degree of probability, from the most distant, even up to absolute certainty. In some situations, the coal will only below the surface, the engine by this means would be enabled to draw one-sixth part more water than without it; and if there were any feeders of water in the pit above this level, they might be conveyed into it, where they would be discharged without being drawn by the engine.

The engine-pit may be from seven to nine feet wide, and whether it be circular, oval, or of any other form, is not very material, provided it be sufficiently strong, though a circular form is most generally approved. If any feeders of water are met with a few fathoms from the surface, it will be proper to make a circular or spiral cutting about one foot deep, and a little hollowed in the bottom, round the circumference of the pit, in order to receive and conduct the water down, without flying over the pit and incommoding the workmen. If the strata are of so tender or friable a nature as not to bear this operation, or if the water leaks through them, then it will be necessary to insert in the fore-mentioned cutting a circular piece of timber called a *crib*, hollowed in the same manner, to collect the water; and a second may be inserted two or three yards below the first, with a sloping niche down the wall or side of the pit, to convey the water from the former into it; proceeding by some of these methods until the pit is sunk 15 or 20 fathoms, at which place it would be proper to fix a cistern or reservoir, for the first or upper set of pumps to stand in; for if the pit be 30 fathoms as supposed, it would be too great a length for the pumps to be all in one set from bottom to top; therefore, if any extraordinary feeders are met with, betwixt 15 and 20 fathoms deep, it would be best to fix the cistern where it may receive them, and prevent their descending to the bottom; observing that the upper set of pumps be so much larger than the lower one, as the additional feeders may require; or if there are no additional feeders, it ought then to be a little smaller.

After the upper cistern is fixed, the operation may be pursued by the other set of pumps in much the same manner as has been described, until the pit is sunk to the coal; which being done, it would be proper to sink it six or eight feet deeper, and to work some coal out from the dip side of the pit, to make room for a large quantity of water to collect, without incommoding the coal-pits when the engine is not working.

It would exceed the proper bounds of this article to enumerate all the accidents to which engine-pits are liable in sinking; we shall therefore only recite a few which seem important.

If a quicksand happens to lie above the solid strata, next the surface, it may be got through by digging the pit of such a wideness at the top (allowing for the natural slope or running of the sand) as to have the proper size of the pit on the uppermost solid stratum, where fixing a wooden frame or tub as the timber-work of the pit, and covering it round on the outside with wrought clay up to the top the sand may again be thrown into the excavation round the tub, and levelled with the surface.

If the quicksand should happen to lie at a considerable depth betwixt the clay and solid strata, then a strong tub of timber closely jointed and shod with iron, of such a diameter as the pit will admit, may be let down into it; and by fixing a great weight upon the top, and by working out the sand, it may be made to sink gradually, until it comes to the rock or other solid stratum below; and when all the sand is got out, if it be lightly calked and secured, it will be sufficient.

It sometimes happens, that a stratum of soft matter lying betwixt two hard solid ones, produces so large a quantity of water as greatly to incommode the operations. In such a case, a frame-work of plank, strengthened with cribs and closely calked, will keep back the whole or the greatest part of it, provided the two strata which include it are of a close texture; or let an excavation of about two feet be made in the soft stratum quite round the circumference of the pit, and let that be filled close up betwixt the hard strata with pieces of dry fir-timber about ten inches square inserted endwise, and afterwards as many wooden wedges driven into them as they can be made to receive; if this be well finished, little or no water will find a passage through it.

It rarely happens that any suffocating damp or foul air is met with in an engine-pit; the falling of water, and the working of the pumps, generally causing a sufficient circulation of fresh air. But that kind of combustible vapour, or inflammable air, which will catch fire at a candle, is often met with. It proceeds from the partings, backs, and cutters, of the solid strata, exhaling from some in an insensible manner, whilst from others it blows with as great impetuosity as a pair of bellows. When this inflammable air is permitted to accumulate, it becomes dangerous by taking fire, and burning or destroying the workmen, and sometimes by its explosion will blow the timber out of the pit and do considerable damage. If a considerable supply of fresh air is forced down the pit by air-boxes and a ventilator, or by dividing the pit into two by a close partition of deals from top to bottom, or by any other means it will be driven out, or so weakened that it will be of no dangerous consequence; or when the inflammable air is very strong, it may be safely carried off by making a close sheathing or lining of thin deals quite round the circumference of the pit, from the top of the solid strata to the bottom, and lengthening it as the pit is sunk, leaving a small vacancy behind the sheathing; when the combustible matter which exhales from the strata, being confined behind these deals, may be vented by one or two small leaden pipes carried from the sheathing to the surface, so that very little of it can transpire into the area of the pit. If a candle be applied to the orifice of the pipe at the surface, the inflammable air will instantly take fire, and continue burning like an oil-lamp, until it be extinguished by some internal cause. Upon the whole, every method should be used to make the pit as strong in every part, and to keep it as dry as possible; and whenever any accident happens, it should be as expeditiously and thoroughly repaired as possible, before any other operation be proceeded in, lest an additional one follow, which would more than double the difficulty of repairing it.

17 Of working the coal.

The first operations, after sinking the engine-pit, are the working or driving a mine in the coal, and sinking the first coal-pit. The situation of the first coal-pit should be a little to the rise of the engine-pit, that the water which collects there may not obstruct the working

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working of the coals every time the engine stops; and it should not exceed the distance of 20, 30, or 40 yards, because when the first mine has to be driven a long way, it becomes both difficult and expensive. If there be not a sufficient circulation of fresh air in the mine, it may be supplied by the before described air-boxes and a ventilator, until it arrives below the intended coal pit, when the pit may be bored and sunk to the coal, in the manner before mentioned.

After the pit is thus got down to the coal, the next consideration should be, the best method of working it. The most general practice in Scotland is to excavate and take away a part only of the stratum of coal in the first working of the pit, leaving the other part as pillars for supporting the roof; and after the coal is wrought in this manner to such a distance from the pit as intended, then these pillars, or so many of them as can be got, are taken out by a second working, and the roof and other solid strata above permitted to fall down and fill up the excavation. The quantity of coal wrought away, and the size of the pillars left in the first working, is proportioned to the hardness and strength of the coal and other strata adjacent, compared with the incumbent weight of the superior strata.

The same mode of working is pursued in most parts of England, differing only as the circumstances of the coalery may require; for the English coal, particularly in the northern counties, being of a fine tender texture, and of the close-burning kind, and also the roof and pavement of the coal in general not so strong as in Scotland, they are obliged to leave a larger proportion of coal in the pillars for supporting the roof, during the first time of working; and in the second working, as many of these pillars are wrought away as can be got with safety.

The Scots coal in general being very hard, and of the open-burning kind, it is necessary to work it in such a manner as to produce as many *great coals* as possible, which is best effected by taking away as high a proportion of the coal as circumstances will allow in the first working; on the contrary, the English coal being very tender, cannot possibly be wrought large, nor is it of much importance how small they are, being of so rich a quality; so that a larger proportion may be left in pillars in this coal than could with propriety be done in the other; and, when all circumstances are considered, each method seems well adapted to the different purposes intended.

The ancient method of working was, to work away as much of the coal as could be got with safety at one working only, by which means the pillars were left so small as to be crushed by the weight of the superior strata, and entirely lost. As great quantities of coals were lost by this method, it is now generally exploded, and the former adopted in its place, by which a much larger quantity of coal is obtained from the same extent of ground, and at a much less expence in the end.

The exact proportion of coal proper to be wrought away, and to be left in pillars at the first working, may be judged of by a comparison of the circumstances before mentioned. If the roof and pavement are both strong, as well as the coal, and the pit about 30 fathoms deep, then two-thirds, or probably three-fourths, may be taken away at the first working, and one-third or one-fourth left in pillars. If both roof and pavement be soft or tender, then a larger proportion must be left in pillars, probably one-third or near one-half; and in all cases the hardness or strength of the coal must be considered. If tender, it will require a larger pillar than hard coal; because, by being exposed to the air after the first working, a part of it will moulder and fall off, by which it will lose much of its solidity and resistance.

The proportion to be wrought away and left in pillars being determined, the next proper step is to fix upon such dimensions of the pillars to be left and of the excavations from which the coal is to be taken away, as may produce that proportion. In order to form a just idea of which, see a plan of part of a pit's workings (fig. 6.) supposed to be at the depth of 30 fathoms, and the coal having a moderate rise. A, represents the engine-pit; B, the coal-pit; A *a* B, the mine from the former to the latter; BC, the first working or excavation made from the coal-pit, commonly called the *winning mine* or *winning headway*, nine feet wide; *bbbb*, &c. the workings called *rooms*, turned off at right angles from the others, of the width of 12 feet: *cccc*, &c. the workings called *throughers* or *thirlings*, 9 feet wide, wrought through at right angles from one room to another; *ddd*, &c. the pillars of coal left at the first working for supporting the roof, 18 feet long and 12 feet broad; DD, two large pillars of coal near the pit bottom, 15 or 20 yards long, and 10 or 15 broad, to support the pit, and prevent its being damaged by the roof falling in; *e e*, the level mine wrought in the coal from the engine-pit bottom four or five feet wide; *ff*, &c. large pillars of coal left next the level, to secure it from any damage by the roof falling in; *g g*, a dike which depresses the coal, 1 fathom; *h h*, &c. large pillars and barriers of coal, left unwrought, adjoining to the dike where the roof is tender, to prevent its falling down. The coal taken out by the first working in this pit is supposed to be one third of the whole; and allowing the rooms 12 feet wide, and the thirlings 9 feet wide, then the pillars will require to be 12 feet wide and 18 feet long; for if one pillar be in a certain proportion to its adjoining room and thirling, the whole number of pillars will be in the same proportion to the whole number of rooms and thirlings in the pit. Suppose ABCD (fig. 7.) to be a pillar of coal 18 feet long and 12 feet broad, its area will be 216 square feet; ACHE, the adjoining thirling, 12 feet by 9 feet, and its area 108 square feet; BAEFG, the adjoining room, 27 feet long and 12 feet broad, and its area 324 square feet; which added to 108 gives 432 square feet or two-thirds wrought, and 216 square feet left, or one-third of the whole area FGHD.

Plate CXLIX. fig. 6.

Fig. 7.

It is proper to observe, that in the prosecution of the workings, the rooms to the right of the winning headway should be opposite to the pillars on the left, and the first, third, and fifth pillar, or the second, fourth, and sixth, adjoining to the said headway, should be of such a length as to overlay the adjoining thirlings, as, in the plan, the pillar 2 overlays the thirlings 1 and 3; and the pillar 4 overlays the thirlings 3 and 5; this will effectually support the roof of the main road BC, and will bring the other pillars into

into their regular order, by which means each pillar will be opposite to two thirlings. Also a larger proportion of coal than common should be left in all places which are intended to be kept open after the second working, such as the pit-bottoms, air-courses, roads and water-courses, or where the roof is tender, as it generally is near dikes, hitches, and troubles; and if the roof should continue tender for a considerable space, it will perhaps be found proper to leave a few inches of coal adhering to the roof, which, together with a few props of timber fixed under it, may support it effectually for a long time. The level mine *e e*, and the winning headway BC, should be wrought forward a considerable length before the other rooms, in order to be driven through any dikes that might interpose, otherwise the progress of the workings might probably be stopt a considerable time, waiting until a course of new rooms were procured on the other side of the dike. Suppose the dike *g g*, fig. 6. to depress the coal six feet or one fathom, and that it rises in the same manner on the under side of the dike as it does on the upper side; in such a case, the only remedy would be to work or drive a level mine through the strata of stone from the engine-level at *e*, over the dike, until it intersect the coal at *i*; and from thence to drive a new level mine in the coal at *i i*, and a new winning headway *i k*. In order to gain a new set of rooms, and to supply fresh air to this new operation, a small mine might be driven from the room *h*, and a hole sunk down upon the level room *i i*; therefore, if the level mine *e e* was not driven so far forward as to have all these operations completed before the rooms and other workings were intercepted by the dike, the working of the pit might cease until these new places were ready.

If there be two or three strata or seams of coal in the same pit (as there often are) having only a stratum of a few feet thick lying betwixt them, it is then material to observe, that every pillar in the second seam be placed immediately before one in the first, and every pillar in the third seam below one in the second; and in such a situation the upper stratum of coal ought to be first wrought, or else all the three together; for it would be unsafe to work the lower one first, lest the roof should break, and damage those lying above.

It sometimes becomes necessary to work the coal lying to the dip of the engine or the level; which coal is consequently drowned with water, and must therefore be drained by some means before it can be wrought. If the quantity of water proceeding from it be inconsiderable, it may then be drained by small pumps laid upon the pavement of the coal, and wrought by men or horses, to raise the water up to the level of the engine-pit bottom; or if the feeders of water be more considerable, and the situation be suitable, the working rod of these pumps might be connected with those in the engine-pit; by which means the water would be raised up to the level; but if the quantity of water be very great; or if, from other circumstances, these methods may not be applicable; then the engine pit may be sunk as deep below the coal as may be necessary, and a level stone mine driven from its bottom to the dip of the strata, until it intersect the stratum of coal, from whence a new level mine might be wrought, which would effectually drain it. Suppose AB, fig. 8. to be a sec-tion of the engine-pit; BC, the coal drained by th engine; BD, the coal to the dip of the engine in tended to be drained; then if the engine-pit be sunl deeper to E, a stone mine may be wrought in the di rection ED, until it intersect the coal at D, by whicl the water will have a free passage to the engine, an the coal will be drained.

If there be another stratum of coal lying at such depth below the first as the engine-pit is intended t be sunk to, the upper seam may in some situations b conveniently drained, by driving a mine in the lowe seam of coal from E to F, and another in the uppe one from B to D; and by boring a hole from D to F the water will descend to F, and, filling the mine EF rise up to the engine-pit bottom at E, which is upon level with D.

Whenever it is judged necessary to work the pil lars, regard must be had to the nature of the roo If the roof is tender, a narrow room may be wrough through the pillar from one end to the other, leavin only a shell of coal on each side for supporting the roc the time of working. Suppose ABCD, fig. 7. to b a pillar of coal 18 feet long and 12 feet broad: if th roof is not strong, the room 1, 2, 3, 4, of eight fee wide, may be wrought up through that pillar, leavin a shell of two feet thick on each side; and if it can b safely done, a part of these shells may also be wrough away, by working two places through them as at 5 an 6. By this means very little of the coal will be lost for two-thirds of the whole being obtained by the fir working, and above two thirds of the pillar by the se cond working, the loss upon the whole would not ex ceed one-tenth: but it may be observed, that some pi lars will not produce so great a proportion, and pe haps others cannot be wrought at all; so that, upo the whole, there may be about one-sixth, one-sevent or in some situations but one-eighth part of the coal los If the roof be hard and strong, then as much coal ma be wrought off each side and each end of the pillar can be done with safety, leaving only a small piece stan ing in the middle; and when the roof is very stron sometimes several pillars may be taken entirely ou without any loss of coal: and in general this last me thod is attended with less loss, and produces larg coals, than the former. In all cases it is proper begin working those pillars first which lie farthest fro the pit bottom, and to proceed working them regular away towards the pit; but if there be a great numb of pillars to the dip of the pit, it is the safest meth to work these out before those to the rise of the pit a begun with.

There is no great difference in the weight of diffe ent kinds of coals, the lightest being about 74 poun avoirdupois, and the heaviest about 79 pounds the c bic foot; but the most usual weight is 75 pounds t foot, which is 18 hundred weight and 9 pounds t cubic yard. The statute chalder is 53 hundred weigh or when measured is as follows: 268.8 cubic inches the Winchester gallon; $4\frac{1}{2}$ gallons to the coal pec about 3 pounds weight; 8 coal-pecks to the boll, abo $247\frac{1}{3}$ pounds; and 24 bolls to the chalder, of hundred weight. If one coal measuring exactly a c bic yard (nearly equal to 5 bolls) be broken in pieces of a moderate size, it will measure seven c bo rent of fresh air will circulate through and ventilate the whole workings, in the direction pointed to by the small arrows in the plan, clearing away all the damps and noxious vapours that may generate. When it is arrived at C, it is conducted across the main headway, and carried through the other part of the pit's workings in the same manner, until it returns through *n n* to the pit B, where it ascends; and as the rooms advance farther, other stoppings are regularly made.

In some of those stoppings, on the side of the main headway, there must be doors to admit a passage for the bringing out of the coals from the rooms to the pit, as at 5 5: these doors must be constantly shut, except at the time of passing through them.

There are other methods of disposing the stoppings so as to ventilate the pit; but none which will so effectually disperse the damps as that described above. If the damps are not very abundant, then the course of stopping 1 1 1, &c. in the level mine, and the others at *b b b*, &c. in the main headway, without any others, may perhaps be sufficient to keep the pit clear. If at any time the circulation of the fresh air is not brisk enough, then a large lamp of fire may be placed at the bottom of the pit B, which, by rarefying the air there, will make a quicker circulation.

20 Of leading and shipping the coals.

Most of the larger coaleries send their coals to the ships for the coasting trade or exportation; and, as the quantity is generally very large, it would take a greater number of carts than could conveniently be obtained at all times to carry them; besides the considerable expence of that manner of carriage: they therefore generally use waggons, for carrying them along waggon-ways, laid with timber, by which means one horse will draw from two to three tons at a time, when in a cart not above half a ton could be drawn.

The first thing to be done in making a waggon-way is to level the ground in such a manner as to take off all sudden ascents and descents, to effect which, it is sometimes necessary to cut through hills, and to raise an embankment to carry the road through hollows. The road should be formed about 12 feet wide, and no part should have a greater descent than of one yard perpendicular in 10 of a horizontal line, nor a greater ascent than one yard in 30. After the road is formed, pieces of timber, about six feet long, and six inches diameter, called *sleepers*, are laid across it, being 18 or 24 inches distant from each other. Upon these sleepers other pieces of timber, called *rails*, of four or five inches square, are laid in a lateral direction, four feet distant from each other, for the waggon-wheels to run upon; which being firmly pinned to the sleepers, the road may then be filled with gravel and finished.

The waggons have four wheels, either made of solid wood or of cast iron. The body of the carriage is longer and wider at the top than at the bottom; and usually has a kind of trap-door at the bottom, which, being loosed, permits the coals to run out without any trouble. The size of a waggon to carry 50 hundred weight of coals is as follows:

	Feet.	Inches.
Length of the top, - -	7	9
Breadth of the top, - -	5	0
Length of the bottom, -	5	0
Breadth of the bottom, -	2	6
Perpendicular height, -	4	3

Where the pits are situated at some considerable distance from the harbour, it becomes necessary to have a store-house near the shipping place, where the coals may be lodged, until the lighters or ships are ready to take them in. The waggon-way should be made into the store-house, at such a height from the ground, as to permit the coals to run from the waggons down a spout into the vessels; or else to fall down into the store-house, as occasion may require.

This kind of store-house is well adapted to dispatch and saving expence; for a waggon load of coals may be delivered either into the store-house or vessels instantly with very little trouble: and if the coals were exposed to the effects of the sun and rain, they would be greatly injured in their quality: but being lodged under cover, they are preserved. See COALERY, SUPPLEMENT.

COALESCENCE, the union or growing together of two bodies before separate. It is principally applied to some bones in the body, which are separate during infancy, but afterwards grow together; or to some morbid union of parts, which should naturally be distinct from each other. Thus there is a coalescence of the sides of the vulva, anus, and nares; of the eye-lids, fingers, toes, and many other parts.

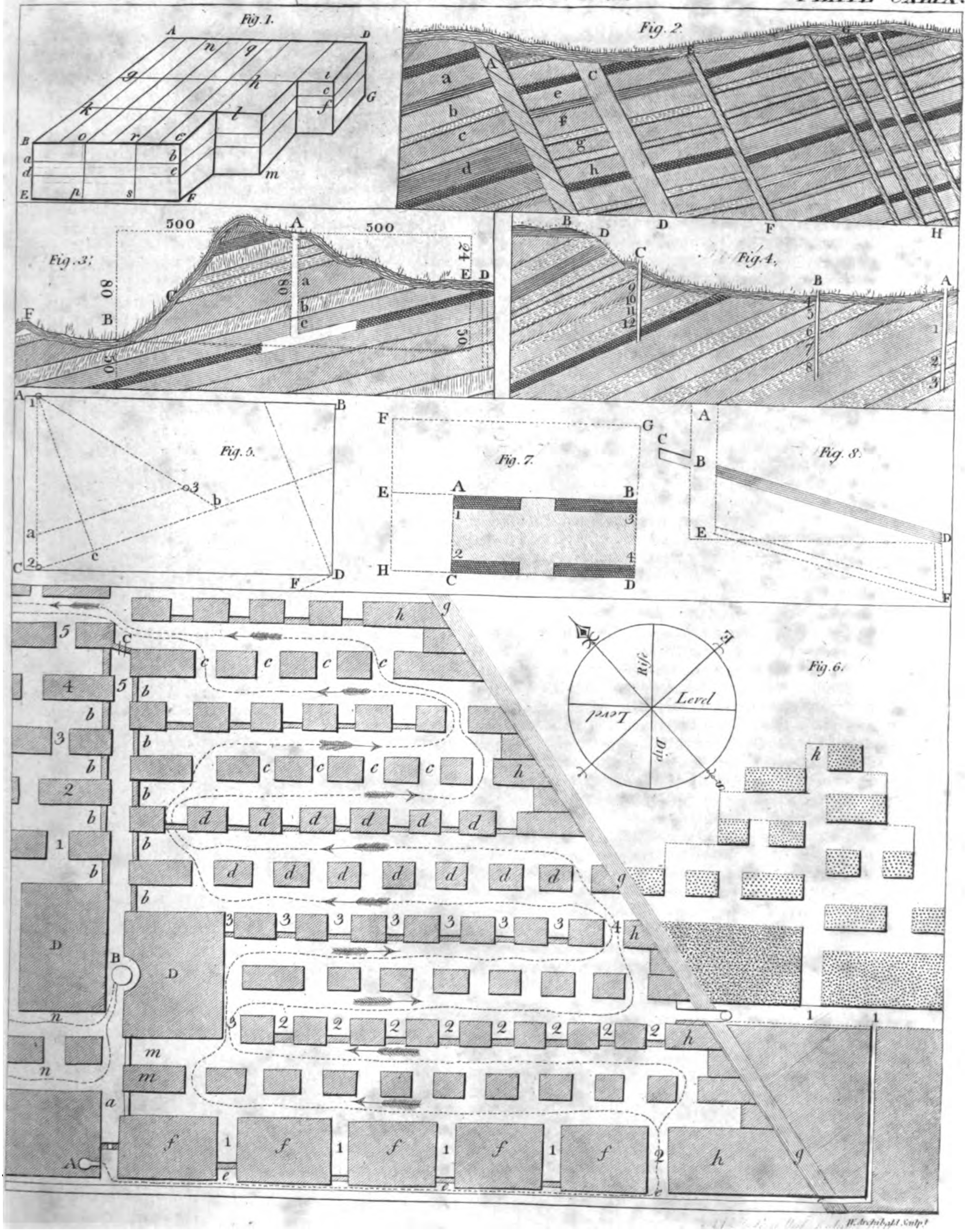
COALLIER, a vessel employed to carry coals from one port to another, chiefly from the northern parts of England to the capital, and more southerly parts, as well as to foreign markets. This trade is known to be an excellent nursery for seamen, although they are often found, from the constitution of their climate, not to be so well calculated for southern navigation.

COAMINGS, in ship-building, are those planks, or that frame, forming a border round the hatches, which raise them up higher than the rest of the deck. Loop-holes for muskets to shoot out at are often made in the coamings, in order to clear the deck of the enemy when the ship is boarded.

COANE, among the Greeks, a name given to a peculiar species of *tutia* or tutty, which was always found in a tubular form. It had its name from *κωνη*, a word used to express a sort of cylindric tube, into which the melted brass was received from the furnace, and in which it was suffered to cool. In cooling, it always deposited a sort of recrement on the sides of the vessel or tube, and this was the tutty called coane.

COAST, a sea-shore, or the country adjoining to the edge of the sea. Dr Campbell, in his Political Survey of Great Britain, considers an extensive sea-coast as of great advantage to any kingdom; and consequently that this island hath many conveniencies resulting from the extent of its coasts, superior to other kingdoms which are much larger. The chief advantages arising from an extensive sea-coast are, that thus there is a convenient opportunity for exportation and importation to or from all parts of the kingdom. Thus, a number of cities are formed on the coasts; by this means the internal parts are improved, &c. The extent of the sea-coasts of Arabia, he looks upon as the genuine source of wealth and splendour to the ancient inhabitants of that peninsula; the same was the instrument of the greatness of ancient Egypt, of Phœnicia, &c. In short, according to him, no country or city can for any length of time be flourishing unless

COAL MINES. PLATE CXLIX.



W. Archibald Sculpt

the viper's head, is the Mexican name of a flower of incomparable beauty. It is composed of five petals or leaves, purple in the innermost part, white in the middle, the rest red, but elegantly stained with yellow and white spots. The plant which bears it has leaves resembling those of the iris, but longer and larger; its trunk is small and slim: This flower was one of the most esteemed among the Mexicans. The Lincean academicians of Rome, who commented on and published the History of Hernandez in 1651, and saw the paintings of this flower, with its colours, executed in Mexico, conceived such an idea of its beauty, that they adopted it as the emblem of their very learned academy, denominating it *Fior de Lince*.

COBALT, a metallic substance which was formerly classed with the semimetals. See CHEMISTRY and MINERALOGY *Index*.

COBBING, a punishment sometimes inflicted at sea. It is performed by striking the offender a certain number of times on the breech with a flat piece of wood called the *cobbing-board*. It is chiefly used as a punishment to those who quit their station during the period of the night-watch.

COBITIS, the LOACHE, in *Ichthyology*, a genus of fishes belonging to the order of abdominales. See ICHTHYOLOGY *Index*. It is frequent in the stream near Amesbury in Wiltshire, where the sportsmen, through frolic, swallow it down alive in a glass of white-wine.

COBLE, a boat used in the turbot fishery, twenty feet six inches long, and five feet broad. It is about one ton burthen, rowed with three pair of oars, and admirably constructed for encountering a mountainous sea.

COBLENTZ, an ancient, handsome, and strong town of Germany, seated at the confluence of the rivers Rhine and Moselle, in a fertile country, with mountains covered with vineyards. It was the usual residence of the elector of Treves, to whom it belonged. Over the Rhine is a bridge of twelve arches, built for the convenience of the inhabitants of Coblentz and the adjacent places. A ferry machine is constantly going from the city to the other side of the Rhine, where there is a little town and very strong castle built on an eminence named *the rock of honour*. This machine is erected on two boats, in the form of a large square gallery, encompassed with ballustrades. Its inhabitants in 1815 amounted to about 10,500, including the suburbs. Its territory produces the best Moselle wine, which is exported both to Frankfort and Holland. The situation of the place is very favourable for trade, as it communicates with France by the Moselle, and with Germany and Switzerland by the Rhine. It is now the chief town of the Prussian territories on the Rhine. It has two yearly fairs. E. Long. 7. 32. N. Lat. 50. 24.

COBOB, the name of a dish among the Moors. It is made of several pieces of mutton wrapt up in the cawl, and afterwards roasted in it; the poorer people, instead of the meat, use the heart, liver, and other parts of the entrails, and make a good dish, though not equal to the former.

COBOOSE, in sea-language, is derived from the Dutch *kambuis*, and denotes a sort of box, resembling a sentry-box, used to cover the chimneys of some merchant ships. It generally stands against the barricade, on the fore-part of the quarter-deck. It is called in the West Indies *cobre vega*.

COBURG, a town of Germany in the circle of Franconia, and capital of a principality of the same name, with a famous college, a fort, and a castle. The town contains about 7000 inhabitants; the principality in 1815 contained 72,000. It is seated on the river Itch, in E. Long. 11. 18. N. Lat. 50. 22.

COBWEB, in *Physiology*, the fine net-work which spiders spin out of their own bowels, in order to catch their prey. See ARANEA.

COCCEIUS, JOHN, professor of theology at Bremen, was founder of a sect called *Cocceians*: they held, amongst other singular opinions, that of a visible reign of Christ in this world, after a general conversion of the Jews and all other people to the true Christian faith, as laid down in the voluminous works of Cocceius. He died in 1699, aged 66.

COCCINELLA, in *Zoology*, a genus of insects of the order of coleoptera. See ENTOMOLOGY *Index*.

COCCOLOBO, in *Botany*, a genus of the trigynia order, belonging to the octandria class of plants; and in the natural method ranking under the 12th order, *Holoraceæ*. See BOTANY *Index*.

COCCOTHRAUSTES, the trivial name of a species of LOXIA. See ORNITHOLOGY *Index*.

COCCULUS INDICUS, the name of a poisonous berry, too frequently mixed with malt-liquors in order to make them intoxicating; but this practice is expressly forbidden by act of parliament. It is the fruit of the *MENISPERMUM Cocculus*. Fishermen have a way of mixing it with paste, which the fish swallow greedily, and are thereby rendered lifeless for a time, and float on the water. It is sometimes used with stavesacre, for destroying vermine in children's heads.

COCCUS, in *Zoology*, a genus of insects belonging to the order of hemiptera. See ENTOMOLOGY *Index*.

COCCYGÆUS MUSCULUS. See ANATOMY, *Table of the Muscles*.

COCCYX, or COCCYGIS OS. See ANATOMY *Index*.

COCHIN, a settlement on the coast of Malabar, in N. Lat. 10. 0. E. Long. 76. 8. The town is not unpleasant. The fortification is irregular, but strong enough to resist any of the Indian powers, and has 40 or 50 cannon facing the sea. The people in this town and the country adjacent are subject to a strange disorder of the legs, called *Cochin* or *elephant legs*, in which the swelled limb is sometimes of such an enormous bulk as to have greatly the appearance both in shape and size of the leg of an elephant. According to Mr Ives, this disorder seems to be merely an œdematous swelling, occasioned by an impoverished state of the blood and juices. The persons afflicted with this distemper very seldom apply to European surgeons, and thus are rarely, if ever, cured. Indeed, our author observes, that their application would probably be of little avail, as the only thing that could be prescribed would be an alteration from the poorest to the most cordial and nutritious diet; and the Indians are so invincibly wedded to their own customs, that they would sooner die than break through them. Of this he says there were

several

favoured here of any Europeans. The Cochin-Chinese themselves, not being inclined to travel, seldom sail out of sight of their own shore, but purchase many trifles from foreigners at great rates, particularly combs, needles, bracelets, glass pendants, &c. They are very fond of our hats, caps, girdles, shirts, and other clothes; and, above all, set a great value on coral. The country is said to have 700 miles of coast, with many large inlets of the sea, and above 60 convenient landing places; which, however, according to Captain Hamilton, are but seldom visited by strangers.

The people of this country have a great affinity with those of Tonquin, with whom they have a common origin, and from whom they differ very little in their manner of living, as well as their manners and customs, all of which they have in a great measure borrowed from the Chinese. The principal exports of the country are silk, sugar, ebony, and calamba wood; gold in dust or in bars, which is sold for only ten times its weight in silver; and copper and porcelain brought from China and Japan. From this country also are exported the birds-nests esteemed such a delicacy at the table. They are found in four islands situated near the coasts of Cochin-China, to the eastward of which are five other smaller ones, where are found prodigious numbers of turtles, the flesh of which is so delicate that the Tonquinese and people of Cochin-China frequently fight desperate battles, in order to take them from one another. The commodities which sell most readily in this country are, saltpetre, sulphur, lead, fine cloth, and barred or flowered chintz. Pearls, amber, and coral, were formerly in great request, but at present only the two last are saleable; and even these will not answer unless the beads of coral be round, well polished, and of a beautiful red colour: the amber must also be extremely clear, the beads of an equal size, and not larger than a hazel nut.

The only money current in Cochin-China is that of Japan, which is paid and received by weight. The money of the country is of copper and as large as our counters; of a round figure, and having a hole in the middle by which the pieces may be strung like beads. Three hundred of these are put on one side, and as many on the other, which in Cochin-China pass for a thousand; because in 600 are found ten times 60, which make a century among almost all the people of the east. There is, however, scarce any country in which merchants are more apt to be deceived with regard to the value of money than Cochin-China, owing to the pieces being unequal in figure and quality, and the difficulty of determining their value, which is regulated only by a few characters stamped upon them. The dealers must therefore be at pains to have honest and skilful people to ascertain the value of the pieces they receive, otherwise they run a great risk of being deceived in their value, as the Cochin-Chinese make a great merit of being able to cheat an European.

European merchants complain, according to M. Grosier, unjustly of the demands made in Cochin-China for entrance, clearance, and anchorage. The duties, indeed, are very trifling, amounting only, even those of the customhouse, to 4 per cent.; but nothing can be removed from a ship which arrives there until she has first been inspected, when the customhouse officers unload her, weigh and count the smallest pieces, and generally take what they look upon to be most valuable, in order to send it to the king. The monarch takes what he thinks proper, and returns the value; but the grandees are said to keep part of the goods also, without paying any thing for them. Thus the ordinary goods, which, had they been accompanied with the more valuable part of the cargo, would have found a ready market, can now scarcely be disposed of; though our author is of opinion, that the matter is not altogether without remedy. When the Dutch sent to this country vessels loaded with cloths, lead, and saltpetre, their cargoes were suffered to remain entire, because they had taken the precaution to pay every year a certain sum for each vessel that entered. Other nations, by endeavouring to avoid the payment of this duty, entirely destroyed their commerce: the people of Cochin-China, however, for some years past, have been much more moderate in their demands; and whatever their exactions may be, they are far less exorbitant than those of the Tonquinese.

M. Grosier observes, that a false report has gained ground in Europe, that when a trading vessel happens to run aground in Cochin-China, or to be driven into any of its harbours by stress of weather, the king seizes the cargo if the rudder be broken. He assures us, however, that, so far from this being the case, a vessel in distress is much safer on the coasts of Cochin-China than almost anywhere else. Barks are immediately sent to the relief of the crew, and people employed to drag the sea with nets in order to recover the goods that are lost; and, in short, neither labour nor expences are spared to put the ships in the best condition possible. Only two things can hurt the trade of foreigners at Cochin-China, one of which may be easily avoided. This regards the clearing out of vessels. Thus, while the master is waiting on the evening before his departure, or on the day fixed for sailing, in order to receive his dispatches, it often happens that he loses his voyage, which may prove the ruin of a trader. For this reason, care must be taken to solicit a clearance a month before; by which means one is always certain of obtaining it, and departing on the day appointed. The other difficulty is occasioned by the necessity of selling goods on credit, which are seldom paid at the stipulated time. This, however, is contrary to the inclination of the prince; for every merchant who can convey to him an account of these unjust delays, is sure to be paid, and sometimes even with interest.

COCHINEAL, or COCHINEEL, a drug used by the dyers, &c. for giving red colours, especially crimsons and scarlets, and for making carmine; and likewise in medicine as a cardiac, cordial, sudorific, alexipharmac, and febrifuge.

The cochineal, in the state in which it is brought to us, is in small bodies of an irregular figure, usually convex, ridged and furrowed on one side, and concave on the other. The colour of the best is a purplish gray, powdered over with a sort of white dust. All that the world knew of it for a long time was, that it was gathered from certain plants in Mexico; and therefore it was naturally supposed to be a seed, till in the year 1692 Father Plumier gave Pomet an account

count of its being an animal. And this, though then disregarded, has been confirmed by subsequent observations. Indeed, to determine the point, we have now the means in our own hands, even in this part of the world.—We need only moisten and soak in water, or in vinegar, a number of cochineals till they are swelled and distended, to know that every one is the more or less perfect body of an insect; the most imperfect and mutilated specimens always show the rings of the body; and from observing others, it will be easy to find the number and disposition of the legs, parts, or even whole ones, being left on several, and often complete pairs. In this way the legs, antennæ, and proboscis, may be discovered. See COCCUS above, and DYEING.

M. Macquer observes, that the cochineal of Sylvester is gathered in the woods of Old and New Mexico. The insect lives, grows, and multiplies on the uncultivated opuntias, which grow there in great abundance. It is there exposed to the inclemencies of the weather, and dies naturally. The colour is more durable than that of the common cochineal, but less bright: but there is no advantage in using it; for, though cheaper, a greater quantity is requisite.

COCHLEA, the SHELL-SNAIL. See HELIX, CONCHOLOGY *Index*.

COCHLEA, in *Anatomy*. See ANATOMY *Index*.

COCHLEARIA, SCURVY-GRASS. See BOTANY *Index*.

COCHLITES, in *Natural History*, an appellation given to the petrified shells of the cochleæ or snails.

COCINTUM, in *Ancient Geography*, a promontory of the Bruttii, reckoned the longest in Italy, and which Holstenius and Vossius have restored to Ovid, reading *Cocintia* for *Ceraunia*, Metam. xv. v. 704.—*Cocintum*, also a town 22 miles to the south of Scylaceum, almost on the spot where now *Stilo* stands, from which the opposite promontory *Cocintum* is commonly called *Capo de Stilo*.

COCK, in *Zoology*, the English name of the males of gallinaceous birds, but more especially used for the common dunghill cock. See PHASIANUS, ORNITHOLOGY *Index*.

Black Cock. } See TETRAO, ORNITHOLOGY
Cock of the Wood. } *Index*.

Cock-Chaffer. See SCARABÆUS, ENTOMOLOGY *Index*.

Cock-Paddle, *Lump-fish* or *Sea-owl*. See CYCLOPTERUS, ICHTHYOLOGY *Index*.

Cock-Pit, a sort of theatre upon which game-cocks fight.

It must appear astonishing to every reflecting mind, that a mode of diversion so cruel and inhuman as that of cock-fighting should so generally prevail: that not only the ancients, barbarians, Greeks, and Romans, should have adopted it; but that a practice so savage and heathenish should be continued by Christians of all sorts, and even pursued in these better and more enlightened times.

The ancient Greeks and Romans, as is well known, were wont to call all the nations in the world barbarians; yet certainly, if we consider the many instances of cruelty practised among them, there was very little reason for the distinction. Human sacrifices were common both to them and the barbarians; and with them the exposing of infants, the combats of men with wild beasts, and of men with men in the gladiatorial scenes, were spectacles of delight and festivity.

The islanders of Delos, it seems, were great lovers of cock-fighting; and Tanagra a city in Bœotia, the isle of Rhodes, Chalcis in Eubœa, and the country of Media, were famous for their generous and magnanimous race of chickens. The kingdom of Persia was probably included in the last, from whence this kind of poultry was first brought into Greece; and if one may judge of the rest from the fowls of Rhodes and Media, the excellency of the broods at that time consisted in their weight and largeness (as the fowls of those countries were heavy and bulky), and of the nature of what our sportsmen call *shakebags* or *turnpokes*. The Greeks, moreover, had some method of preparing the birds for battle, by feeding; as may be collected from Columella.

It should seem, that at first cock-fighting was partly a religious and partly a political institution at Athens; and was there continued for the purpose of improving the seeds of valour in the minds of their youth; but was afterwards abused and perverted both here and in the other parts of Greece to a common pastime, without any moral, political, or religious intention, and as it is now followed and practised among us.

At Rome, as the Romans were prone to imitate the Greeks, we may expect to find them following their example in this mode of diversion, and in the worst way, viz. without any good or laudable motives, since when they took and brought it to Rome, the Greeks had forgotten every thing that was commendable in it, and had already perverted it to a low and unmeaning sport. Signior Hyam thinks the Romans borrowed the pastime from Dardanus, in Asia; but there is little reason for making them go so far for it, when it was so generally followed in Greece, whose customs the Romans were addicted to borrow and imitate. However, it is probable, they did not adopt this opinion very early. It may be gathered from Columella, that the Romans did not use the sport in his time. This author styles cock-fighting a *Grecian diversion*; and speaks of it in terms of ignominy as an expensive amusement, unbecoming the frugal householder, and often attended with the ruin of the parties that followed it. "The words are remarkable. "Nos enim censemus instituere vectigal industrii patris familias, non rixosarum avium lanistæ, cujus plerumque totum patrimonium pignus aleæ, victor gallinaceus pyctes abstulit:" When he describes, as we think, the manner not of the Romans, but of the Greeks, who had in his time converted the diversion of cock fighting into a species of gaming, and even to the total ruin of their families, as happens but too often in England at this day. The Romans, however, at last gave into the custom, though not till the decline of the empire. The first cause of contention between the two brothers Bassianus and Geta, sons of the emperor Septimus Severus, happened, according to Herodian, in their youth, about the fighting of their cocks; and if the battling between those two princes was the first instance of it, probably they had seen and learned it in Greece, whither they had often accompanied the emperor their father.

It is observable, that cocks and quails pitted for the purpose

Cock-pit.

purpose of engaging one another, *à outrance*, or to the last gasp, for diversion, are frequently compared, and with much propriety, to gladiators. Hence Pliny's expression, *Gallorum——ceu gladiatorum*; and that of Columella, *rixosarum avium lanistæ*; *lanista* being the proper term for the master of the gladiators. Consequently one would expect, that when the bloody scenes of the amphitheatre were discarded, as they were soon after the Christian religion became the establishment of the empire, the wanton shedding of men's blood in sport, being of too cruel and savage a nature to be patronized and encouraged in an institution so harmless and innocent as the Christian was, one might justly expect that the *ορτυγομαχια* and the *αλεκτρυομαχια* would have ceased of course. The fathers of the church are continually inveighing against the spectacles of the arena, and upbraiding their adversaries with them. These indeed were more unnatural and shocking than a main of cocks; but this, however, had a tendency towards infusing the like ferocity and implacability in the breasts and dispositions of men.

Besides, this mode of diversion has been in fact the bane and destruction of thousands here, as well as of those *lanistæ avium*, "cock-feeders," mentioned by Columella, whose patrimonial fortunes were totally dissipated and destroyed by it.

The cock is not only an useful animal, but stately in his figure, and magnificent in his plumage. "*Imperitant suo generi*, says Pliny, *et regnum* in quacunque sunt domo, *exercent*." Aristophanes compares him to the king of Persia; most authors also take notice of the "spectatissimum insigne, serratum, quod eorum verticem *regiæ coronæ modo* exornat." His tenderness towards his brood is such, that, contrary to the custom of many other males, he will scratch and provide for them with an assiduity almost equal to that of the hen; and his generosity is so great, that, on finding a hoard of meat, he will chuckle the hens together, and without touching one bit himself will relinquish the whole of it to them. He was called *the bird*, *κατ' ἐξοχην*, by many of the ancients; he was highly esteemed in some countries, and in others was even held sacred, insomuch that one cannot but regret that a creature so useful and noble, should, by a strange fatality, be so enormously abused by us. It is true, our *αλεκτρυονομαχια*, or the massacre of Shrove Tuesday, is now in a declining way; and, in a few years, it is to be hoped, will be totally disused; but the cock-pit still continues a reproach to the humanity of Englishmen, and to their religion; the purest, the tenderest, and most compassionate, of all others, not excepting even the Brachmannic.

It is unknown when the pitched battle first entered England, but it was probably brought hither by the Romans. This bird was here before Cæsar's arrival, but no notice of his fighting occurs earlier than the time of William Fitz-Stephen, who wrote the life of Archbishop Becket, some time in the reign of Henry II. and describes the cocking as a sport of school-boys on Shrove Tuesday. From this time at least the diversion, however absurd and even impious, was continued amongst us. It was followed, though disapproved and prohibited, 39 Edward III.; also in the reign of Henry VIII. and A. D. 1569. It has by some been called a *royal diversion*; and, as every one knows, the cock-pit at Whitehall was erected by a crowned head, for the more magnificent celebration of it. There was another pit in Drury-lane, and another in Javin-street. It was prohibited, however, by one of Oliver's acts, March 31. 1664. What aggravates the reproach and disgrace upon Englishmen, are those species of fighting which are called the *battle-royal* and the *Welsh-main*, known nowhere in the world but there; neither in China, nor in Persia, nor in Malacca, nor among the savage tribes in America. These are scenes so bloody as almost to be too shocking to relate; and yet, as many may not be acquainted with the horrible nature of them, it may be proper for the excitement of our aversion and detestation to describe them in a few words. In the former, an unlimited number of fowls are pitted, and when they have slaughtered one another for the diversion (*Dii boni!*) of the otherwise generous and humane Englishman, the single surviving bird is to be esteemed the victor, and carries away the prize. The Welsh-main consists, we will suppose, of 16 pairs of cocks; of these, the 16 conquerors are pitted a second time; the 8 conquerors of these are pitted a third time; the 4 conquerors the fourth time; and lastly, the two conquerors of these are pitted the fifth time; so that (incredible barbarity) 31 cocks are sure to be most inhumanly murdered for the sport and pleasure, the noise and nonsense, the profane cursing and swearing, of those who have the effrontery to call themselves, with all these bloody doings, and with all this impiety about them, *Christians*; nay, what with many is a superior and distinct character, men of benevolence and morality. But let the morality and benevolence of such be appreciated from the following instance recorded as authentic in the obituary of the Gentleman's Magazine for April 1789. "Died April 4. at Tottenham, John Ardesoif, Esq. a young man of large fortune, and in the splendour of his carriages and horses rivalled by few country gentlemen. His table was that of hospitality, where it may be said he sacrificed too much to conviviality; but if he had his foibles, he had his merits also that far outweighed them. Mr Ardesoif was very fond of cock-fighting, and had a favourite cock upon which he had won many profitable matches. The last bet he laid upon this cock he lost; which so enraged him, that he had the bird tied to a spit and roasted alive before a large fire. The screams of the miserable animal were so affecting, that some gentlemen who were present attempted to interfere, which so enraged Mr Ardesoif, that he seized a poker, and with the most furious vehemence declared, that he would kill the first man who interposed; but, in the midst of his passionate asseverations, he fell down dead upon the spot. Such, we are assured, were the circumstances which attended the death of this great pillar of humanity."

Cock-pit, Cockburne.

Cock-pit, of a ship of war, the apartment of the surgeon and his mates, being the place where the wounded men are dressed in time of battle, or otherwise. It is situated under the lower deck.

COCKBURNE, Mrs Catharine, a most accomplished lady and celebrated writer, was the daughter of Captain David Trotter, a native of Scotland, and a sea-commander in the reign of King Charles II. She was born in London, August 16. 1679, and baptized in the

the Protestant church, according to which she was bred up. She gave early marks of her genius; and learned to write, and also made herself mistress of the French language, by her own application and diligence, without any instructor; but she had some assistance in the study of the Latin grammar and logic, of which latter she drew up an abstract for her own use. The most serious and important sebjects, and especially religion, soon engaged her attention.—But notwithstanding her education, her intimacy with several families of distinction of the Romish persuasion, exposed her, while very young, to impressions in favour of that church, which not being removed by her conferences with some eminent and learned members of the church of England, she embraced the Romish communion, in which she continued till the year 1707. In 1695 she produced a tragedy called *Agnes de Castro*, which was acted at the theatre-royal when she was only in her 17th year. The reputation of this performance, and the verses which she addressed to Mr Congreve upon his Mourning Bride in 1697, were probably the foundation of her acquaintance with that celebrated writer. Her second tragedy, Fatal Friendship, was acted in 1698, at the new theatre in Lincoln's-Inn Fields. This tragedy met with great applause, and is still thought the most perfect of her dramatic performances. Her dramatic talents not being confined to tragedy, she brought upon the stage, in 1707, a comedy called *Love at a loss*, or *Most votes carry it*. In the same year she gave the public her third tragedy, entitled the *Unhappy Penitent*, acted at the theatre-royal in Drury-lane. But poetry and dramatic writing did not so far engross the thoughts of our author, but that she sometimes turned them to subjects of a very different nature, and distinguished herself in an extraordinary manner in defence of Mr Locke's writings, a female metaphysician being a remarkable phenomenon in the republic of letters.

She returned to the exercise of her dramatic genius in 1703, and fixed upon the revolution of Sweden, under Gustavus Erickson, for the subject of a tragedy. This tragedy was acted in 1706, at the queen's theatre in the Hay-Market. In 1707, her doubts concerning the Romish religion, which she had so many years professed, having led her to a thorough examination of the grounds of it, by consulting the best books on both sides of the question, and advising with men of the best judgment, the result was a conviction of the falseness of the pretensions of that church, and a return to that of England, to which she adhered during the remainder of her life. In 1708 she was married to the Rev. Mr Cockburne, then curate of St Dunstan's in Fleet-street, but he afterwards obtained the living of Long-Horsely, near Morpeth in Northumberland. He was a man of considerable abilities; and, among several other things, wrote an account of the Mosaic Deluge, which was much approved by the learned.

Mrs Cockburne's remarks upon some writers in the controversy concerning the foundation of moral duty and moral obligation, were introduced to the world in August 1712, in the Literary Journal, entitled, *The History of the Works of the Learned*. The strength, clearness, and vivacity shown in her remarks upon the most abstract and perplexed questions, immediately raised the curiosity of all good judges about the concealed writer; and their admiration was greatly increased when her sex and advanced age were known. Dr Rutherford's Essay on the Nature and Obligations of Virtue, published in May 1744, soon engaged her thoughts; and notwithstanding the asthmatic disorder which had seized her many years before, and now left her small intervals of ease, she applied herself to the confutation of that elaborate discourse, and finished it with a spirit, elegance, and perspicuity, equal, if not superior, to all her former writings.

The loss of her husband in 1748, in the 71st year of his age, was a severe shock to her; and she did not long survive him, dying on the 11th of May 1749, in her 71st year, after having long supported a painful disorder with a resignation to the Divine will, which had been the governing principle of her whole life, and her support under the various trials of it.

Her works are collected into two large volumes 8vo by Dr Birch, who has prefixed to them an account of her Life and Writings.

COCKERMOUTH, a town of Cumberland in England, situated in W. Long. 3. 12. N. Lat. 54. 35. It is a large town, irregularly built, with broad streets. It is washed by the Derwent on the western side; divided in two by the Cocker; and the parts are connected by a stone bridge of a single arch. The number of inhabitants is between three and four thousand: the manufactures are shalloons, worsted stockings, and hats; the last exported from Glasgow to the West Indies. It is a borough-town, and the right of voting is vested by burgess tenure in certain houses: this is also the town where the county elections are held.—Here is a castle seated on an artificial mount on a bank above the Derwent. It is a square building, and strengthened with several square towers: on each side of the inner gate are two deep dungeons capable of holding 50 persons in either. They are vaulted at top, and have only a small opening in order to lower through it the unhappy victims into this dire prison; and on the outside of each is a narrow slit with a slope from it, down which were put the provisions allotted for the wretched inhabitants. This castle was founded by Waldof, first lord of Allerdale, and son of Gospatrick earl of Northumberland, cotemporary with William the Conqueror. Waldof resided first at Papcastle, which he afterwards demolished; and with the materials built that at Cockermouth, where he and his family long resided; but several arms over the gateway, which Camden says are those of the *Multons*, *Humfranvilles*, *Lucies*, and *Percies*, evince it to have belonged in later times to those families. It appears that it was first granted by Edward II. to Anthony de Lucie, son of Thomas de Multon, who had assumed that name, because his mother was daughter and co-heiress to Richard de Lucie; and afterwards, by marriages, this castle and its honours descended to the Humfranvilles, and finally to the Percies. In 1658, it was garrisoned for the king; and being besieged and taken by the rebels, was burnt, and never afterwards repaired.—Cockermouth is now in the possession of the Lowther family, who have here a great property in coal-works. The town sends two members to parliament, and had 2964 inhabitants in 1811.

COCKET, is a seal belonging to the king's custom-

house;

house, or rather a scroll of parchment sealed and delivered by the officers of the customs to merchants, as a warrant that their merchandises are customed.

It is also used for the office where goods transported were first entered, and paid their custom, and had a cocket or certificate of discharge.

COCKLE. See CARDIUM, CONCHOLOGY *Index*.

COCKLE, *Schorl*, or *Shirle*, in *Mineralogy*, a species of stones, belonging to the siliceous class. See MINERALOGY *Index*.

COCKNEY, a very ancient nickname for a citizen of London. Ray says, an interpretation of it is, A young person coaxed or cockered, made a wanton, or nestle-cock, delicately bred and brought up, so as when arrived at man's estate to be unable to bear the least hardship. Another, A person ignorant of the terms of country economy, such as a young citizen, who having been ridiculed for calling the neighing of a horse laughing, and told that it was called neighing, next morning, on hearing the cock crow, to show instruction was not thrown away upon him, exclaimed to his former instructor, How that cock neighs! whence the citizens of London have ever since been called cock-neighs, or cockneys. Whatever may be the origin of this term, we at least learn from the following verses, attributed to Hugh Bagot earl of Norfolk, that it was in use in the time of King Henry II.

Was I in my castle at Bungay,
Fast by the river Waveney,
I would not care for the king of Cockney.
(i. e. the king of London.)

The king of the cockney occurs among the regulations for the sports and shows formerly held in the Middle Temple, on Childermas day, where he had his officers, a marshal, constable, butler, &c. See Dugdale's *Origines Juridicales*, p. 247.

COCKROACH. See BLATTA. In Captain Cook's last voyage, the ships, while at Huaheine, were infested with incredible numbers of these creatures, whom it was found impossible by any means to destroy. Every kind of food, when exposed only for a few minutes, was covered with these noxious insects, and pierced so full of holes, that it resembled a honey comb. They were particularly destructive to birds which had been stuffed for curiosities, and were so fond of ink, that they ate out the writing on labels. Books, however, were secured from their ravages by the closeness of the binding, which prevented them from getting in between the leaves. They were of two kinds, the *Blatta Orientalis* and *Germanica*.

COCKSWAIN, or COCKSON, an officer on board a man of war, who hath the care of the boat or sloop, and all things belonging to it. He is to be always ready with his boat's gang or crew, and to man the boat on all occasions. He sits in the stern of the boat, and steers; and hath a whistle to call and encourage his men.

COCLES, PUB. HORATIUS, a celebrated Roman, who alone opposed the whole army of Porsenna at the head of a bridge, while his companions behind him were cutting off the communication with the other shore. When the bridge was destroyed, Cocles, though wounded by the darts of the enemy, leapt into the Tiber, and swam across it with his arms. A brazen statue was raised to him in the temple of Vulcan, by the consul Publicola, for his eminent services.

COCOA. See COCOS, BOTANY *Index*.

COCONATO, a town of Piedmont in Italy, famous for being the birth-place of Columbus, who first discovered America. E. Long. 8. 0. N. Lat. 44. 50.

COCOS, in *Botany*, a genus belonging to the natural order of *Palmæ*. See BOTANY *Index*.

COCTION, a general term for all alterations made in bodies by the application of fire or heat.

COCYTUS, one of the rivers of hell, according to the theology of the poets. It has its name απο του κωκυειν, from groaning and lamenting. Hence Milton,

Cocytus nam'd of lamentation loud,
Heard on the rueful stream.

It was a branch of the river Styx: and flowed, according to Horace, with a dull and languid stream.

COD, in *Ichthyology*. See GADUS and FISHERY.

COD is also a term used, in some parts of the kingdom, for a pod. See POD.

Cod-Cape, a promontory on the coast of New England, near the entrance of Boston harbour. W. Long. 69. 50. N. Lat. 42. 0.

CODDY MODDY, the English name of a species of LARUS.

CODE (*codex*), a collection of the laws and constitutions of the Roman emperors, made by order of Justinian. The word comes from the Latin *codex*, "a paper book;" so called *à codicibus*, or *caudicibus arborum*, "the trunks of trees;" the bark whereof being stripped off, served the ancients to write their books on.

The Code is accounted the second volume of the civil law, and contains twelve books; the matter of which is nearly the same with that of the Digests, especially the first eight books; but the style is neither so pure, nor the method so accurate, as that of the digests; and it determines matters of daily use, whereas the digests discuss the more abstruse and subtle questions of the law, giving the various opinions of the ancient lawyers. Although Justinian's code is distinguished by the appellation of *code*, by way of eminence, yet there were codes before his time: such were, 1. The Gregorian code, and Hermogenean code, collections of the Roman laws, made by two famous lawyers, Gregorius and Hermogenes, which included the constitutions of the emperors from Adrian to Dioclesian and Maximinus. 2. The Theodosian code, comprised in 16 books, formed out of the constitutions of the emperors from Constantine the Great to Theodosius the Younger: this was observed almost over all the west, till it was abrogated by the Justinian code. There are also several later codes, particularly the ancient Gothic, and those of the French kings; as the code of Euridic, code-Lewis, code-Henry, code-Marchande, code des Eaux, &c.; and the present king of Prussia has lately published a code, which comprises the laws of his kingdom in a very small volume.

CODEX, in antiquity, denotes a book or tablet on which the ancients wrote. See CODE.

CODEX also denoted a kind of punishment by means of a clog or block of wood, to which slaves who had offended,

fended were tied fast, and obliged to drag it along with them; and sometimes they sat on it closely bound.

CODIA, among botanists, signifies the head of any plant, but more particularly a poppy head; whence its syrup is called *diacodium*.

CODICIL, is a writing, by way of supplement to a will, when any thing is omitted that the testator would have added, or wants to be explained, altered, or recalled.

CODLIN, an apple useful in the kitchen, being the most proper for baking.

CODLING, an appellation given to the young codfish. See GADUS, ICHTHYOLOGY *Index*.

CODON (Κωδων), in antiquity, a cymbal, or rather little brass bell, resembling the head of a poppy. They were fastened to the trappings and bridoles of horses.

CODRINGTON, CHRISTOPHER, a brave English officer, and not less distinguished for his learning and benevolence, was born at Barbadoes in the year 1668, and educated at Oxford; after which he betook himself to the army; and by his merit and courage, soon recommending himself to the favour of King William, was made a captain in the first regiment of foot-guards. He was at the siege of Namur in 1695; and, upon the conclusion of the peace of Ryswick, was made captain-general and governor in chief of the Leeward and Caribbee islands. However, in 1701, several articles were exhibited against him to the house of commons in England; to which he published a distinct and particular answer, and was honourably acquitted of all imputations. In 1703, he showed great bravery at the attack of Guadaloupe, but at last he resigned his government, and lived a studious retired life; for a few years before his death, he chiefly applied himself to church-history and metaphysics. He died at Barbadoes on the 7th of April 1710, and was buried there the day following; but his body was afterwards brought over to England, and interred on the 19th of June 1716, in the chapel of All-Souls College, Oxford. By his last will, he bequeathed his plantations in Barbadoes, and part of the island of Barbuda, to the society for propagating the gospel in foreign parts; and left a noble legacy to All-Souls College, of which he had been a fellow. This legacy consisted of his library, which was valued at 6000l.; and 10,000l. to be laid out, 6000 in building a library, and 4000 in furnishing it with books. He wrote some of the poems in the *Musæ Anglicanæ*, printed at London in 1741.

CODRUS, the 17th and last king of Athens, son of Melanthus. When the Heraclidæ made war against Athens, the oracle said that the victory would be granted to that nation whose king was killed in battle. The Heraclidæ upon this gave strict orders to spare the life of Codrus; but the patriotic king disguised himself and attacked one of the enemy, by whom he was killed. The Athenians obtained the victory, and Codrus was deservedly called the father of his country. He reigned 21 years, about 2153 years before the Christian era. To pay more honour to his memory, the Athenians made a resolution that no man after Codrus should reign in Athens under the name of *king*.

COECUM, or BLIND GUT. See ANATOMY *Index*.

Dr Musgrave gives us an account, in the Philosophical Transactions, of the cœcum of a dog being cut out without any prejudice to the animal. Mr Giles gives us another of the cœcum of a lady being distended, so as to form a tumor that held almost six pints of a thin grayish, almost liquid substance, of which she died. And Mr Knowler a third, of a boy's cœcum being vastly extended and stuffed with cherry-stones, which likewise proved mortal.

COEFFICIENTS, in *Algebra*, are such numbers or known quantities as are put before letters or quantities, whether known or unknown, and into which they are supposed to be multiplied. Thus in $3x$, ax, or bx; 3, a and b, are the coefficients of x; and in $6a$, $9b$; 6 and 9 are the coefficients of a and b. See ALGEBRA.

COELESTIAL, or CELESTIAL, in general, denotes any thing belonging to the heavens: thus we say, *celestial observations*, the *celestial globe*, &c.

COELIAC ARTERY, in *Anatomy*, that artery which issues from the aorta, just below the diaphragm. See ANATOMY *Index*.

COELIAC Vein, in *Anatomy*, that running through the intestinum rectum, along with the cœliac artery.

COELIMONTANA PORTA (Pliny), one of the gates of Rome, situated at the foot of Mount Cœlius; and hence its name, thought to be the ancient *Asinaria* by some; but this others doubt. By this gate Alaric with his Goths is said to have entered and plundered Rome.

COELIOBRIGA, in *Ancient Geography*, a town of the Bracari in the Hither Spain, to the south of Bracara Augusta, the north of the Durius, and not far from the Atlantic; a municipium (Coin). Now thought to be *Barcelos*, a town of Entre Minho y Duero. W. Long. 9. 15. Lat. 41. 20.

COELIUS MONS, one of the seven hills of Rome, so called from *Cocles*, a Tuscan captain, who came to the assistance of Romulus against the Sabines, (Dionysius Halicarnassus). Called also *Querculanus* or *Quercetulanus*, from the oaks growing on it; and *Augustus*, by Tiberius (Tacitus, Suetonius). To the east it had the city walls, on the south the Coeliolus, to the west the Palatine, and on the north the Esquiline.

COELIOLUS, a part of Mount Cœlius to the south, called *Minor Cœlius* (Martial); having the city walls on the east, the Aventine to the south, and on the west and north the valley through which the rivulet of the Appia runs.

COELOMA, among physicians, a hollow ulcer, seated in the tunica cornea of the eye.

COELOS PORTUS, in *Ancient Geography*, a town of the Chersonesus of Thrace, to the south of Sestos, where the Athenians erected a trophy, after a sea victory over the Lacedæmonians (Diodorus Siculus).

COELOSYRIA, in the larger sense of the word, was the name of the whole country lying southward of Seleucia, and extending as far as Egypt and Arabia; but this word is principally applied to the valley lying between Libanus and Antilibanus. This word occurs only in the apocryphal writings of the Old Testament.

COELUS (Heaven), in Pagan mythology, the son of Æther and Dies, or Air and Day. According to Hesiod, he married Terra or the Earth, on whom he begat Aurea or the Mountains, the Ocean, &c. But having at length imprisoned the Cyclops, who were also his children, his wife, being offended, incited her son Saturn to revenge the injury done to his brothers; and by her assistance, he bound and castrated Cœlus, when the blood that flowed from the wound produced the three furies, the giants, and the wood-nymphs; and the genital parts being thrown into the sea, impregnated the waters and formed the goddess Venus. This deity was called by the Greeks *Uranus*.

COEMETERY. See CEMETERY.

COEMPTIONALES, among the Romans, an appellation given to old slaves, which were sold in a lot with others, because they could not be sold alone.

COENOBITE, a religious who lives in a convent, or in community, under a certain rule; in opposition to anchoret or hermit, who lives in solitude. The word comes from the Greek κοινος, *communis;* and βιος, *vita*, "life." Cassian makes this difference between a *convent* and a *monastery*, that the latter may be applied to the residence of a single religious or recluse, whereas the *convent* implies *cœnobites*, or numbers of religious living in common. Fleury speaks of three kinds of monks in Egypt; *anchorets*, who live in solitude; *cœnobites*, who continue to live in community; and *sarabaites*, who are a kind of monks-errant, that stroll from place to place. He refers the institution of cœnobites to the times of the apostles, and makes it a kind of imitation of the ordinary lives of the faithful at Jerusalem. Though St Pachomius is ordinarily owned the institutor of the cœnobite life, as being the first who gave a rule to any community.

COENOBIUM, (κοινοβιον), the state of living in a society or community, where all things are common. Pythagoras is thought to be the author or first institutor of this kind of life; his disciples, though some hundreds in number, being obliged to give up all their private estates, in order to be annexed to the joint stock of the whole. The Essenians among the Jews, and Platonists, are said to have lived in the same manner. Many of the Christians also have thought this the most perfect kind of society, as being that in which Christ and his apostles chose to live.

COESFELDT, a town of Germany, in Westphalia, and in the territories of the bishop of Munster, where he often resides. It is near the river Burkel. E. Long. 64. 2. N. Lat. 51. 58.

COEVORDEN, one of the strongest towns in the United Provinces, in Overyssel, fortified by the famous Cohorn. It was taken by the bishop of Munster, 1673; and the Dutch retook it the same year. It is surrounded by a morass. E. Long. 6. 41. N. Lat. 52. 40.

COFFEA, the COFFEE-TREE. See BOTANY *Index*. The flowers, which are produced in clusters at the root of the leaves, are of a pure white, and have a very grateful odour. The fruit, which is the only useful part, resembles a cherry. When it comes to be of a deep red, it is gathered for the mill, in order to be manufactured into those *coffee-beans* now so generally known. The mill is composed of two wooden rollers furnished with iron plates 18 inches long, and 10 or 12 in diameter. These moveable rollers are made to approach a third which is fixed, and which they call the *chops*. Above the rollers is a hopper, in which they put the coffee, from whence it falls between the rollers and the chops, where it is stripped of its first skin, and divided into two parts, as may be seen by the form of it after it has undergone this operation; being flat on the one side and round on the other. From this machine it falls into a brass sieve, where the skin drops between the wires, while the fruit slides over them into baskets placed ready to receive it: it is then thrown into a vessel full of water, where it soaks for one night, and is afterwards thoroughly washed. When the whole is finished, and well dried, it is put into another machine called the *peeling-mill*. This is a wooden grinder, turned vertically upon its trendle by a mule or horse. In passing over the coffee it takes off the parchment, which is nothing but a thin skin that detaches itself from the berry in proportion as it grows dry. The parchment being removed, it is taken out of this mill to be put into another, which is called the *winnowing-mill*. This machine is provided with four pieces of tin fixed upon an axle, which is turned by a slave with considerable force; and the wind that is made by the motion of these plates clears the coffee of all the pellicles that are mixed with it. It is afterwards put upon a table, where the broken berries, and any filth that may remain among them, are separated by negroes, after which the coffee is fit for sale.

The coffee-tree is cultivated in Arabia, Persia, the East Indies, the isle of Bourbon, and several parts of America. It is also raised in botanic gardens in several parts of Europe. Prince Eugene's garden at Vienna produced more coffee than was sufficient for his own consumption. It delights particularly in hills and mountains, where its root is almost always dry, and its head frequently watered with gentle showers. It prefers a western aspect, and ploughed ground without any appearance of grass. The plants should be placed at eight feet distance from each other, and in holes twelve or fifteen inches deep. If left to themselves, they would rise to the height of 16 or 18 feet, as already observed; but they are generally stinted to five, for the conveniency of gathering their fruit with the greater ease. Thus dwarft, they extend their branches so, that they cover the whole spot round about them. They begin to yield fruit the third year, but are not in full bearing till the fifth. With the same infirmities that most other trees are subject to, these are likewise in danger of being destroyed by a worm or by the scorching rays of the sun. The hills where the coffee-trees are found have generally a gravelly or chalky bottom. In the last, it languishes for some time and then dies; in the former, its roots, which seldom fail of striking between stones, obtain nourishment, and keep the tree alive and fruitful for 30 years. This is nearly the period for plants of the coffee-tree. The proprietor, at the end of this period, not only finds himself without trees, but has his land reduced that it is not fit for any kind of culture; and unless he is so situated, that he can break up a spot of virgin land, to make himself amends for that which is totally exhausted by the coffee-trees, his loss is irreparable.

The coffee produced in Arabia is found so greatly to excel that raised in the American plantations or elsewhere, that the cultivation of the tree is now but seldom practised in any of the British colonies. Large plantations of this kind were formerly made in some of that it moderates alimentary fermentation, and is powerfully sedative. Its action on the nervous system probably depends on the oil it contains; which receives its flavour, and is rendered mildly empyreumatic, by the process of roasting. Neumann obtained by distillation from one pound of coffee, five ounces five drachms and a half of water, six ounces and half a drachm of thick fetid oil, and four ounces and two drachms of a caput mortuum. And it is well known, that rye, torrefied with a few almonds, which furnish the necessary proportion of oil, is now frequently employed as a substitute for these berries.

"The medicinal qualities of coffee seem to be derived from the grateful sensation which it produces in the stomach, and from the sedative powers it exerts on the *vis vitæ*. Hence it assists digestion, and relieves the headach; and is taken in large quantities, with peculiar propriety by the Turks and Arabians, because it counteracts the narcotic effects of opium, to the use of which those nations are much addicted.

"In delicate habits, it often occasions watchfulness, tremors, and many of those complaints which are denominated nervous. It has been even suspected of producing palsies; and from my own observation, I should apprehend, not entirely without foundation. Slare affirms, that he became paralytic by the too liberal use of coffee, and that this disorder was removed by abstinence from that liquor.

"The following curious and important observation is extracted from a letter with which I was honoured by Sir John Pringle, in April 1773: 'On reading your section concerning coffee, one quality occurred to me which I had observed of that liquor, confirming what you have said of its sedative virtues. It is the best abater of the paroxysms of the periodic asthma that I have seen. The coffee ought to be of the best Mocco, newly burnt, and made very strong immediately after grinding it. I have commonly ordered an ounce for one dish; which is to be repeated fresh after the interval of a quarter or half an hour; and which I direct to be taken without milk or sugar. The medicine in general is mentioned by Musgrave, in his treatise *De arthritide anomola*; but I first heard of it from a physician in this place, who having once practised in Litchfield, had been informed by the old people of that place, that Sir John Floyer, during the latter years of his life, kept free from, or at least lived easy under, his asthma, from the use of very strong coffee. This discovery, it seems, he made after the publication of his book upon that disease.' Since the receipt of that letter, I have frequently directed coffee in the asthma with great success."

COFFER, in *Architecture*, a square depressure or sinking in each interval between the modillions of the Corinthian cornice; ordinarily filled up with a rose; sometimes with a pomegranate, or other enrichment.

COFFER, in *Fortification*, denotes a hollow lodgement, athwart a dry moat, from 6 to 7 feet deep, and from 16 to 18 broad; the upper part made of pieces of timber raised two feet above the level of the moat, which little elevation has hurdles laden with earth for its covering, and serves as a parapet with embrasures: the coffer is nearly the same with the caponiere, excepting that this last is sometimes made beyond the counterscarp on the glacis, and the coffer always in the moat, taking up its whole breadth, which the caponiere does not. It differs from the traverse and gallery, in that these latter are made by the besiegers, and the coffer by the besieged. The besieged generally make use of coffers to repulse the besiegers when they endeavour to pass the ditch. To save themselves from the fire of these coffers, the besiegers throw up the earth on that side towards the coffer.

COFFERER *of the King's Household*, a principal officer in the court, next under the comptroller. He was likewise a white-staff officer, and always a member of the privy council. He had a special charge and oversight of the other officers of the household. He paid the wages of the king's servants below stairs, and for provisions as directed by the board of green cloth. This office is now suppressed, and the business of it is transacted by the lord steward, and paymaster of the household. He had 100l. a-year wages, and 400l. a year board wages.

COFFIN, the chest in which dead bodies are put into the ground.

The sepulchral honours paid to the manes of departed friends in ancient times, demand attention, and are extremely curious. Their being *put into a coffin* has been particularly considered as a mark of the highest distinction. With us the poorest people have their coffins. If the relations cannot afford them, the parish is at the expence. On the contrary, in the east they are not at all made use of in our times; Turks and Christians, as Thevenot assures us, agree in this. The ancient Jews seem to have buried their dead in the same manner: neither was the body of our Lord, it should seem, put into a coffin; nor that of Elisha, 2 Kings xiii. 21. whose bones were touched by the corpse that was let down *a little after* into his sepulchre. However, that they were anciently made use of in Egypt, all agree; and antique *coffins of stone* and *sycamore wood*, are still to be seen in that country; not to mention those said to be made of a kind of pasteboard; formed by folding or glueing cloth together a great many times, curiously plastered, and then painted with hieroglyphics. Its being an ancient Egyptian custom, and not practised in the neighbouring countries, were, doubtless, the cause that the sacred historian expressly observes of Joseph, that he was not only embalmed, but put into a coffin too *; both being managements peculiar to the Egyptians.

* Gen. l. 26.

Bishop Patrick, in his commentary on this passage, takes notice of these Egyptian coffins of sycamore wood and of pasteboard; but he doth not mention the contrary usage in the neighbouring countries, which was requisite, one might suppose, in order fully to illustrate the place; but even this perhaps would not have conveyed the whole idea of the sacred author. Maillet apprehends that all were not inclosed in coffins who were laid in the Egyptian repositories of the dead; but that it was an honour appropriated to persons of figure: for after having given an account of several niches found in those chambers of death, he adds †, "But it must not be imagined that the bodies deposited in these gloomy apartments were *all* inclosed in *chests*, and placed in niches. The greatest part were simply embalmed and swathed after that manner which every one hath some notion of;

† Let. vii. p. 181.

Cohesion. that these primitive particles being solid, are incomparably harder than any porous bodies composed of them; even so very hard as never to wear or break in pieces; no ordinary power being able to divide what God himself made one at the first creation. While the particles continue entire, they may compose bodies of one and the same nature and texture in all ages; but should they wear away, or break in pieces, the nature of all things depending on them would be changed. Water and earth composed of old worn particles and fragments of particles, would not now be of the same texture with water and earth composed of entire particles in the beginning. And therefore, that nature may be lasting, the changes of corporeal things are to be placed in the various separations and new associations and motions of these permanent particles; compound bodies being apt to break, not in the midst of solid particles, but where these particles are laid together, and touch in a few points." It seems farther, "That these particles have not only a *vis inertiæ*, accompanied with such passive laws of motion as naturally result from that force; but also that they are moved by certain active principles, such as that of gravity, and that which causeth fermentation and the cohesion of bodies. These principles are to be considered not as occult qualities, supposed to result from the specific forms of things, but as general laws of nature by which the things themselves are formed; their truth appearing to us by phenomena, though their cause is not yet discovered."

3 Attraction the general law of nature.

The general law of nature, by which all the different bodies in the universe are composed, according to Sir Isaac Newton, is that of attraction: i. e. "Every particle of matter has an attractive force, or a tendency to every other particle; which power is strongest in the point of contact, and suddenly decreases, insomuch that it acts no more at the least sensible distance; and at a greater distance is converted into a repellent force, whereby the parts fly from each other. On this principle of attraction may we account for the cohesion of bodies, otherwise inexplicable.

4 Formation of particles of different sizes.

"The smallest particles may cohere by the strongest attractions, and compose bigger particles of weaker virtue; and many of these may cohere, and compose bigger particles, whose virtue is still less: and so on for divers successions, until the progression end in the biggest particles, on which the operations in chemistry, and the colours of natural bodies, depend; and which, by cohering, compose bodies of a sensible magnitude.

5 Distinction of bodies into hard, soft, humid, &c.

If the body is compact, and bends or yields inward to pressure without any sliding of its parts, it is hard and elastic, returning to its figure with a force arising from the mutual attraction of its parts. If the parts slide from one another, the body is malleable or soft. If they slip easily, and are of a fit size to be agitated by heat, and the heat is great enough to keep them in agitation, the body is fluid: and if it be apt to stick to things, it is humid; and the drops of every fluid affect a round figure by the mutual attractions of their parts, as the globe of the earth and sea affects a round figure from the mutual attraction and gravity of its parts.

"Since metals dissolved in acids attract but a small quantity of the acid, their attractive force reaches but to a small distance. Now, as in algebra, where affirmative quantities cease, there negative ones begin; so in mechanics, where attraction ceases, there a repulsive virtue must succeed. That there really is such a virtue seems to follow from the reflections and inflections of the rays of light; the rays being repelled by bodies in both these cases without the immediate contact of the reflecting and inflecting body. The same thing seems also to follow from the emission of light; a ray, as soon as shaken off from a body by the vibrating motion of the parts of the body, and got beyond the reach of attraction, being driven away with exceeding great velocity; for that force which is sufficient to turn it back in reflection may be sufficient to emit it. From the same repelling power it seems to be that flies walk upon the water without wetting their feet; that the object-glasses of long telescopes lie upon one another without touching; and that dry powders are difficultly made to touch one another so as to stick together, without melting them or wetting them with water, which, by exhaling, may bring them together.

Cohesion. 6 Existence of repulsive power proved.

"The particles of all hard homogeneous bodies which touch one another, cohere with a great force; to account for which, some philosophers have recourse to a kind of hooked atoms, which in effect is nothing else but to beg the question. Others imagine, that the particles of bodies are connected by rest, i. e. in effect by nothing at all; and others, by conspiring motions, i. e. by a relative rest among themselves. For myself, it rather appears to me, that the particles of bodies cohere by an attractive force, whereby they tend mutually to each other."

7 No conclusion to be drawn from this account.

From this account of the formation and constitution of bodies, we can conclude nothing, except that they are composed of an infinite number of little particles, kept together by a force or power; but of what nature that power is, whether material or immaterial, we must remain ignorant till farther experiments are made. Some of the Newtonian philosophers, however, have positively determined these powers to be immaterial. In consequence of this supposition, they have so refined upon attractions and repulsions, that their systems seem not far from downright scepticism, or denying the existence of matter altogether. A system of this kind we find adopted by Dr Priestley *, from Messrs Boscovich and Michell, in order to solve some difficulties concerning the Newtonian doctrine of light. "The easiest method (says he) of solving all difficulties, is to adopt the hypothesis of Mr Boscovich, who supposes that matter is not impenetrable, as has been perhaps universally taken for granted; but that it consists of physical points only, endued with powers of attraction and repulsion in the same manner as solid matter is generally supposed to be: provided, therefore, that any body moves with a sufficient degree of velocity, or has a sufficient *momentum* to overcome any powers of repulsion that it may meet with, it will find no difficulty in making its way through any body whatever; for nothing else will penetrate one another but powers, such as we know do in fact exist in the same place, and counterbalance or overrule one another. The most obvious difficulty, and indeed almost the only one that attends this hypothesis, as it supposes the mutual penetrability of matter, arises from the idea

* *Hist. of Vision*, vol. i. p. 392.

8 Mr Michell's hypothesis adopted by Dr Priestley.

ing ascertained, whether the particles of the electric fluid do really repel one another, and attract all other kinds of matter, or not. See the article COHESION in the SUPPLEMENT.

COHOBATION, in *Chemistry*, an operation by which the same liquor is frequently distilled from the same body, either with an intention to dissolve this body, or to produce some change upon it. This is one of those operations which the ancient chemists practised with great patience and zeal, but which is now neglected. To make the operation easier, and to prevent the trouble of frequently changing the vessels, a particular kind of alembic, called a *pelican*, was invented. This vessel was made in the form of a cucurbit with an alembic head, but had two spouts communicating with the body. As the vapour rose up into the head, it was gradually condensed, and ran down the spouts into the body of the pelican, from whence it was again distilled; and so on.

COHORN (N.) the greatest engineer Holland has produced. Among his other works, which are esteemed masterpieces of skill, he fortified Bergen-op-zoom; which, to the surprise of all Europe, was taken by the French in 1747; but that, it is believed, was the effect of treachery. He wrote a treatise on fortification, and died in 1704.

COHORT, in Roman antiquity, the name of part of the Roman legion, comprehending about 600 men. There were ten cohorts in a legion, the first of which exceeded all the rest both in dignity and number of men. When the army was ranged in order of battle, the first cohort took up the right of the first line; the rest followed in their natural order; so that the third was in the centre of the first line of the legion, and the fifth on the left; the second between the first and third; and the fourth between the third and fifth: the five remaining cohorts formed a second line in their natural order.

COIF, the badge of a sergeant of law, who is called sergeant of the coif, from the lawn coif they wear under their caps when they are created sergeants.

The chief use of the coif was to cover the clerical tonsure. See TONSURE.

COILING, on shipboard, implies a sort of serpentine winding of a cable or other rope, that it may occupy a small space in the ship. Each of the windings of this sort is called a *fake;* and one range of fakes upon the same line is called a *tier*. There are generally from five to seven fakes in a tier; and three or four tiers in the whole length of the cable. This, however, depends on the extent of the fakes. The smaller ropes employed about the sails are coiled upon cleats at sea, to prevent their being entangled amongst one another in traversing, contracting, or extending the sails.

COILON, in the ancient Grecian theatres, the same with the cavea of the Romans.

COIMBRA, a handsome, large, and celebrated town of Portugal, capital of the province of Beira, with a bishop's see, and a famous university. The cathedral and the fountains are very magnificent. It is seated in a very pleasant country, abounding in vineyards, olive-trees, and fruits. It stands on a mountain, by the side of the river Mondego. W. Long. 8. 17. N. Lat. 40. 12.

COIN, a piece of metal converted into money by the impression of certain marks or figures thereon.

COIN differs from MONEY as the species from the genus. Money is any matter, whether metal, wood, leather, glass, horn, paper, fruits, shells, or kernels, which have currency as a medium in COMMERCE. Coin is a particular species, always made of metal, and struck according to a certain process called COINING.

The precise epocha of the invention of money is too ancient for our annals; and, if we might argue from the necessity and obviousness of the thing, must be nearly coeval with the world.

Whether coins be of equal antiquity, may admit of some doubt; especially as most of the ancient writers are so frequent and express in their mention of leathern-moneys, paper-moneys, wooden-moneys, &c. Some, however, notwithstanding this, are of opinion, that the first moneys were of metal: the reasons they give, are the firmness, neatness, cleanness, durableness, and universality of metals; which, however, do rather conclude they ought to have been so, than that they actually were so.

In effect, the very commodities themselves were the first moneys, i. e. were current for one another by way of exchange; and it was the difficulty of cutting or dividing certain commodities, and the impossibility of doing it without great loss, that first put men on the expedient of a general medium. See EXCHANGE.

Indeed, thus much may be said in behalf of coins, that, on this view, it was natural for men to have their first recourse to metals, as being almost the only things whose goodness, and as it were integrity, is not diminished by partition; besides the advantages above expressed, and the conveniences of melting and returning them into a mass of any size or weight.

It was probably, then, this property of metals which first accustomed people, who traded together, to account them in lieu of quantities of other merchandises in their exchanges, and at length to substitute them wholly in their stead; and thus arose money; as it was their other property to preserve any mark or impression a long time, which confirmed them in the right; and thus was the first rise of coins.

In the first ages, each person cut his metal into pieces of different sizes and forms, according to the quantity to be given for any merchandise, or according to the demand of the seller, or the quantity stipulated between them. To this end they went to market loaded with metal in proportion to the purchase to be made, and furnished with instruments for portioning it, and scales for dealing it out, according as occasion required. By degrees, it was found more commodious to have pieces ready weighed; and as there were different weights required according to the value of the different wares, all those of the same weight began to be distinguished with the same mark or figure: thus were coins carried one step further. At length the growing commerce of money beginning to be disturbed with frauds, both in the weights and the matter, the public authority interposed; and hence the first stamps or impressions of money; to which succeeded.

Coin.

ed the names of the moneyers; and at length the effigy of the prince, the date, legend, and other precautions to prevent the alterations of the species; and thus were coins completed.

Modern Coins. In England the current species of gold are the guinea, half-guinea, seven-shillings piece, Jacobus, laureat, angel, and rose noble; the four last of which are now seldom to be met with; having been most of them converted into guineas, chiefly during the reign of Charles II. and James II. The silver coins are the crown, half-crown, shilling, and sixpence. Copper coins are the farthing, half-penny, penny and two-penny pieces.

In Scotland, by the articles of the Union, it is appointed that all the coins be reduced to the English, and the same accounts observed throughout. Till then the Scots had their pounds, shillings, and pence, as in England; but their pound was but 20 pence English, and the others in proportion: accordingly, their merk was $13\frac{1}{3}$s. Scots, current in England at $13\frac{1}{3}$d.; their noble in proportion. Besides these they had their turnorer pence and half-pence; their penny $\frac{1}{12}$ of that of England: besides base money of achisons, babees, and placks. The bodle $\frac{1}{6}$ of the penny, $\frac{1}{4}$ of the achison, $\frac{1}{3}$ of the babee, and $\frac{1}{2}$ of the plack.

In Ireland, the coins are as in England, viz. shillings, pence, &c. with this difference, that their shilling is but equal to $11\frac{3}{400}$d. sterling: whence their pound is only 18s. $5\frac{1}{4}$d.

But, for a view of all the coins presently current in the four quarters of the globe, with their values and proportions, see the table subjoined to the article Money.

In many places shells are current for coins; particularly a small white kind dug out of the ground in the Maldives, and some parts of America, called in the Indies *cowries* or *coris*, on the coast of Africa *bonges*, and in America *porcelaines*; of which it takes a vast number to be equivalent in value to a penny. Of zimbis, another kind of shell current, particularly in the kingdoms of Angola and Congo, two thousand make what the negroes call a *macoute*, which is no real money; for of this there is none in this part of Africa, but a manner of reckoning: thus, two Flemish knives they esteem a macoute; a copper bason two pounds weight, and 12 inches diameter, they reckon three macoutes; a fusee 10, &c.

In some places fruits are current for coins. Of these there are three sorts used; two in America, particularly among the Mexicans, which are the cacao and maize; the other in the East Indies, viz. almonds brought thither from Lar, and growing in the desarts of Arabia. Of cacao 15 are esteemed equivalent to a Spanish rial, or seven pence sterling. Maize has ceased to be a common money since the discovery of America by the Europeans. Almonds are chiefly used where the *cowries* are not current. As the year proves more or less favourable to this fruit, the value of the money is higher or lower. In a common year 40 almost are set against a *pescha*, or halfpenny sterling; which brings each almond to $\frac{1}{10}$ of a farthing.

Ancient Coins are those chiefly which have been current among the Jews, Greeks, and Romans. Their values and proportions are as follow:

JEWISH.

					sterl. l.	s.	d.
Gerah					0	0	$1\frac{57}{100}$
10	Becah				0	0	$1\frac{11}{16}$
20	2	Shekel			0	0	$2\frac{3}{8}$
1200	120	50	Maneh / Mina hebraica		5	14	$0\frac{1}{4}$
60000	6000	3000	60	Talent	342	3	9

	sterl. l.	s.	d.
Solidus aureus, or sextula, worth	0	12	$0\frac{1}{2}$
Siculus aureus, worth	1	16	6
A talent of gold, worth	5475	0	0

GRECIAN.

											sterl. s.	d.	qrs.
Lepton											0	0	$0\frac{31}{336}$
7	Chalcus										0	0	$0\frac{31}{48}$
14	2	Dichalcus									0	0	$1\frac{7}{24}$
28	4	2	Hemiobolum								0	0	$2\frac{7}{12}$
56	8	4	2	Obolus							0	1	$1\frac{1}{6}$
112	16	8	4	2	Diobolum						0	2	$2\frac{1}{3}$
224	32	16	8	4	2	Tetrobolum					0	5	$0\frac{2}{3}$
336	48	24	12	6	3	$1\frac{1}{2}$	Drachma				0	7	3
662	96	48	24	12	6	3	2	Didrachmon			1	3	2
1324	112	96	48	24	12	6	4	2	Tetrardstat.		2	7	0
1660	384	120	60	30	15	$7\frac{1}{2}$	5	$2\frac{1}{2}$	$1\frac{1}{4}$	Pentrad.	3	2	3

Note: Of these the drachma, didrachma, &c. were of silver, the rest for the most part of brass. The other parts, as tridrachm, tribolus, &c. were sometimes coined.

Note also: The drachma is here, with the generality of authors, supposed equal to the denarius; though there is reason to believe that the drachma was somewhat the weightier. See Drachma and Denarius.

	sterl. l.	s.	d.
The Grecian gold coin was the stater aureus, weighing two Attic drachms, or half of the stater argenteus, and exchanging usually for 25 Attic drachms of silver in our money.	0	16	$1\frac{1}{4}$
According to our proportion of gold to silver	1	0	9
There were likewise the stater Cyzicenus, exchanging for 28 Attic drachms, or	0	18	1
Stater Philippicus, and stater Alexandrinus, of the same value.			
Stater Daricus, according to Josephus, worth 50 Attic drachms, or	1	12	$3\frac{1}{2}$
Stater Crœsius, of the same value.			

ROMAN.

						sterl. s.	d.	qrs.
Teruncius						0	0	$0\frac{775}{1000}$
2	Semilibella					0	0	$1\frac{55}{100}$
4	2	Libella / As				0	0	$3\frac{1}{10}$
10	5	$2\frac{1}{2}$	Sestertius			0	1	$3\frac{3}{4}$
20	10	5	2	Quinarius / Victoriatus		0	3	$3\frac{1}{2}$
40	20	10	4	2	Denarius	0	7	3

Note.

Note. Of these the denarius, victoriatus, sestertius, and sometimes the as, were of silver, the rest of brass. See As, &c.

There were sometimes also coined of brass the triens, sextans, uncia, sextula, and dupondius.

	l.	*s.*	*d.*
The Roman gold coin was the aureus, which weighed generally double the denarius; the value of which, according to the first proportion of coinage, mentioned by Pliny, was	1	4	3¼
According to the proportion that obtains now amongst us, worth	1	0	9
According to the decuple proportion, mentioned by Livy and Julius Pollux, worth	0	12	11
According to the proportion mentioned by Tacitus, and which afterwards obtained, whereby the aureus exchanged for 25 denarii, its value,	0	16	1½

Coin, in *Architecture*, a kind of dye cut diagonally, after the manner of a flight of a staircase, serving at bottom to support columns in a level, and at top to correct the inclination of an entablature supporting a vault.

Coin is also used for a solid angle composed of two surfaces inclined towards each other, whether that angle be exterior, as the coin of a wall, a tree, &c. or interior, as the coin of a chamber or chimney. See Quoin.

COINAGE, or Coining, the art of making money, as performed either by the hammer or mill.

Formerly the fabric of coins was different from what it is at present. They cut a large plate of metal into several little squares, the corners of which were cut off with scissars. After having shaped these pieces, so as to render them perfectly conformable, in point of weight, to the standard piece, they took each piece in hand again, to make it exactly round by a gentle hammering. This was called a *planchet*, and was fit for immediate coining. Then engravers prepared, as they still do, a couple of steel masses in form of dyes, cut and terminated by a flat surface, rounded off at the edges. They engraved or stamped on it the hollow of a head, a cross, a scutcheon, or any other figure, according to the custom of the times, within a short legend. As one of these dyes was to remain dormant, and the other moveable, the former ended in a square prism, that it might be introduced into the square hole of the block, which, being fixed very fast, kept the dye as steady as any vice could have done. The planchet of metal was horizontally laid upon this inferior mass, to receive the stamp of it on one side, and that of the upper dye, wherewith it was covered, on the other. This moveable dye, having its round engraved surface resting upon the planchet, had at its opposite extremity a flat, square, and larger surface, upon which they gave several heavy blows, with a hammer of an enormous size, till the double stamp was sufficiently, in relievo, impressed on each side of the planchet. This being finished, was immediately succeeded by another, and they thus became a standard coin, which had the degree of fineness of the weight and mark determined by the judgment of the inspectors, to make it good current money; the strong tempering which was and is still given to the two dyes, rendering them capable of bearing those repeated blows. Coining has been considerably improved and rendered expeditious, by several ingenious machines, and by a wise application of the surest physical experiments to the methods of fining, dyeing, and stamping the different metals.

The three finest instruments the mint-man uses, are the laminating engine; the machine for making the impressions on the edges of coins; and the mill.

After they have taken the laminæ, or plates of metal, out of the mould into which they are cast, they do not beat them on the anvil, as was formerly done, but make them pass and repass between the several rollers of the laminating engine, which being gradually brought closer and closer, to each other, presently give the lamina its uniform and exact thickness. Instead of dividing the lamina into small squares, they at once cut clean out of it as many planchets as it can contain, by means of a sharp steel trepan, of a roundish figure, hollow within, and of a proportionable diameter, to shape and cut off the piece at one and the same time. After those planchets have been prepared and weighed with standard pieces, filed or scraped, to get off the superfluous part of the metal, and then boiled and made clean, they arrive, at last, at the machine (fig. 1.), which marks them upon the edge; and finally, the mill (fig. 2), which, squeezing each of them singly between the two dyes, brought near each other with one blow, forces the two surfaces or fields of the piece to fill exactly all the vacancies of the two figures engraved hollow. The engine which serves to laminate lead, gives a sufficient notion of that which serves to flatten gold and silver laminæ between rollers of a lesser size. Plate CL.

The principal pieces of the machine (fig. 1.), to stamp coins on the edge, are two steel laminæ, about a line thick. One half of the legend, or of the ring, is engraved on the thickness of one of the laminæ, and the other half on the thickness of the other; and these two laminæ are straight, although the planchet marked with them be circular. Fig. 1.

When they stamp a planchet, they first put it between the laminæ in such a manner, as that these being each of them laid flat upon a copperplate, which is fastened upon a very thick wooden table, and the planchet being likewise laid flat upon the same plate, the edge of the planchet may touch the two laminæ on each side, and in their thick part.

One of these laminæ is immoveable, and fastened with several screws; the other slides by means of a dented wheel, which takes into the teeth that are on the surface of the lamina. This sliding lamina makes the planchet turn in such a manner, that it remains stamped on the edge, when it has made one turn. Only crown and half-crown pieces can bear the impression of letters on the thickness of their edges.

The coining engine or mill is so fitted for dispatch, (fig. 2.), that a single man may stamp 20,000 planchets in one day; gold, silver, and copper planchets, are all of them coined with a mill, to which the coining squares (fig. 3.) commonly called dyes are fastened; that of the face under, in a square box furnished with male and female screws, to fix and keep it steady; and the other above, in a little box, garnished with the same screws, to fasten the coining square. The planchet Fig. 2.

Sir Thomas Overbury in the Tower in 1612. His contest not long after with the lord chancellor Egerton, with some other cases, hastened the ruin of his interest at court; so that he was sequestrated from the council-table and the office of lord chief justice. In 1621, he vigorously maintained in the house of commons, that no proclamation is of any force against the parliament. The same year, being looked upon as one of the great incendiaries in the house of commons, he was removed from the council of state with disgrace; the king saying, "that he was the fittest instrument for a tyrant that ever was in England:" he was also committed to the Tower, and his papers were seized. Upon the calling of a new parliament in 1625, the court-party, to prevent his being elected a member, got him appointed sheriff of Buckinghamshire; to avoid the office, if possible, he drew up exceptions against the oath of a sheriff, but was obliged to undertake the office. In 1628 he spoke vigorously upon grievances, and made a speech, in which he affirmed, that "the duke of Buckingham was the cause of all our miseries." While he lay upon his death-bed, his papers and last will were seized by an order of council. He died in 1634, and published many works: the most remarkable are his Institutes of the Laws of England; the first part of which is only a translation and comment of Sir Thomas Littleton, one of the chief justices of the common pleas in the reign of Edward IV.

COKENHAUSEN, a strong town of Livonia in Russia, on the river Dwina. E. Long. 25. 50. N. Lat. 56. 30.

COL, one of the western islands of Scotland, is annexed to the county of Argyle. It is 13 miles long, and 9 broad. It abounds in corn, pasture, salmon, eels, and cod. The inhabitants are chiefly employed in the fisheries. W. Long. 7. 15. N. Lat. 57.

COLAPIS, Colops, in *Ancient Geography*, a river of Liburnia, which after a winding north-east course, falls into the Savus at the Insula Segestica. Now the *Culpe*, the boundary of the Alps, running through Croatia into the Save. Colapiani, the people living on it (Pliny).

COLARBASIANS, or Colorbasians, a set of Christians in the second century; so called from their leader Colarbasus, a disciple of Valentinus; who, with Marcus, another disciple of the same master, maintained the whole plenitude and perfection of truth and religion to be contained in the Greek alphabet; and that it was upon this account that Jesus Christ was called the *alpha* and *omega*. This sect was a branch of the Valentinians. See also Marcosians.

COLBERG, a strong, handsome sea-port town of Germany, in Pomerania, belonging to the king of Prussia, with 3000 or 4000 inhabitants. It is remarkable for its salt works; and is seated at the mouth of the river Persant, on the Baltic sea, 60 miles north-east of Stetin, and 30 north-east of Camin. It was taken by the Russians in 1761, but restored at the subsequent peace. E. Long. 15. 39. N. Lat. 54. 22.

COLBERT, John Baptist, Marquis of Segnelai, one of the greatest statesmen that France ever had, was born at Paris in 1619; and descended from a family that lived at Rheims in Champagne, no way considerable for its splendour and antiquity. His grandfather is said to have been a wine merchant, and his father at first followed the same occupation; but afterwards became clerk to a notary. In 1648, his relation John Baptist Colbert, lord of S. Pouange, preferred him to the service of Michael le Tellier, secretary of state, whose sister he had married; and here he discovered such diligence, and exactness in executing all the commissions that were entrusted to his care, that he quickly grew distinguished. One day his master sent him to Cardinal Mazarine, who was then at Sedan, with a letter written by the queen-mother; and ordered him to bring it back, after that minister had seen it. Colbert carried the letter, and would not return without it, though the cardinal treated him roughly, used several arts to deceive him, and obliged him to wait for it several days. Some time after, the cardinal returning to court, and wanting one to write his agenda, or memoranda, desired Le Tellier to furnish him with a fit person for that employment: and Colbert being presented to him, the cardinal had some remembrance of him, and desired to know where he had seen him. Colbert was afraid of putting him in mind of Sedan, lest the remembrance of his importunacy, in demanding the queen's letter, should renew the cardinal's anger. But his eminency was so far from hating him for his faithfulness to his late master, that he received him on condition that he should serve him with the like zeal and fidelity.

Colbert applied himself wholly to the advancement of his master's interests, and gave him so many marks of his diligence and skill, that afterwards he made him his intendant. He accommodated himself so dexterously to the inclinations of that minister, by retrenching his superfluous expences, that he was entrusted with the management of that gainful trade of selling benefices and governments. It was by Colbert's counsel, that the cardinal obliged the governors of frontier places to maintain their garrisons with the contributions they exacted; with which advice his eminency was extremely pleased. He was sent to Rome to negotiate the reconciliation of Cardinal de Retz, for which the pope had showed some concern; and to persuade his holiness to consent to the disincamerating of Casto, according to the treaty concluded with his predecessor Urban VIII. Upon the whole Mazarine had so high an opinion of Colbert's abilities, and withal such a regard for his faithful services, that at his death, which happened in 1661, he earnestly recommended him to Louis XIV. as the properest person to regulate the finances, which at that time stood in much need of reformation. Louis accepted the recommendation, and made Colbert intendant of the finances. He applied himself to their regulation, and succeeded, though it procured him many enemies, and some affronts. France is also obliged to this minister for establishing at that time her trade with the East and West Indies: a great design, and from which she has reaped innumerable advantages.

In 1664, he became superintendant of the buildings; and from that time applied himself so earnestly to the enlarging and adorning of the royal edifices, that they are at present so many masterpieces of architecture: witness the palace of the Thuilleries, the Louvre, St Germain, Fountainbleau, and Chambord. As for Versailles, it may be said that he raised it from the ground, count the arms of this town are a cross regulee between three ducal coronets, two in chief and one in base, the coronet in base passing through the cross.

The walls of the town are still tolerably entire on the south, east, and west sides, but much decayed on the north side; they are generally about nine feet thick. By a statute of Henry VIII. this town was made the see of a suffragan bishop.

This town is the most noted in England for making of baize; it is also of special note for candying the eringo roots, and for oysters.

In the conclusion of the civil war 1648, this town sustained a severe siege of 10 weeks; and the besieged making a very gallant defence, it was changed into a blockade, wherein the garrison and inhabitants suffered the utmost extremity of hunger, being reduced to the necessity of eating horse-flesh, dogs, and cats, and were at last obliged to surrender at discretion, when their two valiant chief officers, Sir Charles Lucas, and Sir George Lisle, were shot under the castle walls in cold blood. Colchester is a borough by prescription, and under that right sends two members to parliament, all their charters being silent on that head. The charter was renewed in 1763. The town is now governed by a mayor, recorder, 12 aldermen, 18 assistants, 18 common-council men. Quarter sessions are held here four times in the year.

The famous abbey-gate of St John is still standing, and allowed to be a surprising, curious, and beautiful piece of Gothic architecture, great numbers of persons coming from distant places to see it. It was built, together with the abbey, in 1097; and Guido, steward to King William Rufus, laid the first stone.

St Ann's chapel, standing at the east end of the town, is valuable in the esteem of antiquarians as a building of great note in the early days of Christianity, and made no small figure in history many centuries past. It is still pretty entire. St Botoph's priory was founded by Ernulphus, in the reign of Henry I. in the year 1110. It was demolished in the wars of Charles I. by the parliament army under Sir Thomas Fairfax. The ruins still exhibit a beautiful sketch of ancient masonry, much admired by the lovers of antiquities. The castle is still pretty entire, and is a magnificent structure, in which great improvements have of late been made. Here is an excellent and valuable library.

The markets, which are on Wednesday and Saturday, are very well supplied with all kinds of provisions. The town contained 12,544 inhabitants in 1811. Colchester is 51 miles from London, and 22 ENE of Chelmsford. It had 16 parish churches, in and out of the walls, only 12 of which are now used, the rest being damaged at the siege in 1648. E. Long. 1. 0. N. Lat. 51. 55.

COLCHI (Arrian, Ptolemy), a town of the Hither India, thought to be *Cochin*, on the coast of Malabar; now a factory and strong fort of the Dutch. E. Long. 75. 0. N. Lat. 10. 0.

COLCHICUM, Meadow-saffron. See Botany *Index*.

COLCHIS, a country of Asia, at the south of Asiatic Sarmatia, east of the Euxine sea, north of Armenia, and west of Iberia. It is famous for the expedition of the Argonauts, and as the birth-place of Medea. It was fruitful in poisonous herbs, and produced excellent flax. The inhabitants were originally Egyptians, who settled there when Sesostris king of Egypt extended his conquests in the north.

COLCOTHAR, the substance remaining after the distillation or calcination of martial vitriol or sulphate of iron. See Chemistry *Index*.

COLD, in a relative sense, signifies the sensation produced by the abstraction of heat from the body.

The nature of cold, and the methods of producing it artificially, have been treated of under the article Chemistry, to which we refer the reader.

Great degrees of cold occur naturally in many parts of the globe in the winter-time. In the winter of 1780, Mr Wilson of Glasgow observed, that a thermometer laid on the snow sunk to 25° below 0; but this was only for a short time; and in general our atmosphere does not admit of very great degrees of cold for any length of time. In 1732, the thermometer at Petersburgh stood at 28° below 0; and in 1737, when the French academicians wintered at the north polar circle, or near it, the thermometer sunk to 33° below 0; and in the Asiatic and American continent, still greater degrees of cold are very common.

The effects of these extreme degrees of cold are very surprising. Trees are burst, rocks rent, and rivers and lakes frozen several feet deep; metallic substances blister the skin like red-hot iron: the air, when drawn in by respiration, hurts the lungs, and excites a cough: even the effects of fire in a great measure seem to cease; and it is observed, that though metals are kept for a considerable time before a strong fire, they will still freeze water when thrown upon them. When the French mathematicians wintered at Torneo in Lapland, the external air, when suddenly admitted into their rooms, converted the moisture of the air into whirls of snow; their breasts seemed to be rent when they breathed it, and the contact of it was intolerable to their bodies; and the alcohol, which had not been highly rectified, burst some of their thermometers by the congelation of the aqueous part.

Extreme cold very often proves fatal to animals in those countries where the winters are very severe; and thus 7000 Swedes perished at once in attempting to pass the mountains which divide Norway from Sweden. It is not necessary indeed, that the cold, in order to prove fatal to the human life, should be so very intense as has been just mentioned. There is only requisite a degree somewhat below 32° of Fahrenheit, accompanied with snow or hail, from which shelter cannot be obtained. The snow which falls upon the clothes, or the uncovered parts of the body, then melts, and by a continual evaporation carries off the animal heat to such a degree, that a sufficient quantity is not left for the support of life. In such cases, the person first feels himself extremely chill and uneasy; he begins to turn listless, unwilling to walk or use exercise to keep himself warm; and at last turns drowsy, sits down to refresh himself with sleep, but wakes no more. An instance of this was seen not many years ago at Terra del Fuego, when Dr Solander, with some others, having taken an excursion up the country, the cold was so intense, that one of their number died. The Doctor himself, though he had warned his companions of the

the danger of sleeping in that situation, yet could not be prevented from making that dangerous experiment himself; and though he was awakened with all possible expedition, his body was so much shrunk in bulk, that his shoes fell off his feet, and it was with the utmost difficulty that he was recovered.

In those parts of the world where vast masses of ice are produced, the accumulation of it, by absorbing the heat of the atmosphere, occasions an absolute sterility in the adjacent countries, as is particularly the case with the island of Iceland, where the vast collections of ice floating out from the northern ocean, and stopped on that coast, are sometimes several years in thawing. Indeed, where great quantities of ice are collected, it would seem to have a power like fire, both augmenting its own cold and that of the adjacent bodies. An instance of this is related under the article EVAPORATION, in Mr Wedgewood's experiment, where the true cause of this phenomenon is also pointed out. See COLD, SUPPLEMENT.

COLD, in *Medicine*. See MEDICINE *Index*.

COLD. See FARRIERY *Index*.

COLDENIA. See BOTANY *Index*.

COLDINGHAM, supposed to be the *Colonia* of Ptolemy, and called by Bede the city Coldana and of Colud (*Coludum*), situated on the borders of Scotland, about two miles from Eyemouth, was a place famous many ages ago for its convent. This was the oldest nunnery in Scotland, for here the virgin-wife Etheldreda took the veil in 670; but by the ancient name *Coludum* it should seem that it had before been inhabited by the religious called *Culdees*. In 870 it was destroyed by the Danes, but its name rendered immortal by the heroism of its nuns; who, to preserve themselves inviolate from those invaders, cut off their lips and noses: and thus rendering themselves objects of horror, were, with their abbess Ebba, burnt in the monastery by the disappointed savages. After this it lay deserted till the year 1098, when King Edgar founded on its site a priory of Benedictines in honour of St Cuthbert, aud bestowed it on the monks of Durham.

Mr Pennant's description of the black, joyless, heathy moor where it was situated, might be sufficient to guard the fair inhabitants of the nunnery were it still subsisting. That description, however, is now altogether inapplicable: The whole tract, five miles over, has been since improved, and converted into corn fields; the cheerless village of Old Cambus is no more; a decent inn with good accommodations has been established at a convenient distance; and the passage of the steep glen called the *Pease*, which terminates the moor on the road towards Edinburgh, and was formerly the terror of travellers, is now rendered safe and easy by means of a bridge extending from one side of the chasm to the other.

COLDINGUEN, a town of Denmark, in North Jutland, and diocese of Ripen. It is remarkable for its bridge, over which pass all the oxen and other cattle that go from Jutland into Germany, which brings in a considerable revenue to the king. It is seated on an eminence, in a pleasant country abounding with game. E. Long. 9. 25. N. Lat. 55. 35.

COLD-FINCH, a species of MOTACILLA. See ORNITHOLOGY *Index*.

COLDSHIRE IRON, that which is brittle when cold.

COLE, WILLIAM, the most famous botanist of his time, was born at Adderbury in Oxfordshire about the year 1626, and studied at Merton college in Oxford. He at length removed to Putney, near London; and published "The Art of Simpling; and Adam in Eden, or Nature's Paradise." Upon the restoration of King Charles II, he was made secretary to Dr Duppa, bishop of Winchester; but died two years after, aged 37.

COLE-FISH, a species of GADUS. See ICHTHYOLOGY *Index*.

COLE-Seed, the seed of the *napus sativa*, or long-rooted, narrow-leaved rapa, called in English *navew*, and reckoned by Linnæus among the brassicas, or cabbage kind. See BRASSICA.

This plant is cultivated to great advantage in many parts of England, on account of the rape oil expressed from its seeds. The practice of sowing it was first introduced by the Germans and Dutchmen who drained the fens of Lincolnshire; and hence the notion hath generally prevailed, that it will thrive only in a marshy soil; but this is now found to be a mistake. In preparing the land which is to receive it, care must be taken to plough it in May, and again about midsummer, making the ground as fine and even as possible. It is to be sown the very day of the last ploughing, about a gallon on an acre. In the months of January, February, and March, it affords very good food for cattle, and will sprout again when cut; after which it is excellent nourishment for sheep. After all, if it is not too closely fed, it will bear seed against next July. The same caution, however, is requisite with this food as with clover, till cattle are accustomed to it, otherwise it is apt to swell them. When this plant is cultivated solely with a view to the seed, it must be sown on deep strong land without dung, and must be suffered to stand till one-half of the seeds at least are turned brown; which, according to the seasons will be sometimes sooner, sometimes later. In this state it is to be cut in the same manner and with the same care as wheat; and every handful as it is cut is to be regularly ranged on sheets, that it may dry leisurely in the sun, which will commonly be in a fortnight; after which it is to be carefully threshed out, and carried to the mill for expressing the oil. The produce of cole-seed is generally from five to eight quarters on an acre; and is commonly sold at 20s. per quarter.

COLEOPTERA, or BEETLE, the name of Linnæus's first order of insects. See ENTOMOLOGY *Index*.

COLEWORT. See BRASSICA.

COLERAIN, a large town of Ireland, in the county of Londonderry and province of Ulster; seated on the river Bann, four miles south of the ocean, in W. Long. 7. 2. N. Lat. 55. 10. It was formerly a place of great consideration, being the chief town of a county erected by Sir John Perrot, during his government of Ireland; whereas it is now only the head of one of the baronies in the county of Londonderry; but it is still a corporation, and sends two members to parliament. It is of a tolerable size, and very elegantly built. The port is very indifferent, occasioned by the extreme rapidity of the river, which repels the tide,

tide, and makes the coming up to the town difficult; so that it has but little trade, and might perhaps have less, if it was not for the valuable salmon-fishery, which amounts to some thousand pounds a-year. If the navigation of the Bann could be opened, which is totally obstructed by a ridge of rocks, it would quickly change the face of things; for then, by the help of this river, and the Newry canal, there would be a direct communication across the kingdom, and, with the assistance of the Black-water river, which likewise falls into Lough Neagh, almost all the counties of the province of Ulster might have a correspondence with each other by water-carriage, to their reciprocal and very great emolument.

COLES, Elisha, author of the well known Latin and English dictionary, was born in Northamptonshire about the year 1640; and was entered of Magdalene College Oxford, which he left without taking a degree; and taught Latin to young people, and English to foreigners, in London, about the year 1663. He afterwards became an usher in Merchant-taylors school; but for some great fault, nowhere expressly mentioned, he was forced to withdraw to Ireland, whence he never returned. He was, however, a good critic in the English and Latin tongues; and wrote several useful books of instruction in his profession.

COLET, John, dean of St Paul's, the son of Henry Colet, knight, was born in London in the year 1466. His education began in St Anthony's school in that city, from whence, in 1483, he was sent to Oxford, and probably to Magdalene college. After seven years study of logic and philosophy, he took his degrees in arts. About the year 1493, Mr Colet went to Paris, and thence to Italy, probably with a design to improve himself in the Greek and Latin languages, which at this time were imperfectly taught in our universities. On his return to England in 1497, he took orders; and returned to Oxford, where he read lectures *gratis*, on the epistles of St Paul. At this time he possessed the rectory of St Dennington in Suffolk, to which he had been instituted at the age of 19. He was also prebendary of York, and canon of St Martin's le Grand in London. In 1502 he became prebendary of Sarum; prebendary of St Paul's in 1505; and immediately after dean of that cathedral, having previously taken the degree of doctor of divinity. He was no sooner raised to this dignity, than he introduced the practice of preaching and expounding the scriptures; and soon after established a perpetual divinity lecture in St Paul's church, three days in every week; an institution which gradually made way for the reformation. About the year 1508, Dean Colet formed his plan for the foundation of St Paul's school, which he completed in 1512, and endowed with estates to the amount of 122l. and upwards. The celebrated grammarian, William Lyle, was his first master, and the company of mercers were appointed trustees. The dean's notions of religion were so much more rational than those of his contemporary priests, that they deemed him little better than a heretic; and on that account he was so frequently molested, that he at last determined to spend the rest of his days in peaceful retirement. With this intention he built a house near the palace of Richmond; but being seized with the sweating sickness, he died in 1519, in the 53d year of his age. He was buried on the south side of the choir of St Paul's; and a stone was laid over his grave, with no other inscription than his name. Besides the preferments above mentioned, he was rector of the guild of Jesus at St Paul's, and chaplain to King Henry VIII. Dean Colet, though a Papist, was an enemy to the gross superstitions of the church of Rome. He disapproved auricular confession, the celibacy of the priests, and such other ridiculous tenets and ceremonies as have ever been condemned by men of sound understanding in every age and country. He wrote, 1. *Rudimenta grammatices*. 2. The construction of the eight parts of speech. 3. Daily devotions. 4. *Epistolæ ad Erasmum*. 5. Several sermons: and other works which still remain in manuscript.

COLIBERTS (*Coliberti*), in *Law*, were tenants in soccage, and particularly such villeins as were manumitted or made freemen. But they had not an absolute freedom; for though they were better than servants, yet they had superior lords to whom they paid certain duties, and in that respect might be called servants, though they were of middle condition between freemen and servants.

COLIC, a severe pain in the lower venter, so called because the colon was formerly supposed to be the part affected. See Medicine *Index*.

Colic, in *Farriery*. See Farriery *Index*.

COLIGNI, Gaspard de, admiral of France, was born in 1516. He signalized himself in his youth, in the reigns of Francis I. and Henry II. and was made colonel of infantry and admiral of France in 1552. Henry II. employed him in the most important affairs; but after the death of that prince, he embraced the reformed religion, and became the chief of the Protestant party: he strongly opposed the house of Guise, and rendered this opposition so powerful, that it was thought he would have overturned the French government. On the peace made after the battles of Jernac and Montcontour, Charles XI. deluded Coligni into security by his deceitful favours; and though he recovered one attempt on his life, when he attended the nuptials of the prince of Navarre, yet he was included in the dreadful massacre of the Protestants on St Bartholomew's day 1572, and his body treated with wanton brutality by a misguided Popish populace.

COLIMA, a sea-port town of Mexico in North America, and capital of a fertile valley of the same name. It is seated at the mouth of a river, in W. Long 103. 20. N. Lat. 18. 30.

COLIOURE, a small, but ancient and strong town of France, in Rousillon, seated at the foot of the Pyrenean mountains, with a small harbour. E. Long. 3. 10. N. Lat. 43. 24.

COLIR, an officer in China, who may properly be called an inspector, having an eye over what passes in every court or tribunal of the empire. In order to render him impartial, he is kept independent, by having his post for life. The power of the colirs is such, that they make even the princes of the blood tremble.

COLISEUM, or Colisæum, in the ancient architecture, an oval amphitheatre, built at Rome by Vespasian, in the place where stood the bason of Nero's gilded house. The word is formed from *colosæum*, on account of the colossus of Nero that stood near it; or, or, according to Nardini, from the Italian *coliseo*. In this were placed statues, representing all the provinces of the empire; in the middle whereof stood that of Rome, holding a golden apple in her hand. The same term, *coliseum*, is also given to another amphitheatre of the emperor Severus. In these *colisea* were represented games, and combats of men and wild beasts; but there is now little remaining of either of them, time and war having reduced them to ruins.

COLLAERT, ADRIAN, an eminent engraver who flourished about 1550, was born at Antwerp. After having learned in his own country the first principles of engraving, he went to Italy, where he resided some time to perfect himself in drawing. He wrought entirely with the graver, in a firm neat style, but rather stiff and dry. The vast number of plates executed by his hand sufficiently evince the facility with which he engraved; and though exceedingly neat, yet they are seldom highly finished.

COLLAERT, *Hans* or *John*, son to the foregoing, was also an excellent artist. He drew and engraved exactly in the style of his father, and was in every respect equal to him in merit. He must have been very old when he died; for his prints are dated from 1555 to 1622. He assisted his father in all his great works, and engraved besides a prodigious number of plates of various subjects. One of his best prints is *Moses striking the rock*, a large print, lengthwise, from Lambert Lombard. A great number of small figures are introduced into this print; and they are admirably well executed: the heads are fine, and the drawing very correct.

COLLAR, in Roman antiquity, a sort of chain put generally round the neck of slaves that had run away, after they were taken, with an inscription round it, intimating their being deserters, and requiring their being restored to their proper owners, &c.

COLLAR, in a more modern sense, an ornament consisting of a chain of gold, enamelled, frequently set with ciphers or other devices, with the badge of the order hanging at the bottom, worn by the knights of several military orders over their shoulders, on the mantle, and its figure drawn round their armories.

Thus, the collar of the order of the Garter consists of S. S. with roses enamelled red, within a garter enamelled blue, and the george at the bottom.

Lord Mayor's COLLAR is more usually called chain. See CHAIN.

Knights of the COLLAR, a military order in the republic of Venice, called also the order of St Mark, or the Medal. It is the doge and the senate that confer this order; the knights wear no particular habit, only the collar, which the doge puts around their neck, with a medal, wherein is represented the winged lion of the republic.

COLLAR *of a Draught-horse*, a part of harness made of leather and canvas, and stuffed with straw or wool, to be put about the horse's neck.

COLLARAGE, a tax or fine laid for the collars of wine-drawing horses.

COLLATERAL, any thing, place, country, &c. situated by the side of another.

COLLATERAL, in genealogy, those relations which proceed from the same stock, but not in the same line of ascendants or descendants, but being, as it were, aside of each other. Thus, uncles, aunts, nephews, nieces, and cousins, are collaterals, or in the same collateral line: those in a higher degree, and nearer the common root, represent a kind of paternity with regard to those more remote. See CONSANGUINITY.

COLLATERAL *Succession*. When a defunct, for want of heirs descended of himself, is succeeded in his estate by a brother or sister, or their descendants, the estate is said to have gone to *collateral heirs*.

COLLATIA, in *Ancient Geography*, a town of the Sabines, thought to be distant between four and five miles from Rome to the east; situated on an eminence (Virgil.) Of this place was Tarquinius Collatinus, married to Lucretia, ravished by Sextus Tarquinius (Livy); situated on this or on the left side of the Anio (Pliny). Extant in Cicero's time, but in Strabo's day only a village; now no trace of it remains.—Another supposed *Collatia* of Apulia, near Mount Garganus, because Pliny mentions the *Collatini* in Apulia, and Frontinus the *Ager Collatinus*.

COLLATINA PORTA, a gate of Rome, at the Collis Hortulorum, afterwards called *Pinciana*, from the Pincii, a noble family. Its name *Collatina* is from *Collatia*, to the right of which was the Via Collatina, which led to that town.

COLLINA, a gate of Rome, at the Collis Quirinalis, not far from the temple of Venus Erycina (Ovid); called also *Salaria*, because the Sabines carried their salt through it (Tacitus). Now *Salaro*.

COLLATION, in the canon law, the giving or bestowing of a benefice on a clergyman by a bishop, who has it in his own gift or patronage. It differs from institution in this, that institution is performed by the bishop, upon the presentation of another; and collation is his own gift or presentation; and it differs from a common presentation, as it is the giving of the church to the person, and presentation is the giving or offering of the person to the church. But collation supplies the place of presentation and institution, and amounts to the same as institution where the bishop is both patron and ordinary. Anciently the right of presentation to all churches was in the bishop; and now if the patron neglects to present to a church, this right returns to the bishop by collation. If the bishop neglects to collate within six months after the elapse of the patron, then the archbishop hath a right to do it; and if the archbishop neglects, then it devolves to the king; the one as superior, to supply the defects of bishops, the other as supreme, to supply all defects of government.

COLLATION, in common law, the comparison or presentation of a copy to its original, to see whether or not it be conformable; or the report or act of the officer who made the comparison. A collated act is equivalent to its original, provided all the parties concerned were present at the collation.

COLLATION, in *Scots Law*, that right which an heir has of throwing the whole heritable and moveable estates of the deceased into one mass, and sharing it equally with the others in the same degree of kindred, when he thinks such share will be more than the value of the heritage to which he had an exclusive title.

COLLATION is also used among the Romanists for the meal or repast made in a fast day, in lieu of a supper. Only fruits are allowed in a collation: F. Lobineau.

neau observes, that anciently there was not allowed even bread in the collations in Lent, nor any thing besides a few comfits and dried herbs and fruits; which custom, he adds, obtained till the year 1513. Cardinal Humbert observes farther, that in the middle of the 11th century there were no collations at all allowed in the Latin church in the time of Lent; and that the custom of collations was borrowed from the Greeks, who themselves did not take it up till about the 11th century.

Collation is also popularly used for a repast between meals, particularly between dinner and supper. The word collation, in this sense, Du Cange derives from *collocutio*, "conference," and maintains, that originally collation was only a conference, or conversation on subjects of piety, held on fast days in monasteries; but that, by degrees, the custom was introduced of bringing in a few refreshments; and that by the excesses to which those sober repasts were at length carried, the name of the abuse was retained, but that of the thing lost.

Collation of Seals, denotes one seal set on the same label, on the reverse of another.

COLLEAGUE, a partner or associate in the same office or magistrature. See Adjunct.

COLLECT, Collection, a voluntary gathering of money, for some pious or charitable purpose. Some say, the name *collect*, or *collection*, was used, by reason those gatherings were anciently made on the days of *collects*, and in *collects*, i. e. in assemblies of Christians; but, more probably, *quia colligebatur pecunia*.

Collect, is sometimes also used for a tax, or imposition, raised by a prince for any pious design. Thus, histories say, that in 1166, the king of England coming into Normandy, appointed a collect for the relief of the holy land, at the desire and after the example of the king of France. See Croisade.

Collect, in the liturgy of the church of England, and the mass of the Romanists, denotes a prayer accommodated to any particular day, occasion, or the like. See Liturgy and Mass.

In the general, all the prayers in each office are called *collects*; either because the priest speaks in the name of the whole assembly, whose sentiments and desires he sums up by the word *oremus*, "let us pray," as is observed by Pope Innocent III. or, because those prayers are offered when the people are assembled together, which is the opinion of Pamelius on Tertullian.

The congregation itself is in some ancient authors called *collect*. The popes Gelasius and Gregory are said to have been the first who established *collects*. Despence, a doctor of the faculty of Paris, has an express treatise on *collects*, their origin, antiquity, authors, &c.

COLLECTIVE, among grammarians, a term applied to a noun expressing a multitude, though itself be only singular; as an army, company, troop, &c. called *collective nouns*.

COLLECTOR, in general, denotes a person who gets or brings together things formerly dispersed and separated. Hence,

Collector, in matters of civil polity, is a person appointed by the commissioners of any duty, the inhabitants of a parish, &c. to raise or gather any kind of tax.

Collector, among botanists, one who gets together as many plants as he can, without studying botany in a scientifical manner.

COLLEGATORY, in the *Civil Law*, a person who has a legacy left him in common with one or more other persons.

COLLEGE, an assemblage of several bodies or societies, or of several persons into one society.

College, among the Romans, served indifferently for those employed in the offices of religion, of government, the liberal and even mechanical arts and trades; so that, with them, the word signified what we call a corporation or company.

In the Roman empire, there were not only the *college of augurs*, and the *college of capitolini*, i. e. of those who had the superintendance of the capitoline games; but also colleges of artificers, *collegium artificum*; college of carpenters, *fabricorum* or *fabrorum tignariorum*; of potters, *figulorum*; of founders, *aerariorum*; the college of locksmiths, *fabrorum serrariorum*; of engineers of the army, *tignariorum*; of butchers, *laniorum*; of dendrophori, *dendrophororum*; of centonaries, *centonariorum*; of makers of military casques, *sagariorum*; of tent-makers, *tabernaculariorum*; of bakers, *pistorum*; of musicians, *tibicinum*, &c. Plutarch observes, that it was Numa who first divided the people into colleges, which he did to the end that each consulting the interests of their colleges, whereby they were divided from the citizens of the other colleges, they might not enter into any general conspiracy against the public repose.

Each of these colleges had distinct meeting places or halls; and likewise, in imitation of the state, a treasury and common chest, a register, and one to represent them, upon public occasions, and acts of government. These colleges had the privilege of manumitting slaves, of being legates, and making by-laws for their own body, provided they did not clash with those of the government.

There are various colleges on foot among the moderns, founded on the model of those of the ancients. Such are the three colleges of the empire, viz.

College of Electors, or their Deputies, assembled in the diet of Ratisbon.

College of Princes; the body of princes, or their deputies at the diet of Ratisbon.

College of Cities, is, in like manner, the body of deputies which the imperial cities send to the diet.

College of Cardinals, or the *Sacred College*; a body composed of the three orders of cardinals. See Cardinals.

College, is also used for a public place endowed with certain revenues, where the several parts of learning are taught.

An assemblage of several of these colleges constitutes an university. The erection of colleges is part of the royal prerogative, and not to be done without the king's license.

The establishment of colleges or universities is a remarkable period in literary history. The schools in cathedrals and monasteries confined themselves chiefly to the teaching of grammar. There were only ly one or two masters employed in that office. But, in colleges, professors are appointed to teach all the different parts of science. The first obscure mention of academical degrees in the university of Paris (from which the other universities in Europe have borrowed most of their customs and institutions), occurs A. D. 1215.

College of Civilians, commonly called *Doctors Commons*; a college founded by Dr Harvey, dean of the arches, for the professors of the civil law residing in London; where usually, likewise, reside the judge of the arches court of Canterbury, judge of the admiralty, of the prerogative court, &c. with other civilians; who all live, as to diet and lodging, in a collegiate manner, commoning together; whence the appellation of *Doctors Commons*. Their house being consumed in the great fire, they all resided at Exeter-house in the Strand till 1672; when their former house was rebuilt, at their own expence, in a very splendid manner. To this college belong 34 proctors, who make themselves parties for their clients, manage their causes, &c.

College of Physicians, a corporation of physicians in London, who, by several charters and acts of parliament of Henry VIII. and his successors, have certain privileges, whereby no man, though a graduate in physic of any university, may, without license, under the said college-seal, practise physic in or within seven miles of London; with power to administer oaths, fine and imprison offenders in that and several other particulars; to search the apothecaries shops, &c. in and about London, to see if their drugs, &c. be wholesome, and their compositions according to the form prescribed by the said college in their dispensatory. By the said charter they are also freed from all troublesome offices, as to serve on juries, be constables, keep watch, provide arms, &c.

The society had anciently a college in Knight-rider-street, the gift of Dr Linacre, physician to King Henry VIII. Since that time they have had a house built them by the famous Dr Harvey, in 1652, at the end of Amen-corner, which he endowed with his whole inheritance in his lifetime; but this being burnt in the great fire in 1666, a new one was erected at the expence of the fellows, in Warwick-lane, with a noble library, given partly by the marquis of Dorchester, and partly by Sir Theodore Mayerne.

Of this college there are at present a president, four censors, eight electors, a register, and a treasurer chosen annually in October; the censors have, by charter, power to survey, govern, and arrest, all physicians, or others practising physic, in or within seven miles of London, and to fine, amerce, and imprison them, at discretion. The number of fellows was anciently thirty, till King Charles II. increased their number to forty; and King James II. giving them a new charter, allowed the number of fellows to be enlarged so as not to exceed fourscore; reserving to himself and successors the power of placing and displacing any of them for the future.

The college is not very rigorous in asserting their privileges; there being a great number of physicians, some of very good abilities, who practise in London, &c. without their license, and are connived at by the college; yet, by law, if any person not expressly allowed to practise, take on him the cure of any disease, and the patient die under his hand, it is deemed felony in the practiser. In 1696, the college made a subscription, to the number of forty-two of their members, to set on foot a dispensatory for the relief of the sick poor: since that they have erected two other dispensatories.

Edinburgh College of Physicians was erected on the 26th November 1681. The design of this institution was, to prevent the abuses daily committed by foreign and illiterate impostors, quacks, &c. For this reason, his majesty, at the time above mentioned, granted letters patent to erect into a body corporate and politic, certain physicians in Edinburgh and their successors, by the title of "the President and Royal College of Physicians at Edinburgh," with power to choose annually a council of seven, one whereof to be president: these are to elect a treasurer, clerk, and other officers; to have a common seal; to sue and be sued; to make laws for promoting the art of physic, and regulating the practice thereof within the city of Edinburgh, town of Leith, and districts of the Canongate, West-port, Pleasance, and Potterrow: through all which the jurisdiction of the college extends. Throughout this jurisdiction, no person is allowed to practise physic, without a warrant from the college, under the penalty of 5l. sterling the first month, to be doubled monthly afterwards while the offence is continued; one-half the money arising from such fines to go to the poor, the other to the use of the college. They are also empowered to punish all licentiates in physic within the above-mentioned bounds, for faults committed against the institutions of the college; and to fine them of sums not exceeding 40s. On such occasions, however, they must have one of the bailies of the city to sit in judgment along with them, otherwise their sentence will not be valid. They are also empowered to search and inspect all medicines within their jurisdiction, and throw out into the street all such as are bad or unwholesome. That they may the better attend their patients, they are exempted from watching, warding, and serving on juries. They are, however, restrained from erecting schools for teaching the art of physic, or conferring degrees on any person qualified for the office of a physician; but are obliged to license all such as have taken their degrees in any other university, and to admit as honorary members all the professors of physic in the rest of the universities of Scotland. These privileges and immunities are not, however, to interfere with the rights and privileges of the apothecary-surgeons, in their practice of curing wounds, contusions, fractures, and other external operations.

Edinburgh College of Surgeons. This is but a very late institution, by which the surgeons of Edinburgh are incorporated into a *Royal College*, and authorized to carry into execution a scheme for making provision for their widows and children, &c. They have also the privilege of examining and licensing, if found qualified, all practitioners in surgery within certain bounds.

College of Justice, the supreme civil court of Scotland; otherwise called *Court of Session*, or *of Council and Session*. See Law *Index*.

Sion College, or the college of the London clergy, which has been a religious house time out of mind,

sometimes

sometimes under the denomination of a priory, sometimes under that of a spital or hospital: at its dissolution under 31st Henry VIII. it was called *Elson's Spital*, from the name of its founder, a mercer, in 1329. At present it is a composition of both, viz. a college for the clergy of London, who were incorporated in 1630, in pursuance to the will of Dr White, under the name of the *President and Fellows of Sion College;* and an hospital for ten poor men and as many women. The officers of the corporation are the president, two deans, and four assistants, who are annually chosen from among the rectors and vicars of London; and are subject to the visitation of the bishop. They have a good library, built and stocked by Mr Simpson, and furnished by several other benefactors, chiefly for the clergy of the city, without excluding other students on certain terms; and a hall, with chambers for students, generally occupied by the ministers of the neighbouring parishes.

Gresham College, or College *of Philosophy;* a college founded by Sir Thomas Gresham, and endowed with the revenue of the Royal Exchange. One moiety of this endowment the founder bequeathed to the mayor and aldermen of London and their successors, in trust, that they should find four able persons to read within the college, divinity, geometry, astronomy, and music; who are chosen by a committee of the common council, consisting of the lord mayor, three aldermen, and eight commoners, and allowed each, besides lodging, 50l. per annum. The other moiety he left to the company of mercers, to find three more able persons, chosen by a committee of that company, consisting of the master and three wardens, during their office, and eight of the court of assistants, to read law, physic, and rhetoric, on the same terms; with this limitation, that the several lecturers should read in termtime, every day in the week, except Sundays; in the morning in Latin, in the afternoon the same in English; but that in music to be read only in English. By 8th Geo. III. cap. 32. the building appropriated to this college was taken down, and the excise office erected in its room. Each of the professors is allowed 50l. per annum, in lieu of the apartments, &c. relinquished by them in the college, and is permitted to marry, notwithstanding the restriction of Sir Thomas Gresham's will. The lectures are now read in a room over the Royal Exchange; and the city and mercer's company are required to provide a proper place for this purpose.

In this college formerly met the Royal Society, that noble academy, instituted by King Charles II. and celebrated throughout the world for their improvements in natural knowledge. See their history and policy under Society.

College *de Propaganda Fide*, was founded at Rome in 1622 by Gregory XV. and enriched with ample revenues. It consists of thirteen cardinals, two priests, and a secretary; and was designed for the propagation and maintenance of the Romish religion in all parts of the world. The funds of this college have been very considerably augmented by Urban VIII. and many private donations. Missionaries are supplied by this institution, together with a variety of books suited to their several appointments. Seminaries for their instruction are supported by it, and a number of charitable establishments connected with and conducive to the main object of its institution.

Another college of the same denomination was established by Urban VIII. in 1627, in consequence of the liberality of John Baptist Viles, a Spanish nobleman. This is set apart for the instruction of those who are designed for the foreign missions. It was at first committed to the care of three canons of the patriarchal churches; but ever since the year 1641 it is under the same government with the former institution.

College *of Heralds*, commonly called the *Herald's Office;* a corporation founded by charter of King Richard III. who granted them several privileges, as to be free from subsidies, tolls, offices, &c. They had a second charter from King Henry VI.; and a house built near Doctors Commons, by the earl of Derby, in the reign of King Henry VII. was given them by the duke of Norfolk, in the reign of Queen Mary, which house is now rebuilt.

This college is subordinate to the earl marshal of England. They are assistants to him in his court of chivalry, usually held in the common hall of the college, where they sit in their rich coats of his majesty's arms. See Herald.

College *of Heralds in Scotland*, consists of Lyon king at arms, six heralds, and six pursuivants, and a number of messengers. See Lyon.

COLLEGIANS, Collegiani, Collegiants, a religious sect formed among the Arminians and Anabaptists in Holland, about the beginning of the seventeenth century; so called because of their colleges, or meetings, twice every week, where every one, females excepted, has the same liberty of expounding the Scripture, praying, &c. They are said to be all either Arians or Socinians; they never communicate in the college, but meet twice a-year from all parts of Holland at Rhinsbergh, (whence they are also called *Rhinsberghers*), a village two miles from Leyden, where they communicate together; admitting every one that presents himself, professing his faith in the divinity of the Holy Scriptures, and resolution to live suitably to their precepts and doctrines, without regard to his sect or opinion. They have no particular ministers, but each officiates as he is disposed. They never baptize without dipping.

COLLEGIATE, or Collegial, churches, are those which have no bishop's see, yet have the ancient retinue of the bishop, the *canons and prebends*. Such are Westminster, Rippon, Windsor, &c. governed by deans and chapters.

Of these collegiate churches there are two kinds; some of royal, and others of ecclesiastical foundation; each of them, in matters of divine service, regulated in the same manner as the cathedrals. There are even some collegiate churches that have the episcopal rights. Some of these churches were anciently abbeys, which in time were secularized. The church of St Peter's, Westminster, was anciently a cathedral; but the revenues of the monastery being by act of parliament, 1 Elizabeth, vested in the dean and chapter, it commenced a collegiate church. In several causes the styling it *cathedral*, instead of *collegiate church* of Westminster, has occasioned error in the pleadings.

COLLET, among jewellers, denotes the horizontal face or plane at the bottom of brilliants. See BRILLIANT.

COLLET, in glass-making, is that part of glass vessels which sticks to the iron instrument wherewith the metal was taken out of the melting-pot: these are afterwards used for making green glass.

COLLETICS, in *Pharmacy*, denotes much the same with AGGLUTINANTS or VULNERARIES.

COLLIER, JEREMY, a learned English nonjuring divine, born in 1650, and educated in Caius college Cambridge. He had first the small rectory of Ampton near St Edmund's Bury in Suffolk, which in six years he resigned, to come to London, in 1685, where he was made lecturer of Gray's Inn; but the change of government that followed, soon rendered the public exercise of his function impracticable. He was committed to Newgate for writing against the revolution; and again, for carrying on a correspondence which that change of events made treasonable; but was released both times, without trial, by the intervention of friends. It is observable that he carried his scruples so far, as to prefer confinement to the tacit acknowledgement of the jurisdiction of the court by accepting his liberty upon bail. Suitable to these principles, he next acted a very extraordinary part with two other clergymen of his own way of thinking, at the execution of Sir John Friend and Sir William Perkins for the assassination plot; by giving them solemn absolution, and by imposition of hands. Absconding for which, he continued under an outlawry to the day of his death in 1726. These proceedings having put a stop to his activity, he employed his retired hours rather more usefully in literary works. In 1698, he attempted to reform our theatrical entertainments, by publishing his "Short view of the immorality and profanenss of the English stage," which engaged him in a controversy with the wits of the time; but as Mr Collier defended his censures not only with wit, but with learning and reason, it is allowed that the decorum observed, for the most part, by succeeding dramatic writers, has been owing to his animadversions. He next undertook a translation of Morreri's great Historical and Geographical Dictionary; a work of extraordinary labour, and which appeared in 4 vols. folio. After this he published "An Ecclesiastical History of Great Britain, chiefly of England," in 2 vols. folio; which is allowed to be written with great judgment, and even with impartiality. He was besides engaged in several controversies, which his conduct and writings gave rise to, not material to mention. In Queen Anne's reign, Mr Collier was tempted, by offers of considerable preferment, to a submission; but as he was a nonjuror upon principle, he could not be brought to listen to any terms.

COLLIER, or COALLIER. See COALLIER.

COLLIERY, COALERY, or COALLIERY. See COALERY.

COLLINS, ANTHONY, a polemical writer, born at Hesten near Hounslow in the county of Middlesex in 1676, was the son of Henry Collins, a gentleman of about 1500l. a-year. He was first bred at Eton college, and then went to King's-college Cambridge, where he had for his tutor Mr Francis Hare, afterwards bishop of Chichester. He was afterwards a student of the Temple; but not relishing the law, soon abandoned that study. He was an ingenious man, and author of several curious books. His first remarkable piece was published in 1707, "An Essay concerning the use of reason in propositions, the evidence whereof depends on human testimony." In 1702, he entered into the controversy between Mr Clark and Dr Dodwell, concerning the immortality of the soul. In 1713, he published his discourse on free-thinking, which made a prodigious noise. In 1725, he retired into the county of Essex, and acted as a justice of peace and deputy lieutenant for the same county, as he had done before for that of Middlesex and liberty of Westminster. The same year, he published a "Philosophical Essay concerning human liberty." In 1718, he was chosen treasurer of the county of Essex; and this office he discharged with great honour. In 1724, he published his "Historical and critical Essay on the 39 Articles." Soon after, he published his "Discourse of the Grounds and reasons of the Christian religion;" to which is prefixed, "An Apology for free debate and liberty of writing; which piece was immediately attacked by a great number of authors. In 1726 appeared his "Scheme of literary prophecy considered, in a view of the controversy occasioned by a late book entitled, A discourse of the grounds," &c. In this discourse he mentions a MS. dissertation of his, to show the Sibylline oracles to be a forgery made in the times of the primitive Christians, who, for that reason, were called *Sibylists* by the Pagans; but it never appeared in print. His Scheme of literary Prophecy was replied to by several writers; and particularly by Dr John Rogers, in his "Necessity of divine revelation asserted." In answer to which our author wrote, "A letter to the Reverend Dr Rogers, on occasion," &c. His health began to decline some years before his death, and he was very much afflicted with the stone, which at last put an end to his life at his house in Harley square in 1729. He was interred in Oxford chapel, where a monument was erected to him, with an epitaph in Latin. His curious library was open to all men of letters, to whom he readily communicated all the assistance in his power; he even furnished his antagonists with books to confute himself, and directed them how to give their arguments all the force of which they were capable. He was remarkably averse to all indecency and obscenity of discourse; and was, independent of his scepticism, a sincerely good man.

COLLINS, *John*, an eminent accountant and mathematician, born in 1624, and bred a bookseller at Oxford. Besides several treatises on practical subjects, he communicated some curious papers to the Royal Society, of which he was a member, which are to be found in the early numbers of the Philosophical Transactions: and was the chief promoter of many other scientifical publications in his time. He died in 1683; and about 25 years after, all his papers coming into the hands of the learned William Jones, Esq. F. R. S. it appeared that Mr Collins held a constant correspondence for many years with all the eminent mathematicians; and that many of the late discoveries in physical knowledge, if not actually made by him, were yet brought forth by his endeavours.

COLLINS, *William*, an admirable poet, was born at

Collins. at Chichester, about the year 1724. He received his classical education at Winchester, after which he studied at New college in Oxford, was admitted a commoner of King's college in the same university, and was at length elected a demy of Magdalene college. While at Oxford, he applied himself to the study of poetry, and published his Oriental Eclogues; after which he came to London. He was naturally possessed of an ear for all the varieties of harmony and modulation; his heart was susceptible of the finest feelings of tenderness and humanity, and was particularly carried away by that high enthusiasm which gives to imagination its strongest colouring; and he was at once capable of soothing the ear with the melody of his numbers, of influencing the passions by the force of the pathos, and of gratifying the fancy by the luxury of description. With these powers, he attempted lyric poetry; and in 1746, published his Odes, descriptive and allegorical; but the sale of this work being not at all answerable to its merit, he burnt the remaining copies in indignation. Being a man of a liberal spirit and a small fortune, his pecuniary resources were unhappily soon exhausted; and his life became a miserable example of necessity, indolence, and dissipation. He projected books which he was well able to execute; and became in idea an historian, a critic, and a dramatic poet; but wanted the means and encouragement to carry these ideas into execution. Day succeeded day, for the support of which he had made no provision; and he was obliged to subsist, either by the repeated contributions of a friend or the generosity of a casual acquaintance. His spirits became oppressed, and he sunk into a sullen despondence. While in this gloomy state of mind, his uncle Colonel Martin died, and left him a considerable fortune. But this came too late for enjoyment; he had been so long harassed by anxiety and distress that he fell into a nervous disorder, which at length reduced the finest understanding to the most deplorable childishness. In the first stages of this disorder he endeavoured to relieve himself by travelling, and passed into France; but the growing malady obliged him to return; and having continued, with short intervals, in this pitiable state till the year 1756, he died in the arms of his sister.

The following character of the poetry of Collins is drawn by Mrs Barbauld, and is extracted from an essay prefixed to an edition of his works published in 1797. "He will be acknowledged to possess imagination, sweetness, bold and figurative language. His numbers dwell on the ear, and easily fix themselves in the memory. His vein of sentiment is by turns tender and lofty, always tinged with a degree of melancholy, but not possessing any claim to originality. His originality consists in his manner, in the highly figurative garb in which he clothes abstract ideas, in the felicity of his expressions, and his skill in embodying ideal creations. He had much of the mysticism of poetry, and sometimes became obscure, by aiming at impressions stronger than he had clear and well-defined ideas to support. Had his life been prolonged, and with life had he enjoyed that ease which is necessary for the undisturbed exercise of the faculties, he would probably have risen far above most of his contemporaries."

Collinson. COLLINSON, Peter, an eminent naturalist and antiquarian, descended of an ancient family, was born on the paternal estate called *Hugal Hall*, or *Height of Hugal*, near Windermere lake, in the parish of Stavely, about ten miles from Kendal in Westmoreland. Whilst a youth, he discovered his attachment to natural history. He began early to make a collection of dried specimens of plants, and had access to the best gardens at that time in the neighbourhood of London. He became early acquainted with the most eminent naturalists of his time; the Drs Derham, Woodward, Hale, Lloyd, and Sloane, were amongst his friends. Among the great variety of articles which form that superb collection, now (by the wise disposition of Sir Hans and the munificence of parliament) the British Museum, small was the number of those with whose history Mr Collinson was not well acquainted; he being one of those few who visited Sir Hans at all times familiarly; their inclinations and pursuits in respect to natural history being the same, a firm friendship had early been established between them. Peter Collinson was elected a fellow of the Royal Society on the 12th of December 1728; and perhaps was one of the most diligent and useful members, not only in supplying them with many curious observations himself, but in promoting and preserving a most extensive correspondence with learned and ingenious foreigners in all countries and on every useful subject. Besides his attention to natural history, he minuted every striking hint that occurred either in reading or conversation; and from this source he derived much information, as there were very few men of learning and ingenuity who were not of his acquaintance at home; and most foreigners of eminence in natural history, or in arts and sciences, were recommended to his notice and friendship. His diligence and economy of time were such, that though he never appeared to be in a hurry, he maintained an extensive correspondence with great punctuality; acquainting the learned and ingenious in distant parts of the globe with the discoveries and improvements in natural history in this country, and receiving the like information from the most eminent persons in almost every other. His correspondence with the ingenious Cadwallader Colden, Esq. of New-York, and the justly celebrated Dr Franklin of Philadelphia, furnish instances of the benefit resulting from his attention to all improvements. The latter of these gentlemen communicated his first essays on electricity to Mr Collinson, in a series of letters, which were then published, and have been reprinted in a late edition of the Doctor's ingenious discoveries and improvements. Perhaps, in some future period, the account procured of the management of sheep in Spain, published in the Gentleman's Magazine for May and June 1764, may not be considered among the least of the benefits accruing from his extensive and inquisitive correspondence. His conversation, cheerful and usefully entertaining, rendered his acquaintance much desired by those who had a relish for natural history, or were studious in cultivating rural improvements; and secured him the intimate friendship of some of the most eminent personages in this kingdom, as distinguished by their taste in planting and horticulture, as by their rank and dignity. He was the first who introduced the great variety of seeds and shrubs which are now the principal pieces either original or translations, and selected the ablest actors, particularly in comedy. To a translation he made of Horace's Art of Poetry, he prefixed an ingenious account of the intention of its author; and added importance to the whole work by many critical notes. The Genius, and the Gentleman, were other two of his performances, as also a number of small pieces of the humorous kind. His understanding was much impaired by a stroke of the palsy, which seized him in the year 1789, in consequence of which melancholy event, his son was intrusted with the management of the theatre. He died in the month of August 1794, in the 62d year of his age.

COLMAR, a considerable town of France, in the department of the Upper Rhine, of which it is the capital. It has great privileges, and the Protestants have liberty of conscience. It is seated near the river Ill, in E. Long. 7. 27. N. Lat. 48. 5.

COLMARS, a town of France, in the department of Lower Alps, and the diocese of Sens. It is seated near the Alps, in E. Long. 6. 35. N. Lat. 44. 7.

COLNBROOK, a town of Buckinghamshire in England, seated on the river Coln, which separates this county from Middlesex. It is a great thoroughfare on the western road, and has several good inns. There are some small islands formed in its neighbourhood by the different branches of the river Coln, where the Danes are supposed to have sheltered themselves from the attacks of Alfred. W. Long. 0. 25. N. Lat. 51. 30.

COLNE, a town of Lancashire in England, seated on a small hill near the confines of the county. W. Long. 2. 5. N. Lat. 53. 50.

COLOCHINA, an ancient town of the Morea, in Turkey in Europe. E. Long. 22. 25. N. Lat. 36. 32.

COLOCYNTHIS, in *Botany*, a species of CUCUMIS.

COLOCZA, a town of Hungary, seated on the Danube, and capital of the county of Bath, with an archbishop's see. It was taken by the Turks in 1686, but afterwards retaken by the Imperialists. E. Long. 18. 29. N. Lat. 46. 38.

COLOGNA, a town of Italy, in Padua, and in the territory of Venice, now subject to Austria. E. Long. 17. 27. N. Lat. 45. 14.

COLOGNE, The ARCHBISHOPRIC or DIOCESE of, formerly one of the states that composed the electoral circle of the Rhine, in Germany. It was bounded on the north by the duchy of Cleves and Gueldres, on the west by that of Juliers, on the south by the archbishopric of Cleves, and on the east by the duchy of Berg, from which it was almost wholly separated by the Rhine. This country is very fruitful in corn and wine, which the inhabitants dispose of by embarking it on the Rhine, it extending above seventy miles along that river. It was divided into the Higher and Lower Diocese: the Higher Diocese contained that part which lies above Cologne, wherein is Bonne, the capital town of the electorate, and where the elector resided; besides which there were Leichnich, Andernach, Bruyl, Zulich, and Kerpen. The Lower Diocese was on the other side of Cologne, and contained the towns of Zonz, Neuys, Heizarwart, Kempen, Rhynberg, and Alpen. The city of Cologne and county of Meurs, though within the diocese of Cologne, did not belong to it; for Cologne was a free city, and Meurs belonged to the house of Nassau Orange; but by way of recompense, the elector had considerable dominions in Westphalia, which they call the *Domain*. This prelate was one of the electors of the empire, and held alternately with that of Treves the second or third rank in the electoral college. He was arch-chancellor of the empire in Italy, which dignity was very important when the emperors were masters of Italy. When the emperors were crowned at Aix-la-chapelle, the archbishop of Cologne performed the ceremony, which caused him to pretend to the same right elsewhere; but he was opposed by the archbishop of Mentz. This occasioned an order, that they should each of them have that honour in his own diocese, but if it was done elsewhere, they should perform it alternately. The archbishop of Cologne was elected by the chapter in that city, which was the most illustrious in all Germany. They were all princes or counts, except eight doctors, who have no occasion to prove their nobility. The archbishopric was secularised during the French revolution, and is now subject to Prussia.

COLOGNE, an ancient and celebrated town of Germany, in the diocese of that name, with an archbishop's see, and a famous university, seated on the river Rhine, in E. Long, 7. 10. N. Lat. 50. 55. In the times of the Romans, this city was called *Colonia Agrippina*, and *Ubiorum*, because it was built by Agrippina, the wife of Claudius I. and mother of Nero; and because the Ubii inhabited this country on the Lower Rhine. In 755 it was an archbishopric, and in 1260 entered into the Hanseatic league, which has now no existence. The university was established in 1388 by Pope Urban VI. The city is fortified with strong walls, flanked with 83 large towers, and surrounded with three ditches; but these fortifications being executed after the ancient manner, could make but a poor defence at present. It lies in the shape of a half-moon, and is said to have 20 gates, 19 parishes, 17 monasteries, and 365 churches and chapels; but the streets, in general, are dirty and badly paved, the windows of the houses composed of small bits of round glass, and the inhabitants are but few for so large a place. It is inhabited mostly by Papists; but there are also many Protestants, who repair to the neighbouring town of Mulheim, in the duchy of Berg, for public worship. Its trade, which is considerable, especially in Rhenish wine, is chiefly in the hands of Protestants, and carried on by the Rhine. The ships with which they trade to the Netherlands are of a particular construction, and considerable burden. The clergy here are very numerous, and have large revenues. That of the archbishop was 130,000l. Baron Polnitz says, that though Cologne is one of the greatest cities, it is one of the most melancholy in all Europe; there being nothing to be seen but priests, friars, and students, many of whom beg alms with a song, and nothing to be heard but the ringing of bells; that there are very few families of quality; that the vulgar are very clownish; and that the noblemen of the chapter stay no longer in town than their duty obliges them. Mr Wright, in his Travels, says, that the women go veiled; and that the best gin is that distilled from the juniper berries which grow in this neighbourhood. This city is perhaps the most remarkable of any in the world for the great number of precious

precious relics it contains, of which the Popish clergy no doubt make their advantage. In the church of St Ursula, they pretend to show her tomb, and the bones of the 11,000 pretended virgin martyrs, though that story is entirely owing to a mistaken inscription. The heads of some of these imaginary martyrs are kept in cases of silver, others are covered with stuffs of gold, and some have caps of cloth of gold and velvet. Brevat says, he saw between 4000 and 5000 skulls, decked with garlands and coronets, ranged on shelves. The canonesses of St Ursula, who must be all countesses, have a handsome income. In their church they pretend to show three of the thorns of our Saviour's crown, and one of the vessels which contained the water that he converted into wine at the marriage of Cana. In the church of St Gereon are 900 heads of Moorish cavaliers, said to have been in the army of Constantine before it was converted, and to have been beheaded for refusing to sacrifice to idols. Every one of the heads has a cap of scarlet, adorned with pearls. In the magnificent cathedral of St Peter, the three wise men who came from the east to visit our Saviour, are said to be interred. They lie in a large purple shrine spangled with gold, set upon a pedestal of brass, in the midst of a square mausoleum, faced within and without with marble and jasper. It is opened every morning at nine o'clock, if two of the canons of the cathedral are present, when the kings or wise men are seen lying at full length, with their heads bedecked with a crown of gold garnished with precious stones. Their names, which are *Gasper*, *Melchier*, and *Balthasar*, are in purple characters on a little grate, which is adorned with an infinite number of large rich pearls and precious stones, particularly an oriental topaz as big as a pigeon's egg, and valued at above 30,000 crowns. Over against them are six large branches of silver, with wax candles, which burn night and day. The bones of these men, we are told, were brought to Constantinople by Helena mother to Constantine, from thence to Milan by Eustorpius bishop of that see, and afterwards hither by Archbishop Rainold. In the Jesuits college are the portraits of the first 13 generals of that order, with Ignatius Loyola at their head; and in the church, which is the finest in Cologne, are many rich statues, with an amazing quantity of fine silver plate; and the utensils for mass are all of gold enriched with precious stones. In the Cordeliers church, is the tomb of the famous Duns Scotus, surnamed *Doctor Subtilis*, with this epitaph, "Scotia me genuit, Anglia me suscepit, Gallia me docuit, Colognia me tenet." Cologne was a free imperial city, but was deprived of its privileges in 1806, and is now subject to Prussia. Towards the defence of the empire, its assessment was 825 florins; and towards the maintenance of the chamber-court, 405 rixdollars $72\frac{1}{2}$ kruitzers, each term. Its militia consists of four companies of foot, who keep guard at the gates. Cologne surrendered to the French in 1794, and was delivered over to the Prussians in 1814. It has repeatedly suffered from inundations of the Rhine, particularly in 1784. The wine raised in the adjacent country is of a very inferior quality. The principal objects of export are wine, timber, earthen-ware, slates, hard-ware, and fire-arms.

Cologne-Earth, a kind of very light bastard ochre, of a deep brown colour.

COLOMBO, a handsome, pleasant, and strong town of Asia, seated on the western side of the island of Ceylon in the East Indies. It was built by the Portuguese in 1638; and in 1658 they were driven from it by the natives, assisted by the Dutch, who were afterwards dispossessed by the British. It is about three quarters of a mile long, and as much in breadth. The natives live in the old town, without the walls of the new; the streets of this last are wide and spacious; and the buildings are in the modern taste, particularly the governor's house, which is a handsome structure. E. Long. 80. 25. N. Lat. 7. 10.

COLOMEY, or Colomia, a town of Poland in Red Russia, seated on the river Pruth, in E. Long. 25. 9. N. Lat. 48. 45.

COLOMNA, Fabio, a very learned botanist, born at Naples about the year 1567. He became skilled in the languages, in music, designing, painting, and the mathematics; and died about the middle of the 17th century. He wrote, 1. Φυτοβασανος, seu Plantarum aliquot (ac piscium) historia. 2. Minus cognitarum rariorumque stirpium εκφρασις; itemque de aquatilibus, aliisque nonnullis animalibus, libellus; and other works.

COLON, in *Anatomy*, the first and most considerable of the large intestines. See Anatomy, N° 194.

Colon, in *Grammar*, a point or character formed thus [:], serving to mark a pause, and to divide the members of a period. See Pointing; see also Period, Comma, and Semicolon. Grammarians generally assign the use of a colon to be, to mark the middle of a period; or to conclude a sense less perfect than the dot or period:—but, a sense less perfect than the period, is an expression extremely vague and indeterminate. See Period.

Others say, a colon is to be used when the sense is perfect, but the sentence not concluded; but neither is this over clear and express.

A late author, in a ingenious discourse, *De ratione interpungendi*, marks the office of the colon, and wherein it differs from the semicolon, &c. more precisely. A colon, on his principles, serves to distinguish those conjunct members of a sentence, which are capable of being divided into other members; whereof one, at least, is conjunct. Thus, in the sentence, *As we cannot discern the shadow moving along the dial-plate, so the advances we make in knowledge are only perceived by the distance gone over;* the two members being both simple, are only separated by a comma. In this, *As we perceive the shadow to have moved, but did not perceive it moving; so our advances in understanding, in that they consist of such minute steps, are only perceivable by the distance;*—the sentence being divided into two equal parts, and those conjunct ones, since they include others; we separate the former by a semicolon, and the latter by commas. But in this, *As we perceive the shadow to have moved along the dial, but did not perceive it moving; and it appears the grass has grown, though nobody ever saw it grow: so the advances we make in knowledge, as they consist of such minute steps, are only perceivable by the distance*—the advancement

in

in knowledge is compared to the motion of a shadow, and the growth of grass; which comparison divides the sentence into two principal parts: but since what is said of the movement of the shadow, and likewise of the growth of grass, contains two simple members, they are to be separated by a semicolon; consequently a higher pointing is required to separate them from the other part of the sentence, which they are opposed to: and this is a colon. See PUNCTUATION.

COLONEL, in military matters, the commander in chief of a regiment, whether horse, foot, or dragoons.

Skinner derives the word from colony, being of opinion, the chiefs of colonies, called *coloniales*, might give the name to chiefs of forces. In the French and Spanish armies, colonel is confined to the infantry and dragoons: the commanding officer of a regiment of horse they usually call *mestre de camp*. Formerly, instead of colonel, the French used the word coronel: and this old spelling comes nearer to our common way of pronouncing the word *colonel*.

A colonel may lay any officer of his regiment in arrest, but must acquaint the general with it; he is not allowed a guard, only a sentry from the quarter-guard.

COLONEL-*Lieutenant*, he who commands a regiment of guards, whereof the king, prince, or other person of the first eminence, is colonel. These colonel-lieutenants have always a colonel's commission, and are usually general officers.

Lieutenant COLONEL, the second officer in a regiment, who is at the head of the captains, and commands in the absence of the colonel.

COLONIA, in *Ancient Geography*, a town of the Trinobantes, a little above Camelodunum. Now Colchester in Essex, according to Camden, who supposes it to take its name from the river Colne, and not that it was a colony; though others think Antonine's distance agrees with Sudbury.

COLONIA *Equestris*, an ancient and noble colony on the Lacus Lemanus. It appears to be the work of Julius Cæsar, who settled there *Equites Limatenei*; and to this Lucan is thought to refer. By the Itinerary it is supposed to have stood between Lausanne and Geneva, 12 miles from the last place by Peutinger's map, which directs to Nyon, placed in Cavo Lemano, according to Lucan's expression, that is, a bay or cove of the lake. Its ancient name was *Noviodunum*, (Notitia Galliæ): hence its modern name.

COLONIA *Metallina*, or *Metallinensis*, a town of Lusitania, situated on the right or west side of the Anas, or Guadiana; but now on the left or east side, from the river's shifting its bed or channel, and called Medelin, a town in Estremadura. W. Long. 6. 12. Lat. 38. 45.

COLONIA *Morinorum*, a town in Belgica, thought to be Tarvenna, the capital of the Morini. Now Terrouen, a town of Artois. E. Long. 2. 15. Lat. 37. 50.

COLONIA *Norbensis*, or *Norba Cæsarea*, a town of Lusitania, to the south of Trajan's bridge on the Tagus. Now *Alcantara*, in Estremadura. W. Long. 7. 10. N. Lat. 39. 10.

COLONIA *Trajana*, (Antonine, Peutinger); a town of Belgica, surnamed also *Ulpia*, (Antonine); and *Tricesima*, from being the station of the thirtieth legion, (Ammian). Now Kellen, a village of the duchy of Cleves, a mile from the Rhine.

COLONIA *Valentia*, (Ptolemy, Livy); a town of the Hither Spain, on the Turias; destroyed by Pompey, (Sallust); restored by Julius Cæsar. Still called Valencia, on the river Guadalaviar, in Valencia. W. Long. 35. Lat. 39. 20.

COLONNA, a town of Italy in the Campagna of Rome, 18 miles eastward of that city. E. Long. 12. 56. N. Lat. 41. 55.

COLONNA, *Pompey*, cardinal archbishop of Montreal in Sicily, and bishop of a very great number of places, made a conspicuous figure in the world. He was equally qualified to wear the cardinal's hat and the helmet, and experienced more than once the reverses of fortune. Julius II. removed him from all his dignities; but Leo I. restored him, created him cardinal, and sent him on several embassies. Clement VII. divested him of the purple, and again restored him to it. It was pretended he was obliged to him for his exaltation to the papal throne. The pope refusing him some request, he reproached him, saying, "That it was by his interest he had arrived at his dignity." The pope replied, "It is true, but let me be pope, and do not endeavour to be so yourself; for by acting as you do, you endeavour to dispossess me of that you have raised me to." He died viceroy of Naples in 1532. He wrote some poems in praise of Isabella Filamarini, in which he protests the chastity of his wishes. He wrote another work, *De laudibus mulierum*.

COLONNADE, in *Architecture*, a peristyle of a circular figure; or a series of columns disposed in a circle, and insulated within side.

A Polystyle COLONNADE, is that whose numbers of columns are too great to be taken in by the eye at a single view. Such is the colonnade of the palace of St Peter's at Rome, consisting of 284 columns of the Doric order, each above four feet and a half diameter, all in Tiburtine marble.

COLONOS, in *Ancient Geography*, an eminence near Athens, whither Oedipus, after his banishment from Thebes, is said to have retired; and hence it is that Sophocles calls the tragedy on the subject *Oedipus Coloneus*. A place sacred to Neptune, and where stood an equestrian statue of him. Here also stood Timon's tower; who, for his love of solitude, and hatred to mankind, was called *Misanthropos*, (Pausanias.).

COLONSAY, one of the Hebrides or Western Islands belonging to Scotland. It comprehends that of Oronsay, from which it is only separated in time of flood, and both belong to the same proprietor, viz. Mr M'Neil. See ORONSAY.

COLONUS, a husbandman or villager, who was bound to pay yearly a certain tribute, or at certain times of the year to plough some part of the lord's land; and from hence comes the word *clown*, who is called by the Dutch, *boor*.

COLONY, a company of people transplanted into a remote province in order to cultivate and inhabit it.

We may distinguish three kinds of colonies. First, those

those serving to ease or discharge the inhabitants of a country, where the people are become too numerous, so that they cannot any longer conveniently subsist.

The second are those established by victorious princes and people, in the middle of vanquished nations, to keep them in awe and obedience.

The third may be called *colonies of commerce;* because, in effect, it is trade that is the sole occasion and object thereof.

It was by means of the first kind of colonies that, some ages after the deluge, the east first, and successively all the other parts of the earth, became inhabited; and without mentioning any thing of the Phœnician and Grecian colonies, so famous in ancient history, it is notorious that it was for the establishment of such colonies, that, during the declension of the empire, those torrents of barbarous nations, issuing, for the generality, out of the north, overran the Gauls, Italy, and the other southern parts of Europe; and, after several bloody battles, divided it with the ancient inhabitants.

For the second kind of colonies, the Romans used them more than any other people; and that to secure the conquests they had made from the west to the east. It is well known how many cities in Gaul, Germany, Spain, and even England, value themselves on their having been of the number of Roman colonies.

There were two kinds of colonies among the Romans: those sent by the senate; and the military ones, consisting of old soldiers, broken and disabled with the fatigues of war, who were thus provided with lands as the reward of their services. See BENEFICE. The colonies sent by the senate were either Roman or Latin, i. e. composed either of Roman citizens or Latins. The coloniæ Latinæ were such as enjoyed the *jus Latii;* said to consist in those two things; one, that whoever was edile or prætor in a town of Latium, became for that reason a Roman citizen; the other, that the Latins were subject to the edicts of their own and not to those of the Roman magistrates: in the year of the city six hundred and sixty-two, after the Social war, the city was granted to all Latium, by the *lex Julia.* The coloniæ Romanæ, were such as had the jus Romanum, but not in its full extent; namely, in the right of suffrage, putting up for honours, magistracies, command in the army, &c.; but the jus Quiritum only, or private right; as right of liberty, of gentility, or dignity of family, sacrifice, marriage, &c. For it was long a rule, never to grant the liberty of the city in full to colonies; nor is there any instance to the contrary, till after the Social war, in the year of the city six hundred and sixty-two. According to Ulpian (l. 1. *D. de Cens.*) there were other colonies, which had little more than the name, only enjoying what they called *jus Italicum*, i. e. they were free from the tributes and taxes paid by the provinces. Such were the colonies of Tyre, Berytus, Heliopolis, Palmyra, &c. M. Vaillant has filled a volume in folio with medals struck by the several colonies, in honour of the emperors who founded them. The ordinary symbol they engraved on their medals, was either an eagle; as when the veteran legions were distributed in the colonies: or a labourer, holding a plough drawn by a pair of oxen; as when the colony consisted of ordinary inhabitants. On all the medals are seen the names of the decemviri, who held the same rank and had the same authority there as the consuls had at Rome.

Lastly, the colonies of commerce are those established by the English, French, Spaniards, Portuguese, and other nations, within these two last centuries, and which they continue still to establish, in several parts of Asia, Africa, and America: either to keep up a regular commerce with the natives, or to cultivate the ground, by planting sugar canes, indigo, tobacco, and other commodities. The principal of this kind of colonies are in the one and the other America, northern and southern; particularly Peru, Mexico, Canada, (lately Virginia, New England, Carolina), la Louisiana, l'Acadia, Hudson's Bay, the Antilles islands, Jamaica, Domingo, and the other islands.—In Africa, Madagascar, Cape of Good Hope, Cape Verd, and its islands, and all those vast coasts extending thence as far as to the Red sea. Lastly, in Asia, the famous Batavia of the Dutch; Goa, Diu, of the Portuguese; and some other less considerable places of the English, French, and Danes.

The practice of settling commercial colonies in distant countries hath been adopted by the wisest nations of antiquity, who acted systematically upon maxims of sound policy. This appears to have been the case with the ancient Egyptians, the Chinese, the Phœnicians, the commercial states of Greece, the Carthaginians, and even the Romans; for though the colonies of the latter were chiefly military, it could easily be shown that they were likewise made use of for the purposes of trade. The savage nations who ruined the Roman empire, sought nothing but to extirpate or hold in vassalage those whom they overcame; and therefore, whenever princes enlarged their dominions at the expence of their neighbours, they had recourse to strong forts and garrisons to keep the conquered in awe. For this they have been blamed by the famous Machiavel, who labours to show, that the settling of colonies would have been a cheaper and better method of bridling conquered countries, than building fortresses in them. John de Witt, who was one of the ablest and best statesmen that ever appeared, strongly recommended colonies; as affording a refuge to such as had been unfortunate in trade; as opening a field for such men to exert their abilities, as through want of interest could not raise themselves in their own country; and as a supplement to hospitals and other charitable foundations, which he thought in time might come to be overcharged. Some, however, have ridiculed the supposed advantages of colonies, and asserted that they must always do mischief by depopulating the mother-country.

The history of the British colonies undoubtedly shows, that when colonists become numerous and opulent, it is very difficult to retain them in proper subjection to the parent state. It becomes then a question not very easily answered, how far they are entitled to the rights they had as inhabitants of the mother-country, or how far they are bound by its laws? On this subject Mr Blackstone hath the following observations.

"Plantations, or colonies in distant countries are either

Colony.

either such where the lands are claimed by right of occupancy only, by finding them desert and uncultivated, and peopling them from the mother-country; or where, when already cultivated, they have either been gained by conquest, or ceded to us by treaties. And both the rights are founded upon the law of nature, or at least on that of nations. But there is a difference between these two species of colonies with respect to the laws by which they are bound. For it hath been held, that if an uninhabited country be discovered and planted by English subjects, all the English laws then in being, which are the birthright of every subject, are immediately there in force. But this must be understood with many and very great restrictions. Such colonists carry with them only so much of the English law as is applicable to their own situation, and the condition of an infant colony; such, for instance, as the general rules of inheritance, and of protection from personal injuries. The artificial refinements and distinctions incident to the property of a great and commercial people, the laws of policy and revenue (such especially as are enforced by penalties), the mode of maintenance for the established clergy, the jurisdiction of spiritual courts, and a multitude of other provisions, are neither necessary nor convenient for them, and therefore are not in force. What shall be admitted, and what rejected, at what times, and under what restrictions, must, in cases of dispute, be decided in the first instance by their own provincial judicature, subject to the revision and controul of the king in council; the whole of their constitution being also liable to be new-modelled and reformed by the general superintending power of the legislature in the mother-country. But in conquered or ceded countries that have already laws of their own, the king may indeed alter and change those laws; but, till he does actually change them, the ancient laws of the country remain, unless such as are against the law of God, as in an infidel country. Our American plantations are principally of this latter sort, being obtained in the last century, either by right of conquest and driving out the natives (with what natural justice I shall not at present inquire), or by treaties. And therefore, the common law of England, as such, has no allowance or authority there; they being no part of the mother-country, but distinct (though dependent) dominions. They are subject, however, to the controul of the parliament; though (like Ireland, Man, and the rest) not bound by any acts of parliament, unless particularly named."

With respect to their interior polity, our colonies, whether those we formerly possessed or still possess, may be distinguished into three sorts. 1. Provincial establishments, the constitutions of which depend on the respective commissions issued by the crown to the governors, and the instructions which usually accompany those commissions; under the authority of which provincial assemblies are constituted, with the power of making local ordinances not repugnant to the laws of Britain. 2. Proprietary governments, granted out by the crown to individuals, in the nature of feudatory principalities, with all their inferior regalities, and subordinate powers of legislation, which formerly belonged to the owners of counties palatine; yet still with these express conditions, that the ends for which the grant was made be substantially pursued and that nothing be attempted which may derogat from the sovereignty of the mother-country. 3. Char ter governments, in the nature of civil corporations with the power of making bye-laws for their own in terior regulation, not contrary to the laws of Britain and with such rights and authorities as are speciall given them in their several charters of incorporatior The form of government, in most of them, is bor rowed from that of England. They have a governo named by the king (or, in some proprietary colonies by the proprietor), who is representative or deputy They have courts of justice of their own, from whos decisions an appeal lies to the king in council here i England. Their general assemblies, which are thei house of commons, together with their council of state being their upper house, with the concurrence of th king, or his representative the governor, make law suited to their own emergencies. But it is partict larly declared, by stat. 7 and 8 W. III. c. 22. that a laws, bye-laws, usages, and customs, which shall be i practice in any of the plantations, repugnant to an law made or to be made in this kingdom relative t the said plantations, shall be utterly void and of non effect. And, because several of the colonies had claim ed the sole and exclusive right of imposing taxes upo themselves, the statute 6 Geo. III. c. 12. expressl declares, that all his majesty's colonies in America have been, are, and of right ought to be, subordinat to and dependent upon the imperial crown and parlia ment of Great Britain, who have full power and au thority to make laws and statutes of sufficient validit to bind the colonies and people of America, subjects t the crown of Great Britain in all cases whatsoever And the attempting to enforce this by other acts of par liament, penalties, and at last by military power, gav rise, as is well known, to the late revolt and final sepa ration of thirteen colonies. See the article AMERICA This country is now detached from Britain, and con sists of 21 independent states. See the article COLO NY, SUPPLEMENT.

COLOPHON, in *Ancient Geography*, a town o Ionia, in the Hither Asia, on a promontory on the Æ gean sea, and washed by the Halesus. The ancien Colophon was destroyed by Lysimachus, in his wa with Antigonus, in order to enlarge Ephesus. Pau sanias says, it was rebuilt in the neighbourhood, in more commodious scite. This was one of the citie that laid claim to Homer. *Colophonem addere*, a pro verbial saying, explained by Strabo to denote, that th Colophonian horse turned the scales in favour of th side on which they fought. The Colophonians had grove, a temple, and an oracle of Apollo Clari (Strabo). Of this town was the poet Antimachu remarked on for his turgid style by Catullus. H wrote a life of Homer, whom he makes a Colophoni (Plutarch).

COLOPHONY, in *Pharmacy*, black resin, or tu pentine, boiled in water, and afterwards dried; o which is still better, the caput mortuum remaining a ter the distillation of the ethereal oil, being furth urged by a more intense and long continued fire.— receives its name of *colophonia*, from Colophon, a cit of Ionia, because the best was formerly brought fro thence. Two sorts are mentioned in ancient writings tl

Colour.

"He also observed, that when young, other children could discern cherries on a tree, by some pretended difference of colour, though he could only distinguish them from the leaves by the difference of their size and shape. He observed also, that by means of this difference of colour they could see the cherries at a greater distance than he could, though he could see other objects at as great a distance as they, that is, where the sight was not assisted by the colour. Large objects he could see as well as other persons; and even the smaller ones if they were not enveloped in other things, as in the case of cherries among the leaves.

"I believe he could never do more than guess the name of any colour; yet he could distinguish white from black, or black from any light or bright colour. Dove or straw colour he called *white*, and different colours he frequently called by the same name; yet he could discern a difference between them when placed together. In general, colours of an equal degree of brightness, however they might otherwise differ, he confounded together. Yet a striped ribbon he could distinguish from a plain one; but he could not tell what the colours were with any tolerable exactness. Dark colours, in general, he often mistook for black; but never imagined white to be a dark colour, nor dark to be a white colour.

"He was an intelligent man, and very desirous of understanding the nature of light and colours; for which end he had attended a course of lectures in natural philosophy.

"He had two brothers in the same circumstances as to sight; and two other brothers and sisters, who, as well as their parents, had nothing of this defect.

"One of the first mentioned brothers, who is now living, I met with at Dublin, and wished to try his capacity to distinguish the colours in a prism; but not having one by me, I asked him, Whether he had ever seen a rainbow? he replied, He had often, and could distinguish the different colours; meaning only, that it was composed of different colours, for he could not tell what they were.

"I then procured and showed him a piece of ribbon; he immediately, and without any difficulty, pronounced it a striped, and not a plain, ribbon. He then attempted to name the different stripes: the several stripes of white he uniformly and without hesitation called white; the four black stripes he was deceived in; for three of them he thought brown, though they were exactly of the same shade with the other, which he properly called black. He spoke, however, with diffidence, as to all those stripes; and it must be owned, that the black was not very distinct; the light green he called yellow; but he was not very positive; he said, "I think this is what you call yellow." The middle stripe, which had a slight tinge of red, he called a sort of blue. But he was most of all deceived by the orange colour, of which he spoke very confidently, saying, "This is the colour of grass, this is green." I also showed him a great variety of ribbons, the colour of which he sometimes named rightly, and sometimes as differently as possible from the true colour.

"I asked him whether he imagined it possible for all the various colours he saw to be mere difference of light and shade; and that all colours could be composed of these two mixtures only? With some hesitation he replied, No, he did imagine there was some other difference.

"It is proper to add, that the experiment of the striped ribbon was made in the day-time, and in a good light."

COLOURS *for staining different kinds of Stones*. See CHEMISTRY.

COLOUR, in *Dyeing*. See DYEING.

Colour of Plants, is an attribute found to be very variable. Different colours are observed, not only in different individuals of the same species, but likewise in different parts of the same individual. Thus, marvel of Peru, and sweet-william, have frequently petals of different colours on the same plant. Three or four different colours are frequently found upon the same leaf or flower, as on the leaves of the amaranthus tricolor, and the flowers of the tulip, auricula, three-coloured violet and others. To produce the most beautiful and striking variety of colours in such flowers, is the principal delight and business of the florist.

The primitive colours, and their intermediate shades or gradations enumerated by botanists, are as follow:

Water-colour, *hyalinus*.
WHITE.
Lead-colour, *cinereus*.
BLACK, *niger*.
Brown, *fuscus*.
Pitch-black, *ater*.
YELLOW, *luteus*.
Straw-colour, *flavus*.
Flame-colour, *fulvus*.
Iron-colour, *gilvus*.
RED.
Flesh-colour, *incarnatus*.
Scarlet, *coccineus*.
PURPLE.
Violet-colour, *cæruleo-purpureus*.
BLUE, *cæruleus*.
GREEN.

These colours seem to be appropriated to particular parts of the plant. Thus white is most common in roots, sweet berries, and the petals of spring flowers. Water-colour, in the filaments and styles. Black, in the roots and seeds; rarely in the seed-vessel, and scarce ever to be found in the petals. Yellow is frequent in the antheræ or tops of the stamina; as likewise in the petals of autumnal flowers, and the compound ligulated flowers of Linnæus. Red is common in the petals of summer flowers, and in the acid fruits. Blue and violet-colour in the petals. Green in the leaves and calyx, but rarely in the petals. In the interchanging of colours, which in plants is found to depend upon differences in heat, climate, soil, and culture, a sort of elective attraction is observed to take place. Thus, red is more easily changed into white and blue; blue into white and yellow; yellow into white; and white into purple. A red colour is often changed into a white, in the flowers of heath, mother of thyme, betony, pink, viscous campion, *cucubalus*, trefoil, orchis, foxglove, thistle, cudweed, saw-wort, ros-

Colour. rose, poppy, fumitory, and geranium. Red passes into blue in pimpernel. Blue is changed into white in bell-flower, greek-valerian, bind-weed, columbine, violet vetch, milk-wort, goat's rue, viper's bugloss, comfrey, borrage, hyssop, dragon's head, scabious, blue-bottle, and succory. Blue is changed into yellow in crocus. Yellow passes easily into white in melilot, agrimony, mullein, tulip, *blattaria* or moth-mullein, and corn marigold. White is changed into purple in wood-sorrel, thorn-apple, pease, and daisy.

Although plants are sometimes observed to change their colour upon being moistened with coloured juices, yet that quality in vegetables seems not so much owing to the nature of their nourishment, as to the action of the internal and external air, heat, light, and the primitive organization of the parts. In support of this opinion, we may observe with Dr Grew, that there is a far less variety in the colours of roots, than of the other parts of the plant; the pulp within the skin, being usually white, sometimes yellow, rarely red. That this effect is produced by their small intercourse with the external air, appears from this circumstance, that the upper parts of roots, when they happen to stand naked above the ground, are often dyed with several colours: thus the tops of sorrel roots turn red; those of turnips, mullein, and radishes, purple; and many others green; whilst those parts of the same roots which lie more under ground, are commonly white. The green colour is so proper to leaves, that many, as those of sage, the young sprouts of St John's wort, and others which are reddish when in the bud, acquire a perfect green upon being fully expanded. In like manner, the leaves of the sea-side grape (*polygonum*), which when young are entirely red, become, as they advance in growth, perfectly green, except the middle and transverse ribs, which retain their former colour.

As flowers gradually open and are exposed to the air, they throw off their old colour and acquire a new one. In fact, no flower has its proper colour till it is fully expanded. Thus the purple stock julyflowers are white or pale in the bud. In like manner batchelor's buttons, blue-bottle, poppy, red daisies, and many other flowers, though of divers colours when blown, are all white in the bud. Nay, many flowers change their colour thrice successively; thus, the very young buds of lady's looking-glass, bugloss, and the like, are all white; the larger buds purple or murrey; and the open flowers blue.

With respect to the colours of the juices of plants, we may observe, that most resinous gums are tinctured; some, however, are limpid; that which drops from the domestic pine is clear as rock-water. The milk of some plants is pale, as in burdock; of others white, as in dandelion, euphorbium, and scorzonera; and of others yellow, as in lovage, and greater celandine. Most mucilages have little colour, taste, or smell. Of all the colours above enumerated, green is the most common to plants, black is the most rare.

Colour being a quality in plants so apt to change, ought never to be employed in distinguishing their species. These ought to be characterized from circumstances not liable to alteration by culture or other accidents. The same inconstancy of colour observed in the flowers, is likewise to be found in the other parts of plants. Berries frequently change from green to red, and from red to white. Even in ripe fruits, the colour, whether white, red, or blue, is apt to vary; particularly in apple, pear, plum, and cherry trees. Seeds are more constant in point of colour than the vessel which contains them. In the seeds, however, of the poppy, oats, pea, bean, and kidney-bean, variations are frequently observed. The root, too, although not remarkably subject to change, is found to vary in some species of carrot and raddish. Leaves frequently become spotted, as in a species of orchis, hawk-weed, ranunculus, knot-grass, and lettuce; but seldom relinquish their green colour altogether. Those of some species of amaranthus, or flower-gentle, are beautifully coloured. The spots that appear on the surface of the leaves are of different colours, liable to vary, and not seldom disappear altogether. The leaves of officinal lung-wort, and some species of sow-bread, sorrel, trefoil, and ranunculus, are covered with white spots. Those of dog's-tooth violet, with purple and white. Those of several species of ranunculus, and orchis, with black and purple. Those of amaranthus tricolor, with green, red, and yellow. Those of ranunculus acris, and a species of bog bean, with red or purple. The under surface of the leaves of some species of pimpernel and the sea-plantain is marked with a number of dots or points; a white line runs through the leaves of Indian reed, black-berried heath, and a species of Canary grass: and the margin or brim of the leaf, in some species of box, honeysuckle, ground-ivy, and the ever-green oak, is of a silver-white colour. The whole plant is often found to assume a colour that is unnatural or foreign to it. The varieties in some species of eryngo, mug-wort, orrach, amaranthus, purslane, and lettuce, furnish examples.

Such being the inconstancy of colours in all the parts of the plant, specific names derived from that quality are very properly, by Linnæus, deemed erroneous; whether they respect the colour of the flower, fruit, seeds, roots, leaves, or express in general the beauty or deformity of the entire plant, with a particular view to that circumstance. Of this impropriety, committed by former botanists, Linnæus himself is not always guiltless. Thus the two species of *sarracena*, or the side-saddle flower, are distinguished by the colour of their petals into the yellow and purple sarracena; although the shapes and figure of the leaves afforded much more constant as well as striking characters. The same may be said of his lupinus albus and luteus; reseda alba, glauca, and lutea; angelica atro-purpurea; dictamnus albus; lamium album; selago coccinea; sida alba; passiflora rubra, lutea, incarnata, and cœrulea; and of many others, in which the specific name is derived from a character or quality that is so liable to vary in the same species.

We shall conclude this article with observing, that of all sensible qualities, colour is the least useful in indicating the virtues and powers of vegetables. The following general positions on this subject are laid down by Linnæus, and seem sufficiently confirmed by experiment. A yellow colour generally indicates a bitter taste; as in gentian, aloe, celandine, turmeric, and other yellow flowers. Red indicates an acid or sour taste; as in cranberries, barberries, currants, raspberries, mulberries, cherries, the fruit of the rose, sea-buck-

 thorn,

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thorn, and service-tree. Herbs that turn red towards autumn, have likewise a sour taste; as sorrel, wood-sorrel, and bloody dock. Green indicates a crude alkaline taste, as in leaves and unripe fruits. A pale colour denotes an insipid taste, as in endive, asparagus, and lettuce. White promises a sweet luscious taste; as in white currants and plums, sweet apples, &c. Lastly, black indicates a harsh, nauseous, disagreeable taste; as in the berries of deadly night-shade, myrtle-leaved sumach, herb-christopher, and others; many of which are not only unpleasant to the taste, but pernicious and deadly in their effects.

To be ascertained of the acid or alkaline property of any plant, express some of the juice, and rub it upon a piece of blue paper; which, if the plant in question is of an acid nature, will turn red; if of an alkaline, green. For the method of extracting colours from the different parts of plants, see the article *Colour-Making*.

Difference of Colour in the Human Species. See Complexion.

Colour, in *Heraldry*. The colours generally used in heraldry are, red, blue, black, green, and purple; which the heralds call *gules*, *azure*, *sable*, *vert* or *sinople*, and *purpure;* tenne or tawny, and sanguine, are not so common; as to yellow and white, called *or* and *argent*, they are metals, not colours.

The metals and colours are sometimes expressed in blazon by the names of precious stones, and sometimes by those of planets or stars. See Blazoning.

Oenomaus is said first to have invented the distinctions of colours, to distinguish the gundillæ of combatants at the Circensian games; the green for those who represented the earth, and blue for those who represented the sea.

Colours, in the military art, include the banners, flags, ensigns, &c. of all kinds, borne in the army or fleet. See Flag and Standard.

Colours, in the Latin and Greek churches, are used to distinguish several mysteries and feasts celebrated therein.

Five colours only are regularly admitted in the Latin church: these are white, green, red, violet, and black. The white is for the mysteries of our Saviour, the feast of the Virgin, those of the angels, saints, and confessors: the red is for the mysteries and solemnities of the holy sacrament, the feasts of the apostles and martyrs; the green for the time between pentecost and advent, and from epiphany to septuagesima; the violet in advent and Christmas, in vigils, rogations, &c. and in votive masses in time of war; lastly, the black is for the dead, and the ceremonies thereto belonging.

In the Greek church, the use of colours is almost abolished, as well as among us. Red was, in the Greek church, the colour for Christmas and the dead, as black among us.

To Colour Strangers Goods, is when a freeman allows a foreigner to enter goods at the customhouse in his name.

Colour-Making, the art of preparing the different kinds of colours used in painting.

This art properly belongs to chemistry; and is one of the most curious, though least understood, parts of it. The principles on which colour-making depends are entirely different from those on which the theory of other parts of chemistry is founded; and the practical part being in the hands of those who find it their interest to conceal their methods as much as possible, it thence happens, that there is not only no distinct theory of this art, but scarce a single good receipt for making any one colour hath ever yet appeared.

The first general division of colours is into opaque and transparent. By the first are meant such colours as, when laid over paper, wood, &c. cover them fully, so as to efface any other painting or stain that might have been there before; the others are of such a nature as to leave the ground on which they are laid visible through them. Of the first kind are white-lead, red-lead, vermilion, &c.; of the latter kind are the colours used for illuminating maps, &c.

Another division is into oil-colours and water-colours; by which is meant such as are appropriated to painting in oil and in water. Most of all those which are proper for painting in water, are also proper for being used in oil. There is, however, this remarkable difference betwixt colours when mixed with water and with oil, that such as are quite opaque in water will become perfectly transparent in oil. Thus, blue verditer, though exceedingly opaque in water, if ground with oil, seems totally to dissolve, and will become very transparent. The same thing happens to such colours as have for their basis the oxide of tin, alabaster, or calcareous earth. The most perfectly opaque colours in oil are such as have lead, mercury, or iron for their basis: to the latter, however, Prussian blue is an exception; for though the basis of that colour is iron, it proves quite transparent when ground with oil. In water colours, those prepared from metals, Prussian blue alone excepted, are always opaque; from vegetables or animals, transparent. Coals, however, whether vegetable or animal, are opaque both in water and oil.

Colours, again, may be considered as either simple or compound. The simple ones are such as require nothing to be superadded to them, in order to make a full strong colour, without regarding whether they are formed of many or new ingredients; and in this view, white-lead, red-lead, vermilion, oxides of iron, &c. are simple colours. The compound ones are formed by the union of two or more colouring substances; as blue and yellow united together to form a green, red and yellow to form an orange, a white earth or oxide with the red colour of cochineal or brazil to form a lake, &c.; and thus carmine, lake, rose-pink, Dutch-pink, English pink, &c. are compound colours.

The last and most important division of colours is into true and false. By the former are meant those which retain their colour under every possible variety of circumstances, without fading in the least: the others are such as do not; but either lose their colour altogether, or change to some other. What is chiefly apt to affect colours, is their being exposed to the sun in summer, and to the cold air in winter: but to this there is one exception, viz. white-lead; which, when ground with oil, retains its whiteness if exposed to the weather, but degenerates into a brownish or yellowish colour if close kept. In water this substance is very apt to lose its colour, whether exposed to the air or that the union between the two substances may be as perfect as possible. If the colour is to be a very fine one, suppose from cochineal, the colouring matter must be extracted with alcohol without heat. When the spirit is sufficiently impregnated, it is to be poured by little and little upon the oxide, rubbing it constantly, in order to distribute the colour equally through all parts of the oxide. The spirit soon evaporates, and leaves the oxide coloured with the cochineal. More of the tincture is then to be poured on, rubbing the mixture constantly as before; and thus, with proper management, may very beautiful colours, not inferior to the best carmine, be prepared at a moderate expence. If, instead of cochineal, we substitute brazil-wood, turmeric, logwood, &c. different kinds of red, yellow, and purple, will be produced. For the coarser colours, aqueous decoctions are to be used in a similar manner; only, as these are much longer in evaporating than the alcohol, very little must be poured on at a time, and the colours ought to be made in large quantity, on account of the tediousness of the process.

13 Effects of different kinds of salts.

Hitherto we have considered only the effects of the pure and simple salts, viz. acids and alkalies, on different colours; but by combining the acids with alkalies, earths, or metals, these effects may be varied almost *in infinitum;* neither is there any rule yet laid down by which we can judge *à priori* of the changes of colour that will happen on the admixture of this or that particular salt with any colouring substance. In general, the perfect neutrals act weakly; the imperfect ones, especially those formed from metals, much more powerfully. Alum and sal ammoniac considerably heighten the colour of cochineal, brazil, turmeric, fustic, madder, logwood, &c. The same thing is done, though in a less degree, by common salt, Glauber's salt, nitre, and many other neutrals. Solutions of iron in all the acids strike a black with every one of the above mentioned substances; and likewise with sumach, galls, and other astringents. Solutions of lead, or saccharum saturni, universally debase red colours to a dull purple. Solution of copper changes the purple colour of logwood to a pretty good blue; and, in general, solutions of this metal are friendly to blue colours. The effects of solutions of gold, silver, and mercury, are not so well known; they seem to produce dark colours of no great beauty.

14 Solution of tin the most powerful.

The most powerful solution, however, with regard to a great number of colours, is that of tin, made in nitro-muriatic acid. Hence we may see the fallacy of Mr Delaval's hypothesis concerning colours *, that the least refrangible ones are produced by the most dense metals: for tin, which hath the least density of any metal, hath yet, in a state of solution, the most extraordinary effects upon the least refrangible colours, as well as those that are most so. The colour of cochineal is changed by it into the most beautiful scarlet; a similar change is made upon the colouring matter of gum-lac. Brazil-wood is made to yield a fine purplish crimson; logwood, a beautiful dark purple; turmeric, fustic, weld, and all yellow-colouring woods and flowers, are made to communicate colours far more beautiful than can be got from them by any other method. The blue colour of the flowers of violets, eye-bright, iris, &c. are heightened so as to equal, if not excel, the blue produced by a solution of copper in volatile alkali. In short, this solution seems to be of much more extensive use in colour-making, when properly applied, than any thing hitherto thought of. It is not, however, universally serviceable. The colour of madder it totally destroys, and likewise that of saf-flower, changing them both to a dull orange. It likewise spoils the colour of archil; and what is very remarkable, the fine red colour of tincture of roses made with sulphuric acid is by solution of tin changed to a dirty green.

* See *Chromatics*, N° 3.

The most important consideration in colour-making is to make choice of such materials as produce the most durable colours; and if these can be produced, an ordinary colour from them is to be preferred to a bright one from those which fade sooner. In what the difference consists between the colours that fade and those which do not, is not known with any degree of certainty. From some appearances it would seem, that those substances which are most remarkable for keeping their colour, contain a viscous glutinous matter, so combined with a resinous one as to be soluble both in water and alcohol. The most durable red colour is prepared from gum-lac. This is very strongly resinous, though at the same time so far glutinous, that the colouring matter can be extracted from it by water. Next to gum-lac are madder-roots and cochineal. The madder is an exceedingly penetrating substance, insomuch that, when given to animals along with their food, it tinges their bones of a deep red colour. Its colouring matter is soluble both in water and alcohol. Along with the pure red, however, there is in madder a kind of viscous astringent substance, of a dark brown colour, which seems to give the durability to the whole. The colouring matter of cochineal, though soluble both in water and alcohol, is very tenacious and mucilaginous, in which it bears some resemblance to the *purpura* of the ancients, which kept its colour exceedingly well. Where the colours are fugitive, the tinging substance seems to be too resinous or too mucilaginous. Thus the colour of brazil, turmeric, &c. are very resinous, especially the latter, insomuch that the colouring matter of turmeric can scarcely be extracted by water. Both these are perishable, though beautiful colours; and much more are the red, purple, and blue flowers, commonly to be met with. These seem to be entirely mucilaginous, without the least quantity of resinous matter. The yellow flowers are different, and in general keep their colour pretty well. Whether it would be possible, by adding occasionally a proper quantity of gum or resin, to make the fugitive colours more durable, hath not yet been tried, but seems to have some probability. What tends a little to confirm this, is a process given by M. Hellot for imparting durability to the colour of brazil. It consists only in letting decoctions of the wood stand for some time in wooden casks till they grow stale and *ropy*. Pieces of woollen cloth now dyed in the liquor acquired a colour so durable that they were not in the least altered by exposure to the air during four months in the winter season. Whether this change in the durability of the colour was effected by the ropiness following the fermentation

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finely prepared chalk. Pearl-white is made from oyster-shells; and egg-shell white from the shells of eggs. All these, by their attraction for acids, must necessarily destroy such colours as have any acid or metallic salt in their composition. The nitrate of bismuth is apt to turn black, as are also flake-white and white-lead, when used in water. The white precipitate of lead recommended under CHEMISTRY, N° 1856. is greatly superior as a water-colour to all these, being perfectly free of any alkaline quality, and not at all apt to lose its own colour, or to injure that of other substances. It is a carbonate of lead.

24 Red colours.

3. *Red.* The red colours used in painting are of two sorts, viz. those which incline to the purple, and such as are of a full scarlet, and tend rather to the orange. The first are carmine, lake, rose-pink, red-ochre, and Venetian-red. The second are vermilion, red-lead, scarlet-ochre, common Indian red, Spanish-brown, and terra di Sienna, burnt.

We have already laid down some general rules for the preparation of carmine and lake. Particular receipts have been delivered with the greatest confidence for making these fine colours; but all of them must necessarily prove ineffectual, because an earthy basis is recommended for striking the colour upon. From the principles of chemistry, however, we are certain, that if nitric acid, or solution of tin, is made use of for brightening a colour made with any earthy basis, it must infallibly be destroyed by that basis, by reason of its alkaline quality. Carmine is the brighest and most beautiful red colour known at present; the best comes from France. Lake differs from it in being capable of mixture with oil, which carmine is not, unless with great difficulty. The former is also much more inclined to purple than carmine. This last quality, however, is reckoned a defect; and accordingly, the more that lake approaches to the scarlet or true crimson, the more it is valued. On dropping solution of tin into an aqueous tincture of brazil wood, a beautiful precipitate falls, of a purplish crimson colour. This may be very well substituted in place of the dearer lakes on many occasions.

Rose-pink is a very beautiful colour, inclining more to the purple than scarlet. It seems to be made of chalk, coloured with a decoction of brazil-wood, heightened by an alkaline salt; for which reason it is exceedingly perishable, and but little esteemed. The colour might be made much more durable, as well as better, by employing for a basis the white precipitate of lead abovementioned, and brightening it with solution of tin.

Red ochre and Venetian red differ in nothing from the colcothar of vitriol well calcined. The oxides of iron may be made to appear either purplish, or inclining to the scarlet, according to the manner in which the calcination is performed. If the matter is perfectly deprived of its phlogiston, and subjected to an intense fire, it always turns out red; but the mixture of a small quantity of inflammable matter gives it a purplish cast. Hence various paints are kept in the shops under different names, which yet differ from each other only in the slight circumstances above mentioned; and such are the scarlet-ochre, Spanish brown, and terra di Sienna burnt. It is remarkable, that the oxides of iron never show their colour till they become cold. Colcothar of vitriol, while hot, always appears of a very dark dusky purple.

Of the preparation of vermilion and red-lead, an account is given under the article CHEMISTRY, N° 1701 1832. These are very durable colours: the first is the best red used in oil painting, but does not answer well in water; the other is rather an orange; and, like other preparations of lead, is in some cases apt to turn black.

4. *Orange.* The only true orange-coloured paints are red orpiment and orange lake. The first is a sublimate formed of arsenic and sulphur; the other may be prepared from turmeric infused in alcohol having its colour struck upon oxide of tin, and brightened by a solution of that metal. All the shades of orange however, may be extemporaneously prepared by mixing red and yellow colours together, in due proportions.

5. *Yellow.* The yellow paints most commonly in use are, king's-yellow, Naples-yellow, Dutch-pink English-pink, masticot, common orpiment, yellow ochre, terra di Sienna unburnt, and turpith mineral.

King's-yellow is evidently an arsenical preparation Its colour is exceedingly beautiful, but apt to fade on which account, and its great price, it is seldom used.

Naples-yellow was for a long time thought to be a preparation of arsenic, but is now discovered to have lead for its basis. It is therefore apt to turn black and lose its colour, which makes it the less valuable. It is nevertheless used in preference to king's-yellow, on account of its inferiority in price. This colour is particularly liable to be spoiled by iron when moist, and therefore should never be touched by that metal unless previously ground in oil.

Dutch-pink is said to be prepared by striking the colour of yellow berries upon finely levigated chalk But of this there is great reason to doubt; the basis of Dutch-pink seems much more hard and gritty than chalk, and its colour more durable than those struck upon that earth usually are. Very good yellows may be prepared with the white precipitate of lead, formerly mentioned, by using either yellow berries, fustic or any other substance capable of yielding that colour English pink is paler than the Dutch, and keeps its colour greatly worse.

Masticot is prepared by calcining white-lead till it assumes a yellowish colour. It is not apt to change but the colour is so dull that it is seldom used either in oil or water.

Common orpiment is a pretty bright greenish-yellow, prepared by subliming arsenic with sulphur. Its nauseous smell, which is greatly increased by grinding in oil, makes it very disagreeable; nor does it keep its colour for any length of time. That kind of orpiment least inclined to green is to be preferred for the purposes of painting.

Yellow-ochre and terra di Sienna are ferruginous earths, capable of becoming red by calcination. Green vitriol precipitated by lime may be advantageously substituted for either of them. See CHEMISTRY.

Turpith mineral is but little used in painting, though its fine yellow colour seems greatly to recommend it. This preparation is in all probability very durable an

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and should seem therefore worthy of a preference either to king's or Naples yellow. See CHEMISTRY *Index*.

Gamboge is a paint that can only be used in water, and is the most common yellow made use of for colouring maps, &c.; but for this it is not very proper, being neither quite transparent, nor very durable.

27 Green colours.

6. *Green.* The only simple green colour that hath a tolerable degree of brightness is verdigris, or preparations of it. This, however, though a very beautiful colour, is far from being durable. It is improved in colour, though not in durability, by dissolution and crystallization in distilled vinegar, in which state it is called *distilled verdigris*. A more durable water colour is made by dissolving the verdigris in cream of tartar, or rather the pure tartaric acid; but in oil this is found to be equally fugitive with the verdigris itself. See CHEMISTRY *Index*.

Compound greens are either made of Prussian or some other blue, mixed with yellow; but in whatever way these colours can be compounded, the beauty of the green produced is greatly inferior to distilled, or even common verdigris. The tartaric solution of verdigris, mixed with a little gamboge, is the best transparent green water-colour we have had an opportunity of trying; and a mixture of Prussian blue and turpith-mineral is probably the best opaque one.

Sap-green is a simple colour, but exceedingly inferior to distilled verdigris, or even to the tartaric solution of verdigris with gamboge. It is prepared from the juice of unripe buckthorn berries evaporated to the consistence of a gum. Its green colour is greatly inclined to yellow. A kind of compound green has been sometimes used, called *Prussian green*, which consists only of Prussian blue and yellow ochre. It has no beauty, nor is it durable. It is prepared as Prussian blue, only not pouring on any muriatic acid to dissolve the ochreous sediment which falls at the same time.

Another green sometimes used is called *terre verte*. This is a native earth, probably impregnated with copper. It is of a bluish-green colour, much of that tint called *sea-green*. It is gritty, and therefore must be well levigated before it is used. Its colour is durable, but not very bright.

28 Blue colours.

7. *Blue.* The blue colours are ultramarine, Prussian blue, verditer, smalt, bice, and indigo. Of these the ultramarine is the finest, but its great price hinders it being much used. It is a preparation from lapis lazuli; is an exceeding bright colour, and never fades with whatever substance it is mixed. It is now, however, in a great measure superseded by Prussian blue, to the disadvantage of painting in general; as Prussian blue, though very beautiful, is far from being durable. For an account of its preparations, see the article ULTRAMARINE.

The process for making Prussian blue is described, and its nature fully considered, under CHEMISTRY, N° 774; so that it is sufficient here to observe, that Prussian blue is to be accounted of the best quality when it is deep, bright, and not inclined to purple. It ought to be tried by mixture with white lead, as the brightness of the colour will appear much more when diluted than when concentrated in the lumps of the blue itself.

The preparation of blue verditer is kept a secret, and the best chemists have been puzzled to find out the method. The colour is exceedingly bright, and has a considerable tinge of green. A method of preparing a colour equally beautiful, and agreeing in all respects with what is sold in the shops, except that of effervescing with acids, we have found to be as follows: Dissolve copper in strong caustic alkali, until the liquid has assumed a very deep blue colour; and the deeper this colour is, the finer will your verditer be. When the menstruum has dissolved as much of the metal as it can take up, it is to be poured out into a broad and well glazed earthen pan, held over a very gentle fire; and from the moment it is put on, the liquor is to be continually agitated with a wooden spatula, so that the liquor may be heated as equally as possible. The whole secret consists in properly regulating the degree of heat; for if it exceeds the due proportion ever so little, the verditer will turn out of a dirty green. The proper degree is about 90° of Fahrenheit's thermometer. In this gentle heat the alkali slowly evaporates; and in proportion to its doing so the verditer falls to the bottom. After it is once formed, freed from the alkaline liquor, and dried, it can bear the effusion of boiling water without the least injury. Dr Priestley, in his sixth volume, takes notice, that a solution of copper in volatile alkali affords a blue precipitate by heat, but without taking notice of the requisites for its success. In making this preparation it is necessary to dissolve copper in its metallic state; for the solution of any oxide will not yield a blue but a green colour. This colour is durable in water, but dissolves in oil, and has then all the inconveniences of verdigris above mentioned.

Smalt is glass coloured with zaffre, a preparation from cobalt *. It is commonly so grossly powdered that it cannot be used in painting, and its texture is so hard that it cannot easily be levigated. Its colour is exceedingly bright and durable; so that when finely levigated it is used instead of ultramarine. The most proper materials for levigating this substance seem to be the plates of M. Reaumur's porcelain recommended by Dr Lewis. See CHEMISTRY *Index*. For the preparation and qualities of bice, see the articles ARMENUS *Lapis* and BICE.

* See *Zaffre* and *Smalt*.

Indigo is but little used in painting either in oil or water, on account of the dulness of the colour. It requires no other preparation than being washed over. Its goodness is known by the darkness and brightness of the colour. See INDIGO.

29 Purple colours.

8. *Purple.* The only simple colour of this kind used at present is colcothar of vitriol. A beautiful purple lake may be prepared from logwood by means of solution of tin; but this method of preparing colours is very little known as yet.

30 Brown colours.

9. *Brown.* The brown colours are, bistre, brown-ochre, Cologne-earth, umber, and brown-pink. Under the article BISTRE is given a process for making that colour, by infusing soot in water, pouring off the tincture, and then evaporating it to an extract; but Dr Lewis is of opinion, with M. Landois in the French *Encyclopédie*, that the soot is either boiled in water, or ground with a little liquid of some kind into a smooth paste; it is then diluted with more water, and after standing for about half an hour till the grosser substance of the soot has settled, the liquor is poured off into

31 Dr Lewis's opinion concerning bistre.

Colour-making. into another vessel, and set by for two or three days, that the finer parts may fall to the bottom, and this fine matter is the bistre. This is a very useful colour in water, being exceedingly fine, durable, and not apt to spoil any other colours with which it is mixed. The brown pink is said to consist of chalk tinged with the colouring matter of fustic, heightened by fixed alkaline salts. It is therefore very perishable, and is seldom used. The other browns are a kind of ochreous earths; for a description of which see their proper articles.

32 Attempts to make lake of all colours.

Having now considered most of the colouring substances usually to be met with in the shops, we shall next take notice of some attempts that have been made to produce all the different colours from vegetables, after the manner of lakes; which, though the methods hitherto tried have for the most part failed of success, may perhaps some time or other be found applicable to valuable purposes.

33 Black from astringents.

From infusions of astringent vegetables mixed with green vitriol, is produced a deep black liquor of very extensive use in dyeing *. The substances which produce the deepest blacks are galls and logwood. When a decoction or infusion of the galls is dropped into a solution of the vitriol largely diluted with water, the first drops produce bluish or purplish red clouds, which soon mingling with the liquor, turn it uniformly of their own colour. It seems to be on the quality of the water that this difference in the colour depends. With distilled water, or the common spring waters, the mixture is always blue. If we previously dissolve in the water the most minute quantity of any alkaline salt, too small to be discovered by any of the common means by which waters are usually tried, or if the water is in the least putrid, the colour of the mixture proves purple or reddish. Rain-water, caught as it falls from the clouds in an open field in clean glass-vessels, gives a blue; but such as is collected from the tops of the houses, grows purple with the mixture of vitriol and galls: from whence it may be presumed, that this last has contracted a putrid tendency, or received an alkaline impregnation, though so slight as not to be sensible on other ways of trial.

* See *Dyeing*.

Both the purple and blue liquors, on adding more of the astringent infusion, deepen to a black, more or less intense, according to the nature of dilution: if the mixture proves of a deep opaque blackness, it again becomes bluish or purplish when further diluted. If suffered to stand in this diluted state for two or three days, the colouring matter settles to the bottom in form of a fine black mud, which by slightly shaking the vessel is diffused again through the liquor, and tinges it of its former colour. When the mixture is of a full blackness, this separation does not happen, or in a far less degree; for though a part of the black matter precipitates in standing, yet so much remains dissolved, that the liquor continues black. This suspension of the colouring substance, in the black liquid, may be attributed in part to the gummy matter of the astringent infusion increasing the consistence of the watery fluid; for the separation is retarded in the diluted mixture by a small addition of gum arabic. If the mixture either in its black or diluted state is poured into a filter, the liquor passes through coloured; only a part of the black matter remaining on the filter. The filtered liquor, on standing for some time becomes turbid and full of fine black flakes: being freed from these by a second filtration, it again puts on the same appearance: and thus repeatedly till all the colouring parts are separated, and the liquor has become colourless.

Dr Lewis, from whose Philosophical Commerce of Arts this account is taken, further informs us, that the colouring matter, when separated from the liquor and dried, appeared of a deep black, which did not seem to have suffered any change from the air by exposure for upwards of four months. Made red hot, it glowed and burnt, but did not flame, and became a rusty brown powder, which was readily attracted by a magnetic bar; though in its black state the magnet had no action upon it. Sulphuric acid, diluted with water and digested on the black powder, dissolved the greatest part of it, leaving only a very small quantity of whitish matter. Solution of pure fixed alkaline salt dissolved very little of it: the liquor received a reddish brown colour, and the powder became blackish brown. This residuum was attracted by the magnet after being red hot, though not before: the alkaline tincture, passed through a filter, and mixed with a solution of green vitriol, struck a deep brownish black colour, nearly the same with that which results from mixing with the vitriolic solution an alkaline tincture of galls.

It hath also been attempted to produce black from a combination of other colours; as green may be produced from a mixture of blue and yellow. M. le Blon in his Harmony of Colours, gives a method of forming black, by mixing together the three colours called *primitive*, viz. blue, red, and yellow; and M. Castel in his *Optique des Couleurs* published in 1740, says that this compound black has an advantage in painting, above the simple ones, of answering better for the darkening of other colours. Thus, if blue, by the addition of black, is to be darkened into the colour called *blue-black*, the simple blacks, according to him, if used in sufficient quantity to produce the requisite deepness, conceal the blue, while the compound black leave it distinguishable. Le Blon does not mention the proportion of the three colours necessary for producing black. Castel directs 15 parts of blue, five of red, and three of yellow; but takes notice that these proportions are rather speculatively than practically just, and that the eye only can be the true judge, our colours all being very imperfect, and our pigments or other bodies of one denomination of colour being very unequal in their degree of intensity. He observes, that the pigments should all be of the deepest and darkest kind; and that instead of taking one pigment for each colour, it is better to take as many as can be got; for the greater discord there is of heterogeneous and discordant drugs, the more true and beautiful, he says, will the black be, and the more capable of uniting with all other colours, without suppressing them, and even without making them tawny.

Dr Lewis acquaints us, that by mixing different blue, red, and yellow colours, he has not been able to produce a perfect black; but has often obtained from them very dark colours, such as may be called *brown blacks* or *gray-blacks*; such as we commonly see in the da

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names of the plant which produces it, *safflower;* and from the countries whence it is commonly brought to us, *Spanish-red*, and *China lake*. This pigment impregnates alcohol with a beautiful red tincture, but communicates no colour to water. I have endeavoured to separate, by the same treatment, the red matter of some of the other reddish yellow flowers, as those of garden marigold, but without success. Plain water extracted a yellow colour, and alkaline ley extracted afterwards only a paler yellow: though the digestions were continued till the flowers had lost their colour, the tinctures were no other than yellow, and not so deep as those obtained from the pure yellow flowers. The little yellow flocculi, which in some kinds of flowers are collected into a compact round disc, as in the daisy and corn marigold, agree, so far as they have been examined, with the expanded yellow petala. Their colour is affected in the same manner by acids, by alkalies, and by alum; and equally extracted by water and by spirit. But the yellow farina, or fine dust, lodged on the tips of the stamina of flowers, appears to be of a different kind. It gives a fine bright yellow to spirit, and a duller yellow to water; the undissolved part proving in both cases of a pale yellowish white. Both the watery and spirituous tinctures were heightened by alkaline liquors, turned red by acids, and again to a deep yellow on adding more of the alkali: I know no other vegetable yellow that is turned red by acids.

"White flowers are by no means destitute of colouring matter. Alkaline lixivia extract from some of them a green tincture, and change their colourless expressed juices to the same colour; but I have not observed that they are turned red by acids. The flowers of the common wild convolvulus or bind-weed, which in all their parts are white, give a deep yellow or orange tincture to plain water; which, like the tinctures of flowers that are naturally of that colour, is rendered paler by acids, heightened a little by alum, and more considerably by alkaline salts. The vapours of the volatile sulphuric acid, or of burning sulphur, which whiten or destroy the colour of the coloured flowers, make no change in the white.

36 Colours from fruits.

"The red juices of fruits, as currants, mulberries, elder-berries, morello, black cherries, &c. gently inspissated to dryness, dissolve again almost totally in water, and appear nearly of the same red colour as at first. Rectified spirit extracts the tinging particles, leaving a considerable portion of mucilaginous matter undissolved; and hence the spirituous tincture proves of a brighter colour than the watery. The red solutions, and the juices themselves, are sometimes made dull, and sometimes more florid by acids, and generally turned purplish by alkalies. The colours of these juices, are, for the most part, perishable. They resist, indeed, the power of fermentation, and continue almost unchanged, after the liquor has been converted into wine; but when the juice is spread thin upon other bodies, exsiccated, and exposed to the air, the colour quickly alters and decays; the bright lively red changes the soonest: the dark dull red stain from the juice of the black cherry, is of considerable durability. The fruit of the American opuntia or prickly pear, the plant upon which the cochineal insect is produced, is perhaps an exception: This bright red fruit, according to Labat, gives a beautiful red dye. Son[e] experiments, however, made upon the juice of th[e] fruit, as brought into England, did not promise to [be] of any great advantage; but the particulars I cann[ot] now recollect.

"The ripe berries of buckthorn stain paper of [a] green colour. From these is prepared the substan[ce] called *sap green*, a pigment sufficiently durable, re[a]dily soluble in water, but not miscible with oil. T[he] berries dried while green, and macerated in alu[m] water, are said to yield a yellow pigment; and wh[en] they have grown over ripe so as to fall off spontan[e]ously, a purple one. It is said that the berry of t[he] heliotropum tricoccum, which grows wild about Mon[t]pelier, stains paper of a green colour, and that th[e] green turns presently to a blue: that the common bl[ue] paper receives its colour from this juice: and that t[he] red rags called *turnsol*, employed for colouring win[e] and other liquors, are tinctured by the same jui[ce] turned red by acids. According to M. Nissole of t[he] French academy of sciences (as quoted by Savary [in] his Dictionnaire de Commerce), the following juice [is] obtained, not from the berries, but from tops of t[he] planted gathered in August, ground in mills, and the[n] committed to the press. The juice is exposed to t[he] sun about an hour, the rags dipt in it, dried in the su[n], moistened by the vapour which arises during the slac[k]ing of quicklime with urine, then dried again in the su[n] and dipped again in the juice. The Dutch and othe[rs] are said to prepare turnsol rags, and turnsol in the ma[ss] from different ingredients, among which archil is a pri[n]cipal one.

"In some plants, peony for instance, the seeds [at] a certain point of maturity are covered with a fi[ne] shining red membrane. The pellicles of the seeds [of] a certain American tree afford the red masses broug[ht] into Europe under the names of *annotto*, *orlean*, a[nd] *roucou**. Mr Pott, in the Berlin Memoirs for t[he] year 1752, mentions a very extrordinary property [of] this concrete. 'With sulphuric acid it produces a bl[ue] colour, of extreme beauty; but with this capital defe[ct] that all salts and liquors, and even common water, d[e]stroy it.' The specimen of annotto, which I exami[n]ed, was not sensibly acted upon by sulphuric acid; [it] received no change in its own colour, and communica[t]ed none to the liquor. Nor did any visible chang[e] ensue upon dropping the acid into tincture of anno[tto] made in water, or in spirit.

"The green colour of the leaves of plants is e[x]tracted by rectified spirit of wine and by oils. T[he] spirituous tinctures are generally of a fine deep gree[n] even when the leaves themselves are dull-coloured, yellowish, or hoary. The colour, however, seld[om] continues long even in the liquor; much less when t[he] tinging matter is separated in a solid form, and ex[po]sed with a large surface to the air. The editor of t[he] Wirtemberg Pharmacopœia observes, that the lea[ves] of acanthus, brankursine, or bear's-breach, give [a] more durable green tincture to spirit than those of a[ny] other herb. Alkalies heighten the colour both of t[he] tinctures and green juices; acids weaken, destroy, [or] change it to a brownish: lime water improves b[oth] the colour and durability: by means of lime, not [in]elegant green lakes are procurable from the leaves [of] acanthus, lily of the valley, and several other pla[nts]

Th[e]

Colour-making ‖ Colt.

by any other method. It must, however, be observed, that there are several substances used in colour-making, which solution of tin cannot bear to be mixed with. These are principally sugar of lead and cream of tartar, as well as all the calcareous earths and alkaline salts. With alum it may be mixed very safely, and is in many cases the better for it.

41 Colours from roots.

The roots of plants, however, seem to promise more durability of colour than the upper parts. We have seen a blue colour of considerable durability and brightness prepared from the roots of common radishes by expressing the juice, combining it with tobacco-pipe clay, and brightening it with a little alum. The root of the red beet is also said to yield a durable colour of a beautiful red, inclining to scarlet; but this we cannot affirm from our own experience.

42 Colours for maps.

With regard to liquid colours for maps, &c. we apprehend there can be very little difficulty in preparing all the possible varieties of them, if what we have above laid down is attended to. The only colour with which there can be any difficulty is *blue;* but the common solution of indigo in alkalies or acids may be made to answer this purpose, though, on account of their strongly saline quality, they are not very proper. A very curious method of procuring a beautiful transparent blue colour is by extracting the colouring matter from Prussian blue, by means of a caustic alkali. This, when laid upon paper, appears of a dirty brown colour; but if washed over with a weak solution of green vitriol, is instantly changed to a most beautiful blue. This seems to afford a method of procuring blue transparent colours of greater beauty than they are usually met with.—See specimens of transparent colours prepared according to the above rules, on the *Chart* subjoined to HISTORY.

COLOURING, among painters, the manner of applying and conducting the colour of a picture; or the mixtures of light and shade, formed by the various colours employed in painting. See PAINTING.

COLOURING of Glass. See GLASS.

COLOURING of Porcelain. See PORCELAIN.

COLT, in *Zoology*, a general name for the young of the horse kind: the male being likewise, for distinction's sake, called a *horse-colt*; the female, a *filly*.

Sportsman's Dictionary.

After the colts have been foaled, you may suffer them to run with the mare till about Michaelmas, sooner or later, according as the cold weather comes in; then they must be weaned; though some persons are for having them weaned after Martinmas, or the middle of November. The author of the *Complete Horseman* is of opinion, that the reason why most foals advance so slowly, and are not capable of service till they are six or seven years old, is because they have not suckled long enough; whereas, if they had sucked the whole winter over, they would be as good at four or five years old as they are now at eight.

They ought now to be kept in a convenient house, with a low rack and manger for their hay and oats, which must be sweet and good; with a little wheaten bran mixed with the oats to cause them to drink, and to keep their bodies open. But, since there are some who allege, that oats make foals become blind, or their teeth crooked; the same author is of opinion, that oats will wear their teeth, and make them the sooner to change, and also to raze; therefore he judges it to be the best way to break them in a mill, becaus that by endeavouring with their jaws to bruise and chev them, they stretch and swell their eye and nether-ja veins, which so attract the blood and humours that the fall down upon the eyes, and frequently occasion th loss of them; so that it is not the heating quality o the oats, but the difficulty in chewing, that is the caus of their blindness.

Further, colts thus fed with grain do not gro thickish upon their legs, but grow broader and bette knit than if they had eaten nothing but hay and bran and will endure fatigue the better. But above al they must be kept from wet and cold, which are hurt ful to them, nothing being more tender than they are For proof of this, take a Spanish stallion, and let hir cover two mares, which for age, beauty, and comeli ness, may admit of no difference between them; an if they produce both horse-colts, or both fillies, whic is one and the same thing, let one run abroad, and th other be housed every winter, kept warm, and ordinari ly attended; and that colt which has been kept abroa shall have large fleshy shoulders, flabby and gout legs, weak pasterns, and ill hoofs; and shall be a dul heavy jade, in comparison to the other which is housed and orderly kept; and which will have a fine forehead be fine shaped, and have good legs and hoofs, and b of good strength and spirit; by which you may know that to have the finest stallion, and the most beautif mare, is nothing, if they are spoiled in the breedin up. It is worth observation, that some foals, under si months old, though their dams yield plenty of milk yet decay daily, and have a cough, proceeding fro certain pellicles or skins that breed in their stomachs which obstruct their breathing, and at last destro them entirely. To remedy this malady, take the ba wherein the colt was foaled, dry it, and give him a much of it in milk as you can take up with three fin gers; but if you have not preserved the bag, procur the lungs of a young fox, and use it instead of the afore said powder.

It will be proper to let the colts play an hour c two in some court-yard, &c. when it is fair weathe provided you put them up again carefully, and se that they take no harm. When the winter is spen turn them into some dry ground, where the grass i short and sweet, and where there is good water, th they may drink at pleasure; for it is not necessa that a colt should fill his belly immediately, like horse that labours hard. The next winter you m take them into the house, and use them just as you d your other horses; but let not your horse-colts an fillies be kept together after the first year. This m thod may be observed every summer and winter ti you break them, which you may do after they ha been three years old; and it will be a very easy thin if you observe the aforesaid method of housing them for ordering them the second year as you do yo other horses, they will be so tame and gentle, th you need not fear their leaping, plunging, kickin or the like; for they will take the saddle quietly. A for all those ridiculous methods of beating and curbi them, they are in effect spoiling them, whatever th call it, in ploughed fields, deep ways, or the lik instead of which, let the rider strive to win them gentle usage, never correcting them but when it necessar

COLUMBANUS, a saint and a poet, was born in Ireland, and brought up to a religious life among the disciples of St Columba. He made uncommon progress in learning; and very early in life distinguished himself for poetical abilities, by the composition of a book of psalms, and a number of moral poems, intended also to be set to music. Jonas, a writer of ecclesiastical history, mentions, that Columbanus belonged originally to a monastery of the name of *Benchor*. The same monastery is mentioned by St Bernard in his life of his friend St Malachi; and he relates that it sent out a great number of monks, who spread over Europe. Columbanus passed from Britain into France, in the year 589, and founded the monastery of Luxeville near Besançon. He had been kindly received and patronized by King Childebert; but he was afterwards expelled out of France by the wicked queen Brunichild. He retired to Lombardy in Italy, where he founded the monastery of Bobio.

COLUMBARIA, in *Ancient Geography*, an island like a rock on the west of Sicily, opposite to Drepanum, now *Columbara*.

COLUMBIA RIVER, a large river of North America, which rises in the Rocky mountains near the 54th degree of north latitude, and after receiving the large branches called Lewis river, and Clarke's river, falls into the Pacific ocean in N. Lat. 45. 50. W. Long. 124. The tide flows up the Columbia 183 miles, and vessels of considerable burden may ascend as far as the first fall, which is 261 miles from the mouth. By means of this river, and the Missouri, whose head branches approach near one another, the Americans have established an inland communication with the Pacific ocean.

COLUMBIC ACID. See CHEMISTRY *Index*.

COLUMBINE. See AQUILEGIA, BOTANY *Index*.

COLUMBIUM, a new metal which was discovered in a mineral from North America. See CHEMISTRY *Index*.

COLUMBO ROOT, an article lately introduced into the materia medica, the natural history of which is not yet well known. According to Dr Percival's account, it grew originally on the continent of America, from whence it was transplanted to Columbo, a town in Ceylon, which gives name to, and supplies all India with it. The inhabitants of these countries have for a long time used it in disorders of the stomach and bowels. They carry it about with them, and take it sliced or scraped in Madeira wine. This root comes to us in circular pieces, which are from half an inch or an inch to three inches in diameter; and divided into *frusta*, which measure from two inches to one quarter of an inch. The sides are covered with a thick corrugated bark, of a dark brown hue on its external surface, but internally of a light yellow colour. The surfaces of the transverse sections appear very unequal, highest at the edges, and forming a concavity towards the centre. On separating this surface, the root is observed to consist of three lamina, viz. the cortical, which in the larger roots, is a quarter of an inch thick; the ligneous, about half an inch; and the medullary, which forms the centre, and is near an inch in diameter. This last is much softer than the other parts, and, when chewed, seems mucilaginous; a number of small fibres run longitudinally through it, and appear on the surface. The cortical and ligneous parts are divided by a black circular line. All the thicker pieces have small holes drilled through them, for the convenience of drying. Columbo-root has an aromatic smell, but is disagreeably bitter, and slightly pungent to the taste, somewhat resembling mustard seed, when it has lost, by long keeping, part of its essential oil. Yet, though ungrateful to the taste, when received into the stomach, it appears to be corroborant, antiseptic, sedative, and powerfully antiemetic. In the cholera morbus it alleviates the violent *tormina*, checks the purging and vomiting, corrects the putrid tendency of the bile, quiets the inordinate motions of the bowels, and speedily recruits the exhausted strength of the patient. It was administered to a great number of patients, sometimes upwards of 20 in a day, afflicted with the cholera morbus, by Mr Johnson of Chester, in 1756. He generally found that it soon stopped the vomiting, which was the most fatal symptom, and that the purging and remaining complaints quickly yielded to the same remedy. The dose he gave was from half a drachm to two drachms of the powder, every three or four hours, more or less according to the urgency of the symptoms. Though this medicine possesses little or no astringency, it has been observed to be of great service in diarrhœas, and even in the dysentery. In the first stage of these disorders, where astringents would be hurtful, Columbo-root may be prescribed with safety; as, by its antispasmodic powers, the irregular actions of the primæ viæ are corrected. But as a cordial, tonic, and antiseptic remedy, it answers better when given towards their decline. Its efficacy has also been observed in the vomitings which attend the bilious cholic; and in such cases, where an emetic is thought necessary, after administering a small dose of ipecacuan, the stomach may be washed with an infusion of Columbo-root. This will tend to prevent those violent and convulsive retchings which in irritable habits abounding with bile are sometimes excited by the mildest emetic. In bilious fevers, 15 or 20 grains of this root, with an equal or double quantity of vitriolated tartar, given every four, five, or six hours, produce very beneficial effects. From its efficacy in these bilious diseases of this country, it is probable that it may be useful in the yellow fever of the West Indies, which is always attended with great sickness, violent retchings, and a copious discharge of bile. The vomiting recurs at short intervals, often becomes almost incessant, and an incredible quantity of bile is sometimes evacuated in a few hours. Children during dentition are often subject to severe vomitings and diarrhœas. In these cases the Columbo-root is an useful remedy, and hath often procured almost instant relief, when other remedies often efficacious have been tried in vain. This root is also extremely beneficial in a languid state of the stomach, attended with want of appetite, indigestion, nausea, and flatulence. It may be given either in substance, with some grateful aromatic, or infused in Madeira wine. Habitual vomiting, when it proceeds from a weakness or irritability of the stomach, from an irregular gout, acidities, acrimonious bile, or an increased and depraved secretion of the pancreatic juice, is greatly relieved by the use of Columbo-root, in conjunction with aromatics, chalybeates, or the testaceous powders. In the nausea and cogent reason, however, was a mistaken notion of the ancient geographers concerning the immense extent of the continent of India. Though hardly any of them had penetrated beyond the river Ganges, some Greek writers had ventured to describe the provinces beyond that river, which they represented as regions of an immense extent. Ctesias affirmed that India was as large as all the rest of Asia. Onesicritus, whom Pliny the naturalist follows, contended that it was equal to a third part of the habitable earth. Nearchus asserted that it would take four months to march from one extremity of it to the other in a straight line. The journal of Marco Polo, who travelled into Asia in the 13th century, and who had proceeded towards the east far beyond the limits to which any European had ever advanced, seemed also so much to confirm these accounts, that Columbus was persuaded that the distance from the most westerly part of Europe to the most easterly part of Asia was not very considerable; and that the shortest, as well as most direct course to the remote regions of the east, was to be found by sailing due west.

In 1474, Columbus communicated his ideas on this subject to one Paul a physician in Florence, a man eminent for his knowledge in cosmography. He approved of the plan, suggested several facts in confirmation of it, and warmly encouraged Columbus to persevere in an undertaking so laudable, and which must redound so much to the honour of this country and the benefit of Europe. Columbus, fully satisfied of the truth of his system, was impatient to set out on a voyage of discovery. The first step towards this was to secure the patronage of some of the considerable powers of Europe capable of undertaking such an enterprise. He applied first to the republic of Genoa; but his countrymen, strangers to his abilities, inconsiderately rejected his proposal as the dream of a chimerical projector, and thus lost for ever the opportunity of restoring their commonwealth to its ancient lustre. His next application was to the court of Portugal, where King John II. listened to him in the most gracious manner, and referred the consideration of his plan to Diego Ortiz, bishop of Ceuta, and two Jewish physicians, eminent cosmographers, whom he was accustomed to consult in matters of this kind. Unhappily these were the persons who had been the chief directors of the Portuguese navigations, and had advised to search for a passage to India by steering a course directly opposite to that which Columbus had recommended as shorter and more certain. They could not therefore approve of his proposal, without submitting to the double mortification of condemning their own theory, and of acknowledging his superiority. The result of their conferences was, that they advised the king to fit out a vessel privately, in order to attempt the proposed discovery, by following exactly the course which Columbus seemed to point out. John, forgetting on this occasion the sentiments of a monarch, meanly adopted this perfidious counsel. But the pilot chosen to execute Columbus's plan had neither the genius nor fortitude of its author. Contrary winds arose; no sign of approaching land appeared; his courage failed; and he returned to Lisbon, execrating the project as equally extravagant and dangerous.

On discovering this dishonourable transaction, Columbus immediately quitted Portugal, and applied to the king of Spain; but lest he should be here again disappointed, he sent his brother Bartholomew into England, to whom he had fully communicated his ideas, in order that he might negotiate at the same time with Henry VII. who was reckoned one of the most sagacious as well as opulent princes of Europe. Bartholomew was very unfortunate in his voyage: he fell into the hands of pirates, who stripped him of every thing, and detained him a prisoner for several years. At last he made his escape, and arrived in London, but in such extreme indigence that he was obliged to employ himself, during a considerable time, in drawing and selling maps, in order to pick up as much money as would purchase a decent dress in which he might venture to appear at court. The proposals were received by Henry with more approbation than by any monarch to whom they had hitherto been presented.

Columbus himself made his proposals to the king of Spain, not without many doubts of success, which soon appeared to be well founded. True science had as yet made so little progress in the kingdom of Spain, that most of those to whom the consideration of his plan was referred were utterly ignorant of the first principles on which he founded his hopes. Some, from mistaken notions concerning the dimensions of the globe, contended that a voyage to those remote regions of the east which Columbus expected to discover, could not be performed in less than three years. Others concluded, that either he would find the ocean of infinite extent, according to the opinion of some ancient philosophers; or that if he should persist in steering westwards beyond a certain point, the convex figure of the globe must infallibly prevent his return; and he must perish in the vain attempt to unite the two opposite hemispheres, which nature had for ever disjoined. Even without designing to enter into any particular discussion, some rejected the scheme in general, upon the credit of a maxim made use of by the ignorant in all ages, "That it is presumptuous in any person to suppose that he alone possesses knowledge superior to all the rest of mankind united." By continual disappointments and delays, he was at last wearied out, and resolved to repair to the court of England in person, in hopes of meeting with a favourable reception there. He had already made preparations for this purpose, and taken measures for the disposal of his children during his absence, when Juan Perez, the prior of the mo nastery of Rabida near Palos, in which they had bee educated, earnestly solicited him to defer his journe for a short time. Perez was a man of considerabl learning, and some credit with Queen Isabella. T her therefore he applied; and the consequence of h application was a gracious invitation to Columbus ba to court, accompanied with the present of a sm sum to equip him for the journey. Ferdinand, ho ever, still regarded the project as chimerical; and h the address to employ, in this new negotiation w him, some of the persons who had formerly p nounced his scheme to be impracticable. To th astonishment, Columbus appeared before them w the same confident hopes of success as formerly,

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Roman philosopher, was a native of Cadiz, and lived under the emperor Claudius, about the year 42. He wrote a book on agriculture, entitled *De Re Rustica*, and another *De Arboribus*.

COLUMEY, a town of Red Russia in Poland, seated on the river Pruth, towards the confines of Moldavia, about 38 miles from Halicz, and 63 south of Leopol. This town has been often pillaged by the Cossacks, insomuch that it is now inconsiderable, though there are several mines of salt in its district. E. Long. 16. 25. N. Lat. 48. 45.

COLUMN, in *Architecture*, a round pillar made to support and adorn a building, and composed of a base, a shaft, and capital. See ARCHITECTURE, N° 33.

COLUMNS, *denominated from their use.*—Astronomical column is a kind of observatory, in form of a very high tower built hollow, and with a spiral ascent to an armillary sphere placed a-top for observing the motions of the heavenly bodies. Such is that of the Doric order erected at the Hotel de Soissons at Paris, by Catharine de Medicis, for the observations of Orontius Fineus, a celebrated astronomer of that time.

Chronological COLUMN, that which bears some historical inscription digested according to the order of time; as by lustres, olympiads, fasti, epochas, annals, &c. At Athens, there were columns of this kind, whereon was inscribed the whole history of Greece digested into olympiads.

Funeral COLUMN, that which bears an urn, wherein are supposed to be inclosed the ashes of some deceased hero; and whose shaft is sometimes overspread with tears and flames, which are symbols of grief and of immortality.

Gnemonic COLUMN, a cylinder whereon the hour of the day is represented by the shadow of a stile. See DIAL.

Historical COLUMN, is that whose shaft is adorned with a basso-relievo, running in a spiral line its whole length, and containing the history of some great personage: such are the Trajan and Antonine columns at Rome.

Hollow COLUMN, that which has a spiral staircase withinside for the convenience of ascending to the top; as the Trajan column, the staircase whereof consists of 185 steps, and is illuminated by 43 little windows, each of which is divided by tambours of white marble. The Monument, or fire-column at London, has also a staircase; but it does not reach to the top. These kinds of columns are also called *columnæ*, *coclideæ*, or *cochlideæ*.

Indicative COLUMN, that which serves to show the tides, &c. along the sea-coasts. Of this kind there is one at Grand Cairo of marble, on which the overflowings of the Nile are expressed; by this they form a judgment of the succeeding seasons; when the water, for instance, ascends to 23 feet, it is a sign of great fertility in Egypt. See NILOMETER.

Instructive COLUMN, that raised, according to Josephus, lib. i. cap. 3. by the sons of Adam, whereon were engraven the principles of arts and sciences. Baudelot tells us, that the son of Pisistratus raised another of this kind, of stone, containing the rules and precepts of agriculture.

Itinerary COLUMN, a column with several faces, placed in the cross ways in large roads; serving to show the different routes by inscriptions thereon.

Lactary COLUMN, at Rome, according to Festus, was a column erected in the herb-market, now the place *Montanara*, which had a cavity in its pedestal, wherein young children abandoned by their parents, out of poverty or inhumanity, were exposed, to be brought up at the public expence.

Legal COLUMN. Among the Lacedæmonians there were columns raised in public places, whereon were engraven the fundamental laws of the state.

Limitrophous or *Boundary* COLUMN, that which shows the limits of a kingdom or country conquered. Such was that which Pliny says Alexander the Great erected at the extremity of the Indies.

Manubiary COLUMN, from the Latin *manubiæ*, "spoils of the enemy;" a column adorned with trophies built in imitation of trees, whereon the spoils of enemies were anciently hung. See TROPHY.

Memorial COLUMN, that raised on occasion of any remarkable event, as the Monument of London, built to perpetuate the memory of the burning of that city in 1666. It is of the Doric order, fluted, hollow, with a winding staircase; and terminated a-top with waving flames. There is also another of the kind, in form of an obelisk, on the banks of the Rhine in the Palatinate, in memory of the famous passage of that river by the great Gustavus Adolphus and his army.

Menian COLUMN, any column which supports a balcony or meniana. The origin of this kind of column, Suetonius and Ascanius refer to one Menias; who having sold his house to Cato and Flaccus, consuls, to be converted into a public edifice, reserved to himself the right of raising a column withoutside, to bear a balcony, whence he might see the shows.

Military COLUMN, among the Romans, a column whereon was engraven a list of the forces in the Roman army, ranged by legions, in their proper order; with design to preserve the memory of the number of soldiers, and of the order preserved in any military expedition. They had another kind of military column, which they called *columna bellica*, standing before the temple of Janus; at the foot whereof the consul declared war by throwing a javelin towards the enemies countries.

Milliary COLUMN, was a column of marble raised by order of Augustus in the middle of the Roman forum; from whence, as the centre, the distances of the several cities, &c. of the empire were reckoned, by other milliary columns disposed at equal distances on all the grand roads. This column was of white marble, the same with that which is now seen on the ballustrade o[f] the perron of the capitol at Rome. Its proportion i[s] massive, being a short cylinder, the symbol of the glob[e] of the earth. It was called *milliarium aureum*, [a]s having been gilt, at least the ball, by order of Augu[s]tus. It was restored by the emperors Vespasian a[nd] Adrian, as appears by the inscriptions.

Sepulchral COLUMN, anciently was a column erect[ed] on a tomb or sepulchre, with an inscription on its ba[se]. Those over the tombs of persons of distinction we[re] very large; those for the common people small; th[e] last are called *stellæ* and *cippi*.

Statuary COLUMN, that which supports a statue. S[uch] was that erected by Pope Paul V. on a pedestal bef[ore]

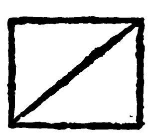
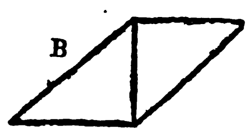
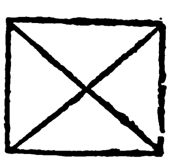
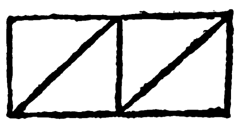
The construction of this table is very simple. The line A a consists of the first 12 numbers. The line A b consists everywhere of units; the second term 3, of the line B c, is composed of the two terms 1 and 2 in the preceding rank: the third term 7, in that line, is formed of the two terms 3 and 3 in the preceding rank: and so of the rest; every term, after the first, being composed of the two next terms in the preceding rank: and by the same method it may be continued to any number of ranks. To find by this table how often any number of things can be combined in another number, under 13, as suppose five cards out of 8: in the eighth rank look for the fifth term, which is 56, and that is the number required.

Though we have shown in the foregoing problems the manner of finding the combination of all numbers whatever, yet as this table answers the same purpose, for small numbers, by inspection only, it will be found useful on many occasions; as will appear by the following examples.

V. To find how many different sounds may be produced by striking on a harpsichord two or more of the seven natural notes at the same time. 1. The combinations of two in seven, by the foregoing triangle are, - - - - - 21
2. The combinations of 3 in 7, are - 35
3. The combinations of 4 in 7, are - - 35
4. The combinations of 5, are - - 21
5. The combinations of 6, are - - 7
6. The seven notes altogether once, - 1

Therefore the number of all the sounds will be 120

VI. Take four square pieces of pasteboard, of the same dimensions, and divide them diagonally, that is, by drawing a line from two opposite angles, as in the figures, into 8 triangles; paint 7 of these triangles with the primitive colours, red, orange, yellow, green, blue, indigo, violet, and let the eighth be white. To find how many chequers or regular four-sided figures, different either in form or colour, may be made out of those eight triangles. First, by combining two of these triangles, there may be formed either the triangular square A, or the inclined square B called a *rhomb*. Secondly, by combining four of the triangles, the large square C may be formed; or the long square D, called a *parallelogram*.

A

B

C

D


Now the first two squares, consisting of two parts out of 8, they may each of them, by the eighth rank of the triangle, be taken 28 different ways, which makes 56. And the last two squares, consisting of four parts, may each be taken by the same rank of the triangle 70 times, which makes - 140
To which add the foregoing number - - 56

And the number of the different squares that may be formed of the 8 triangles will be } 196

VII. A man has 12 different sorts of flowers, and a large number of each sort. He is desirous of setting them in beds or flourishes in his parterre: Six flowers in some, 7 in others, and 8 in others; so as to have the greatest variety possible; the flowers in no two beds to be the same. To find how many beds he must have.
1. The combinations of 6 and 12 by the last rank of the triangle, are - - - - 924
2. The combinations of 7 in 12, are - 792
3. The combinations of 8 in 12, are - 495

Therefore the number of beds must be - 2211

VIII. To find the number of chances that may be thrown on two dice. As each die has six faces, and as each face of one die may be combined with all the faces of the others, it follows that 6 multiplied by 6, that is, 36, will be the number of all the chances; as is also evident from the following table:

Points.							Numb. of chances.	Numb. of points.
2	1.1						1	2
3	2.1	1.2					2	6
4	2.2	3.1	1.3				3	12
5	4.1	1.4	3.2	2.3			4	20
6	3.3	5.1	1.5	4.2	2.4		5	30
7	6.1	1.6	5.2	2.5	4.3	3.4	6	42
8	4.4	6.2	2.6	5.3	3.5		5	40
9	6.3	3.6	5.4	4.5			4	36
10	5.5	6.4	4.6				3	30
11	6.5	5.6					2	22
12	6.6						1	12
							36	252

It appears by this table, 1. That the number of chances for each point continually increases to the point of seven, and then continually decreases till 12: therefore if two points are proposed to be thrown, the equality, or the advantage of one over the other, is clearly visible (A). 2. The whole number of chances on the dice being 252, if that number be divided by 36, the number of different throws on the dice, the quotient is 7: it follows therefore, that at every throw there is an equal chance of bringing seven points. 3. As there are 36 chances on the dice, and only 6 of them doublets, it is 5 to 1, at any one throw, against throwing a doublet.

By

(A) It is easy from hence to determine whether a bet proposed at hazard, or any other game with the dice, be advantageous or not; if the dice be true (which, by the way, is rarely the case for any long time together, as it is so easy for those that are possessed of a dexterity of hand to change the true dice for false.)

Combination.

By the same method the number of chances upon any number of dice may be found: for if 36 be multiplied by 6, that product, which is 216, will be the chances on 3 dice; and if that number be multiplied by 6, the product will be the chances of 4 dice, &c.

Combinations of the Cards. The following experiments, founded on the doctrine of combinations, may possibly amuse a number of our readers. The tables given are the basis of many experiments, as well on numbers, letters, and other subjects, as on the cards; but the effect produced by them with the last is the most surprising, as that which should seem to prevent any collusion, that is, the shuffling of the cards, is on the contrary the cause from whence it proceeds.

It is a matter of indifference what numbers are made use of in forming these tables. We shall here confine ourselves to such as are applicable to the subsequent experiments. Any one may construct them in such manner as is agreeable to the purposes he intends they shall answer.

To make them, for example, correspond to the nine digits and a cipher, there must be ten cards, and at the top of nine of them must be written one of the digits, and on the tenth a cipher. These cards must be placed upon each other in the regular order, the number 1 being on the first, and the cipher at bottom. You then take the cards in your left hand, as is commonly done in shuffling, and taking off the two top cards 1 and 2, you place the two following, 3 and 4, upon them; and under those four cards the three following 5, 6, and 7; at the top you put the cards 8 and 9, and at the bottom the card marked 0; constantly placing in succession 2 at top and 3 at bottom: And they will then be in the following order:

8.9..3.4..1.2...5.6.7..0

If you shuffle them a second time, in the same manner, they will then stand in this order:

6.7..3.4..8.9..1.2.5.7..0

Thus, at every new shuffle they will have a different order, as is expressed in the following lines:

1 shuffle	8.9.3.4.1.2.5.6.7.0
2	6.7.3.4.8.9.1.2.5.0
3	2.5.3.4.6.7.8.9.1.0
4	9.1.3.4.2.5.6.7.8.0
5	7.8.3.4.9.1.2.5.6.0
6	5.6.3.4.7.8.9.1.2.0
7	1.2.3.4.5.6.7.8.9.0

It is a remarkable property of this number, that the cards return to the order in which they were first placed, after a number of shuffles, which added to the number of columns that never change the order, is equal to the number of cards. Thus the number of shuffles is 7, and the number of columns in which the cards marked 3, 4, &c. never change their places is 3, which are equal to 10, the number of the cards. This property is not common to all numbers; the cards sometimes returning to the first order in a less number, and sometimes in a greater number of shuffles than that of the cards.

Tables of Combinations,

Constructed on the foregoing principles.

I. *For ten Numbers.*

Order before dealing.	After 1st deal.	After the 2d.	After the 3d.
1	8	6	2
2	9	7	5
3	3	3	3
4	4	4	4
5	1	8	6
6	2	9	7
7	5	1	8
8	6	2	9
9	7	5	1
0	0	0	0

These tables, and the following examples at piquet, except the 36th, appear to have been composed by M. Guyot.

II. *For twenty-four Numbers.*

Order before dealing.	After 1st deal.	After the 2d.	After the 3d.
1	23	21	17
2	24	22	20
3	18	12	2
4	19	15	7
5	13	5	13
6	14	6	14
7	8	9	3
8	9	3	18
9	3	18	12
10	4	19	15
11	1	23	21
12	2	24	22
13	5	13	5
14	6	14	6
15	7	8	9
16	10	4	19
17	11	1	23
18	12	2	24
19	15	7	8
20	16	10	4
21	17	11	1
22	20	16	10
23	21	17	11
24	22	20	16

III. *For twenty-seven Numbers.*

Order before dealing.	After 1st deal.	After the 2d.	After the 3d.
1	23	21	17
2	24	22	20
3	18	12	2
4	19	15	7
5	13	5	13
6	14	6	14
7	8	9	3
8	9	3	18
9	3	18	12
10	4	19	16
11	1	13	21
12	2	24	22
13	5	13	5

Order before dealing.	After 1st deal.	After the 2d.	After the 3d.
14	6	14	6
15	7	8	9
16	10	4	19
17	11	1	23
18	12	2	24
19	15	7	8
20	16	10	4
21	17	11	1
22	20	16	10
23	21	17	11
24	22	20	16
25	25	25	25
26	26	26	26
27	27	27	27

IV. *For Thirty-two Numbers.*

Order before dealing.	After 1st deal.	After the 2d.	After the 3d.
1	28	26	22
2	29	27	25
3	23	17	7
4	24	20	12
5	18	10	9
6	19	11	3
7	13	1	28
8	14	2	29
9	8	14	2
10	9	8	14
11	3	23	17
12	4	24	20
13	1	28	26
14	2	29	27
15	5	18	10
16	6	19	11
17	7	13	1
18	10	9	8
19	11	3	23
20	12	4	24
21	15	5	18
22	16	6	19
23	17	7	13
24	20	12	4
25	21	15	5
26	22	16	6
27	25	21	15
28	26	22	16
29	27	25	21
30	30	30	30
31	31	31	31
32	32	32	32

I. "Several letters that contain no meaning, being "written upon cards, to make them, after they have "been twice shuffled, to give an answer to a question "that shall be proposed; as, for example, *What is* "*love?*" Let 24 letters be written on as many cards which, after they have been twice shuffled, shall give the following answer:

A dream of joy that soon is o'er.

First write one of the letters in that line on each of the cards (B). Then write the answer on a paper, and assign one of the 24 first numbers to each card, in the following order:

A D R E A M O F J O Y T H A T S O O N
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
I S O' E R.
20 21 22 23 24.

Next write on another paper a line of numbers from 1 to 24, and looking in the table for 24 combinations, you will see that the first number after the second shuffle is 21; therefore the card that has the first letter of the answer, which is A, must be placed against that number, in the line of numbers you have just made (C). In like manner the number 22 being the second of the same column, indicates that the card which answers to the second letter D of the answer, must be placed against that number; and so of the rest. The cards will then stand in the following order:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 18 19
O O F S A M N T O I S R H A E O 'E J
20 21 22 23 24
R A D Y T

From whence it follows, that after these cards have been twice shuffled, they must infallibly stand in the order of the letters in the answer.

Observe, 1. You should have several questions, with their answers, consisting of 24 letters, written on cards; these cards should be put in cases and numbered, that you may know to which question each answer belongs. You then present the questions; and when any one of them is chosen, you pull out the case that contains the answer, and showing that the letters written on them make no sense, you then shuffle them, and the answer becomes obvious.

2. To make this experiment the more extraordinary, you may have three cards, on each of which an answer is written; one of which cards must be a little wider, and another a little longer, than the others. You give these three cards to any one, and when he has privately chosen one of them, he gives you the other two, which you put in your pocket without looking at them, having discovered by feeling which he has chosen. You then pull out the case that contains the cards that answer to his question, and perform as before.

3. You may also contrive to have a long card at the bottom after the second shuffle. The cards may be then cut several times, till you perceive by the touch that the long card is at bottom, and then give the answer;

(B) These letters should be written in capitals on one of the corners of each card, that the words may be easily legible when the cards are spread open.

(C) For the same reason, if you would have the answer after one shuffle, the cards must be placed according to the first column of the table; or if after three shuffles, according to the third column.

swer; for the repeated cuttings, however often, will make no alteration in the order of the cards.

The second of these observations is applicable to some of the subsequent experiments, and the third may be practised in almost all experiments with the cards. You should take care to put up the cards as soon as the answer has been shewn; so that if any one should desire the experiment to be repeated, you may offer another question, and pull out those cards that contain the answer.

Though this experiment cannot fail of exciting at all times pleasure and surprise, yet it must be owned that a great part of the applause it receives arises from the address with which it is performed.

II. "The 24 letters of the alphabet being written "upon so many cards, to shuffle them, and pronounce "the letters shall then be in their natural order; but "that not succeeding, to shuffle them a second time, "and then show them in proper order." Write the 24 letters on the cards in the following order:

1 2 3 4 5 6 7 8 9 10 11 12
R S H Q E F T P G U X C

13 14 15 16 17 18 19 20 21 22 23 24
N O D Y Z I K & A B L M

The cards being disposed in this manner, show them upon the table, that it may appear they are promiscuously marked. Then shuffle and lay them again on the table, pronouncing that they will be then in alphabetical order. Appear to be suprised that you have failed; take them up again, and give them a second shuffle, and then counting them down on the table they will all be in their natural order.

III. "Several letters being written promiscuously "upon 32 cards, after they have been once shuffled, to "find in a part of them a question; and then shuffling "the remainder a second time, to show the answer. "Suppose the question to be, *What is each Briton's* "*boast?* and the answer, *His liberty;* which taken "together contain 32 letters."

After you have written those letters on 32 cards, write on a paper the word, *his liberty*, and annex to the letters the first ten numbers thus:

H I S L I B E R T Y.
1 2 3 4 5 6 7 8 9 10

Then have recourse to the table of combinations for ten numbers, and apply the respective numbers to them in the same manner as in experiment I. taking the first column, as these are to be shuffled only once according to that order.

1 2 3 4 5 6 7 8 9 10
I B S L E R T H I Y

This is the order in which these cards must stand after the whole number 32 has been once shuffled, so that after a second shuffle they may stand in their proper order. Next dispose the whole number of letters according to the first column for 32 letters; the last ten are to be here placed in the order above; as follows:

W H A T I S E A C H B R I T O N ' S
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

B O A S T?
18 19 20 21 22

I B S L E R T H I Y
23 24 25 26 27 28 29 30 31 32

Therefore, by the first column of the table, they will next stand thus:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
I T B R O N S C H B O A E A S T *long card.*

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
I I S B S L I B E R T W H H I Y

You must observe, that the card here placed the 16th in order, being the last of the question, is a long card; that you may cut them, or have them cut, after the first shuffle, at that part, and by that means separate them from the other ten cards that contain the answer.

Your cards being thus disposed, you show that they make no meaning; then shuffle them once, and cutting them at the long card, you give the first part to any one, who reads the question, but can find no answer in the other, which you open before him; you then shuffle them a second time, and show the answer as above.

IV. "To write 32 letters on so many cards, then "shuffle and deal them by twos to two persons, in "such manner, that the cards of one shall contain a "question, and those of the other an answer. Suppose the question to be, *Is nothing certain?* and the "answer, *Yes, disappointment.*"

Over the letters of this question and answer, write the following numbers, which correspond to the order in which the cards are to be dealt by two and two.

I S N O T H I N G C E R T A I N?
31 32 27 28 23 24 19 20 15 16 11 12 7 8 3 4

Y E S, D I S A P O I N T M E N T.
29 30 25 26 21 22 17 18 13 14 9 10 5 6 1 2

Then have recourse to the first column of the table for 32 numbers, and dispose these 32 cards in the following order, by that column.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
O I E R G C A N T P I N T A I S

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
T M E H S D I N N O Y N T E I S

The cards being thus disposed, shuffle them once, and deal them two and two: when one of the parties will necessarily have the question, and the other the answer.

Instead of letters you may write words upon the 32 cards, 16 of which may contain a question, and the remainder the answer; or what other matter you please. If there be found difficulty in accommodating the words to the number of cards, there may be two or more letters or syllables written upon one card.

V. "The five beatitudes." The five blessings we will suppose to be, 1. Science. 2. Courage. 3. Health. 4. Riches, and, 5. Virtue. These are to be found upon cards that you deal, one by one, to five persons. First, write the letters of these words successively, in the

Combination.

Cards.	Numbers.	Cards.	Numbers.
		brought up	34
1 Nine	9	6 Ten clubs	10
2 King } spades	10	7 Ten diamonds	10
3 Seven	7	8 Ten hearts	10
4 Seven diamonds	7	9 Ace clubs	1
5 Ace spades	1	10 Ace hearts (wide card)	1
carried up	34	total	66

		brought up	101
11 Eight hearts	8	22 Queen hearts	10
12 Eight spades	8	23 Nine	9
13 Seven hearts	7	24 Knave	10
14 Nine clubs	9	25 Eight } diamonds	8
15 Knave } spades	10	26 King	10
16 Ten	10	27 Queen	10
17 Queen clubs	10	28 Knave hearts	10
18 Nine hearts	9	29 King clubs	10
19 Queen spades	10	30 Ace diamonds	1
20 Knave clubs	10	31 Seven } clubs	7
21 King hearts	10	32 Eight	8
carried up	101	total	194

When the cards are by shuffling disposed in this order, you cut them at the wide card, and pronounce that the cards you have cut off contain 66 points, and consequently the remaining part 194.

VIII. "The Inconceivable Repique (E)." When you would perform this experiment with the cards used in the last, you must observe not to disorder the first 10 cards in laying them down on the table. Putting those cards together, in their proper order therefore, you shuffle them a second time in the same manner, and offer them to any one to cut, observing carefully if he cut them at the wide card, which will be the ace of hearts, and will then be at top; if not, you must make him, under some pretence or other, cut them till it is; and the cards will then be ranged in such order that you will repique the person against whom you play, though you let him choose (even after he has cut) in what suit you shall make the repique.

Order of the cards after they have been shuffled and cut.

1 Eight hearts
2 Eight } spades
3 Knave } spades
4 Ten } spades
5 Queen } clubs
6 Knave } clubs
7 King } hearts
8 Queen } hearts
9 Eight } diamonds
10 King } diamonds
11 Queen } diamonds
12 Ace } diamonds
13 Seven } clubs
14 Eight } clubs
15 Knave hearts
16 King clubs
17 Nine } diamonds
18 Knave } diamonds
19 Nine hearts
20 Queen spades
21 Seven hearts
22 Nine clubs
23 Ten hearts
24 Ace clubs
25 Seven spades
26 Seven diamonds
27 Nine spades
28 King } spades
29 Ace } spades
30 Ten clubs
31 Ten diamonds
32 Ace hearts
wide card.

Combination.

The cards being thus disposed, you ask your adversary in what suit you shall repique him? If he say in clubs or diamonds, you must deal the cards by threes, and the hands will be as follows:

Elder.	Younger.
Hearts, king	Clubs, ace
——— queen	——— king
——— knave	——— queen
——— nine	——— knave
——— eight	——— nine
——— seven	Diamonds, ace
Spades, queen	——— king
——— knave	——— queen
——— eight	——— knave
Diamonds, eight	——— nine
Clubs, eight	Spades, ten
——— seven	Hearts, ten

Rentrée, or take in of the elder.	Rentrée of the younger
Seven spades	Ten clubs
Seven diamonds	Ten diamonds
Nine } spades	Ace hearts
King } spades	
Ace } spades	

If he against whom you play, who is supposed to be elder hand, has named clubs for the repique, and has taken in five cards, you must then lay out the queen, knave, and nine of diamonds, and you will have, with the three cards you take in, a sixiem major in clubs, and quatorze tens. If he leave one or two cards, you must discard all the diamonds.

If he require to be repiqued in diamonds, then discard the queen, knave, and nine of clubs: or all the clubs, if he leave two cards; and will then have a hand of the same strength as before.

Note. If the adversary should discard five of his hearts, you will not repique him, as he will then have a septiem in spades: or if he only take one card: but neither of these any one can do, who has the least knowledge of the game. If the person against whom you play would be repiqued in hearts or spades, you must deal the cards by twos, and the game will stand thus:

Elder hand.	Younger hand.
King } diamonds	Ace } clubs
Knave } diamonds	King } clubs
Nine } diamonds	Ace } diamonds
Eight } diamonds	Queen } diamonds

(E) This manœuvre of piquet was invented by the countess of L——— (a French lady), and communicated by her to M. Guyot.

Combination.

Elder hand.		Younger hand.	
Queen	clubs	Queen	spades
Knave	clubs	Knave	spades
Nine	clubs	Ten	spades
Eight	clubs	King	hearts
Seven	clubs	Queen	hearts
Eight	hearts	Knave	hearts
Seven	hearts	Ten	hearts
Eight spades		Nine	hearts
Rentrée		Rentrée.	
Seven spades		Ten clubs	
Seven diamonds		Ten diamonds	
Nine	spades	Ace hearts	
King	spades		
Ace	spades		

If he require to be repiqued in hearts, you keep the quint to a king in hearts, and the ten of spades, and lay out which of the rest you please; then, even if he should leave two cards, you will have a sixiem major in hearts, and quatorze tens, which will make a repique.

But if he demand to be repiqued in spades; at the end of the deal you must dexterously pass the three cards that are at the bottom of the stock (that is, the ten of clubs, ten of diamonds, and ace of hearts) to the top (r), and by that means you reserve the nine, king, and ace of spades for yourself; so that by keeping the quint in hearts, though you should be obliged to lay out four cards, you will have a sixiem to a king in spades, with which and the quint in hearts you must make a repique.

Observe here likewise, that if the adversary lay out only three cards, you will not make the repique; but that he will never do, unless he be quite ignorant of the game, or has some knowledge of your intention.

This last stroke of piquet has gained great applause, when those that have publicly performed it have known how to conduct it dexterously. Many persons who understand the nature of combining the cards, have gone as far as the passing the three cards from the bottom of the stock, and have then been forced to confess their ignorance of the manner in which it was performed.

XI. "The Metamorphosed Cards." Provide 32 cards that are differently coloured, on which several different words are written, and different objects painted. These cards are to be dealt two and two to four persons, and at three different times, shuffling them each time. After the first deal, every one's cards are to be of the same colour; after the second deal they are all to have objects that are similar: and after the third, words that convey a sentiment.

Dispose of the cards in the following order.

Cards.	Colours.	Objects.	Words.
1	Yellow	Bird	I find
2	Yellow	Bird	In you
3	Green	Flower	Charming
4	Green	Flower	Flowers
5	White	Bird	To hear
6	White	Orange	Beauty
7	Red	Butterfly	My
8	Red	Flower	Notes
9	Red	Flower	In
10	Red	Butterfly	Shepherdess
11	Green	Butterfly	Lover
12	Green	Butterfly	Your
13	White	Flower	Of
14	White	Flower	An inconstant
15	Yellow	Orange	Image
16	Yellow	Flower	Enchanting
17	White	Orange	Adorn
18	Yellow	Butterfly	My
19	Yellow	Butterfly	Phyllis
20	White	Bird	Birds
21	Red	Orange	Sing
22	Red	Orange	Dear
23	Green	Orange	And sweetness
24	Green	Orange	The
25	Green	Bird	Of
26	Green	Bird	Present
27	Yellow	Flower	As
28	Red	Bird	Changes
29	Red	Bird	Bosom
30	Yellow	Orange	Me
31	White	Butterfly	Your
32	White	Butterfly	I long

The cards thus coloured, figured, and transcribed, are to be put in a case, in the order they here stand.

When you would perform this experiment, you take the cards out of the case, and show, without changing the order in which they were put, that the colours, objects, and words, are all placed promiscuously. You then shuffle them in the same manner as before, and deal them, two and two, to four persons, observing that they do not take up their cards till all are dealt, nor mix them together: and the eight cards dealt to each person will be found all of one colour. You then take each person's cards, and put those of the second person under those of the first, and those of the fourth person under those of the third. After which you shuffle them a second time; and having dealt them in the same manner, on the first person's cards will be painted all the birds; on the second person's cards all the butterflies; on those of the third, the oranges; and on those of the fourth, the flowers. You take the cards a second time, and observing the same precautions, shuffle and deal them as before; and then the first person, who had the last time the birds in his hand, will have the words that compose this sentence:

Sing, dear birds; I long to hear your enchanting notes.

The second person, who the last deal had the butterflies, will now have these words:

Of an inconstant lover your changes present me the image.

The third, who had the oranges, will have this sentence:

As

(r) The manner of doing this is explained in the article Legerdemain.

As in my Phyllis, I find in you beauty and sweetness.

The fourth, who had the flowers, will have these words:

Charming flowers, adorn the bosom of my shepherdess.

It seems quite unnecessary to give any further detail, as they who understand the foregoing experiments will easily perform this.

Among the different purposes to which the doctrine of combinations may be applied, those of writing in cipher, and deciphering, hold a principal place. See the article CIPHER.

COMBINATION, in *Chemistry*, signifies the union of two bodies of different natures, from which a new compound body results. For example, when an acid is united with an alkali, we say that a combination betwixt these two saline substances takes place; because from this union a neutral salt results, which is composed of an acid and an alkali.

COMBUST, in *Astronomy*. When a planet is in conjunction with the sun, or not distant from it above half its disk, it is said to be combust, or in combustion.

According to Argol, a planet is combust, or in combustion, when not above eight degrees and thirty minutes distant from the sun, either before or after him.

COMBUSTIO PECUNIÆ, the ancient way of trying mixed and corrupt money, by melting it down, upon payments into the exchequer. In the time of King Henry II. a constitution was made, called the trial by *combustion;* the practice of which differed little or nothing from the present method of assaying silver. But whether this examination of money by combustion was to reduce an equation of money only to sterling, viz. a due proportion of alloy with copper, or to reduce it to pure fine silver, does not appear. On making the constitution of trial it was considered, that though the money did answer *numero et pondere*, it might be deficient in value; because mixed with copper or brass, &c.

COMBUSTION, a term denoting the operation of fire upon any inflammable substance, by which it smokes, flames, and is reduced to ashes.

There is not a phenomenon in nature by which the attention of philosophers has been more engaged, or which has puzzled them more to account for, than this very common operation. To explain it, theories have been invented, the most opposite and contradictory to one another that can be imagined; and, till very lately, the state of science did not afford data sufficient to explain it in a rational manner. See CHEMISTRY *Index*.

COMEDY, a sort of dramatic poetry, which gives a view of common and private life, recommends virtue, and corrects the vices and follies of mankind by means of ridicule. See the article POETRY.

This last kind alone was received among the Romans, who nevertheless made a new subdivision of it into ancient, middle, and new, according to the various periods of the commonwealth. Among the ancient comedies were reckoned those of Livius Andronicus; among the middle those of Pacuvius; and among the new ones, those of Terence. They likewise distinguished comedy according to the quality of the persons represented, and the dress they wore, into togatæ, prætextatæ, trabeatæ, and tabernariæ, which last agrees pretty nearly with our farces. Among us, comedy is distinguished from farce, as the former represents nature as she is; the other distorts and overcharges her. They both paint from the life, but with different views: the one to make nature known, the other to make her ridiculous.

COMENIUS, JOHN AMOS, a grammarian and Protestant divine, born in Moravia in 1592. He was eminent for his design to introduce a new method of teaching languages; for which purpose he published some essays in 1616, and had prepared some others, when the Spaniards pillaged his library, after having taken the city of Fulnec, where he was minister and master of the school. Comenius fled to Lesna, a city of Poland, and taught Latin there. The book he published in 1631, under the title of *Janua Linguarum reserata*, gained him a prodigious reputation, insomuch that he was offered a commission for regulating all the schools in Poland. The parliament of England desired his assistance to regulate the schools in that kingdom. He arrived at London in 1641; and would have been received by a committee to hear his plan, had not the parliament been taken up with other matters. He therefore went to Sweden, being invited by a generous patron, who settled a stipend upon him that delivered him from the fatigues of teaching; and now he employed himself wholly in discovering general methods for those who instructed youth. In 1657 he published the different parts of his new method of teaching. He was not only taken up with the reformation of schools; but he also filled his brain with prophecies, the fall of Antichrist, Millennium, &c. At last Comenius took it into his head to address Louis XIV. of France, and to send him a copy of the prophecies of Drabicius; insinuating, that it was to this monarch God promised the empire of the world. He became sensible at last of the vanity of his labours, and died in 1671.

COMET, an opaque, spherical, and solid body like a planet, performing revolutions about the sun in elliptical orbits, which have the sun in one of their foci.

There is a popular division of comets into *tailed*, *bearded*, and *hairy* comets; though this division rather relates to the different circumstances of the same comet, than to the phenomena of several. Thus, when the light is westward of the sun, and sets after it, the comet is said to be *tailed*, because the train follows it in the manner of a tail: when the comet is eastward of the sun, and moves from it, the comet is said to be *bearded*, because the light marches before it in the manner of a beard. Lastly, when the comet and the sun are diametrically opposite (the earth between them), the train is hid behind the body of the comet, except a little that appears round it in form of a border of *hair:* and from this last appearance the word comet is derived; as κομητης, *cometa*, comes from κομη, *coma*, hair. But there have been comets whose disk was as clear, as round, and as well defined, as that of Jupiter, without either tail, beard, or coma. See ASTRONOMY *Index*.

3

COMETARIUM,

Comitia. vided into two parts or orders; the *proletarii* and the *capite censi*. The former, as their name implies, were designed purely to stock the republic with men, since they could supply it with so little money: and the latter, who paid the lowest tax of all, were rather counted and marshalled by their heads than by their estates.

Persons of the first rank, by reason of their pre-eminence, had the name of *classici;* whence came the name of *classici auctores* for the most approved writers. All others, of what classis soever, were said to be *infra classem*. The assembly of the people by centuries was held for the electing of consuls, censors, and prætors; as also for the judging of persons accused of what they called *crimen perduellionis*, or actions by which the party had showed himself an enemy to the state, and for the confirmation of all such laws as were proposed by the chief magistrates, who had the privilege of calling these assemblies.

The place appointed for their meeting was the *campus martius;* because in the primitive times of the commonwealth, when they were under continual apprehensions of enemies, the people, to prevent any sudden assault, went armed, in martial order, to hold these assemblies; and were for that reason forbidden by the laws to meet in the city, because an army was upon no account to be marshalled within the walls; yet, in later ages, it was thought sufficient to place a body of soldiers as a guard in the janiculum, where an imperial standard was erected, the taking down of which denoted the conclusion of the comitia.

Though the time of holding these comitia for other matters was undetermined; yet the magistrates, after the year of the city 601, when they began to enter on their place, on the kalends of January, were constantly *designed* about the end of July and the beginning of August.

All the time between their election and confirmation they continued as private persons, that inquisition might be made into the election, and the other candidates might have time to enter objections, if they met with any suspicion of unfair dealing. Yet, at the election of the censors, this custom did not hold; but as soon as they were elected, they were immediately invested with the honour.

By the institution of these comitia, Servius Tullius secretly conveyed the whole of the power from the commons; for the centuries of the first and richest class being called out first, who were three more in number than all the rest put together, if they all agreed, as generally they did, the business was already decided, and the other classes were needless and insignificant. However, the three last scarce ever came to vote.

The commons, in the time of the free state, to remedy this disadvantage, obtained, that before they proceeded to voting any matter at these comitia, that century should give their suffrages first upon whom it fell by lot, with the name of *centuria prerogativa;* the rest being to follow according to the order of their classes. After the constitution of the 35 tribes into which the classes and their centuries were divided, in the first place, the tribes cast lots which should be the *prerogative tribe;* and then the centuries of the tribes for the honour of being a prerogative century. All the other tribes and centuries had the appellation of *jure vocatæ*, because they were called out according to their proper places. Comitia.

The prerogative century being chosen by lot, the chief magistrate, sitting in a tent in the middle of the campus martius, ordered that century to come out and give their voices; upon which they presently separated from the rest of the multitude, and came into an inclosed apartment, which they termed *septa* or *ovilia*, passing over the *pontes* or narrow boards laid there for the occasion; on which account *de pontibus dejici* signifies to be denied the privilege of voting, and persons thus dealt with are called *depontani.*

At the higher end of the pontes stood the *diribitores* (a sort of under officers, so called from their marshalling the people), and delivered to every man, in the election of magistrates, as many tablets as there appeared candidates, one of whose names was written upon every tablet. A proper number of great chests were set ready in the *septa*, and every body threw in which tablet he pleased.

By the chests were placed some of the public servants, who taking out the tablets of every century, for every tablet, made a prick or a point in another tablet which they kept by them. Thus, the business being decided by most points gave occasion to the phrase *omne tulit punctum*, and the like.

The same method was observed in the justiciary process at these comitia, and in the confirmation of laws; except that, in both these cases, only two tablets were offered to every person; on one of which was written U. R. and on the other A, in capital letters; the two first standing for *uti rogas*, "be it as you desire," relating to the magistrate who proposed the question; and the last for *antiquo*, or "I forbid it."

It is remarkable, that though in the election of magistrates, and in the ratification of laws, the votes of that century, whose tablets were equally divided, signified nothing; yet in the trials of life and death, if the tablets *pro* and *con* were the same in number, the person was actually acquitted.

The division of people into *tribes* was an invention of Romulus, after he had admitted the Sabines into Rome; and though he constituted at that time only three, yet as the state increased in power, and the city in number of inhabitants, they rose by degrees to 35. For a long time after this institution, a *tribe* signified no more than such a space of ground with its inhabitants. But at last the matter was quite altered, and a tribe was no longer *pars urbis*, but *pars civitatis;* not a quarter of the city, but a company of citizens living where they pleased. This change was chiefly occasioned by the original difference between the tribes in point of honour. For Romulus having committed all sordid and mechanic arts to the care of strangers, slaves, and libertines; and reserved the more honest labour of agriculture to the freemen and citizens, who by this active course of life might be prepared for martial service; the *tribus rusticæ* were for this reason esteemed more honourable than the *tribus urbanæ*. And now all persons being desirous of getting into the more creditable division; and there being several ways of accomplishing their wishes, as by adoption, by the power of censors, or the like; that rustic tribe which had the most worthy names in its roll had the preference

Anciently the administration of vacant bishoprics belonged to the nearest neighbouring bishop; which is still practised between the archbishopric of Lyons and the bishopric of Autun: on this account they were called *commendatory bishops*.

This custom appears to be very ancient. St Athanasius says of himself, according to Nicephorus, that there had been given him *in commendam*, i. e. in administration, another church besides that of Alexandria whereof he was stated bishop.

The care of churches, it seems, which had no pastor, was committed to a bishop, till they were provided with an ordinary: the register of Pope Gregory I. is full of these commissions, or commendams, granted during the absence or sickness of a bishop, or the vacancy of the see.

Some say, that Pope Leo IV. first established the modern commendams, in favour of ecclesiastics who had been expelled their benefices by the Saracens; to whom the administration of the vacant churches was committed for a time, in expectation of their being restored; though St Gregory is said to have used the same while the Lombards desolated Italy.

In a little time the practice of commendams was exceedingly abused; and the revenues of monasteries given to laymen for their subsistence. The bishops also procured several benefices, or even bishoprics, *in commendam*, which served as a pretext for holding them all, without directly violating the canons. Part of the abuse has been retrenched; but the use of commendams is still retained as an expedient to take off the incompatibility of the person by the nature of the benefice.

When a parson is made bishop, his parsonage becomes vacant; but if the king give him power, he may still hold it *in commendam*.

COMMENDATUS, one who lives under the protection of a great man. *Commendati homines*, were persons who, by voluntary homage, put themselves under the protection of any superior lord: for ancient homage was either *predial*, due for some tenure; or *personal*, which was by compulsion, as a sign of necessary subjection; or voluntary, with a desire of protection; and those who, by voluntary homage, put themselves under the protection of any man of power, were sometimes called *homines ejus commendati*, as often occurs in Doomsday. *Commendati dimidii* were those who depended on two several lords, and paid one half of their homage to each; and *sub-commendati* were like under-tenants under the command of persons that were themselves under the command of some superior lord: also there were *dimidii sub-commendati*, who bore a double relation to such depending lords. This phrase seems to be still in use in the usual compliment, "Commend me to such a friend," &c. which is to let him know, "I am his humble servant."

COMMENSURABLE, among geometricians, an appellation given to such quantities as are measured by one and the same common measure.

Commensurable Numbers, whether integers or fractions, are such as can be measured or divided by some other number without any remainder; such are 12 and 18, as being measured by 6 and 3.

Commensurable in Power, is said of right lines, when their squares are measured by one and the same space or superfices.

Commensurable Surds, those that being reduced to their least terms, become true figurative quantities of their kind; and are therefore as a rational quantity to a rational one.

COMMENTARY, or COMMENT, in matters of literature, an illustration of the difficult or obscure passages of an author.

COMMENTARY, or *Commentaries*, likewise denotes a kind of history, or memoirs of certain transactions, wherein the author had a considerable hand: such are the Commentaries of Cæsar.

COMMERCE,

IS an operation by which the wealth, or work, either of individuals or of societies, may be exchanged by a set of men called *merchants*, for an equivalent, proper for supplying every want, without any interruption to industry, or any check upon consumption.

Chap. I. History *of* Commerce.

§ 1. *General History.*

It is a point as yet undecided by the learned, to what nation the invention and first use of commerce belonged: some attribute it to one people, some to another, for reasons that are too long to be discussed here. But it seems most probable that the inhabitants of Arabia were those that first made long voyages. It must be allowed, that no country was so happily situated for this purpose as that which they inhabited, being a peninsula washed on three sides by three famous seas, the Arabian, Indian, and Persian. It is also certain, that it was very early inhabited; and the first notice we have of any considerable trade refers it to the Ishmaelites, who were settled in the hither part of Arabia. To them Joseph was sold by his brethren, when they were going down with their camels to Egypt with spicery, balm, and myrrh. It may seem strange to infer from hence, that commerce was already practised by this nation, since mention is here made of camels, or a caravan, which certainly implies an inland trade; and it must be likewise allowed, that balm and myrrh were the commodities of their country. But whence had they the spicery? Or how came Arabia to be so famous in ancient times for spices? Or whence proceeded that mistake of many great authors of antiquity, that spices actually grew there? Most certainly, because these people dealt in them; and that they dealt in them the first of any nation that we know of, appears from this very instance. Strabo and many other good authors assure us, that in succeeding times they were very great traders: they tell us particularly what ports they had; what prodigious magazines they kept of the richest kinds

History.

kinds of goods; what wonderful wealth they obtained; in what prodigious magnificence they lived, and into what excesses they fell in respect to their expences for carving, building, and statues. All this shows that they were very great traders; and it also shows, that they traded to the East Indies; and from thence only they could have their spices, their rich gums, their sweet-scented woods, and their ivory, all which it is expressly said they had in the greatest abundance. This therefore proves, that they had an extensive and flourishing commerce; and that they had it earlier than any other nation, seems evident from their dealing at that time in spices. Besides, there is much less difficulty in supposing that they first discovered the route to the Indies, than if we ascribe that discovery to any other nation; for, in the first place, they lay nearest, and in the next they lay most conveniently; to which we may add, thirdly, that as the situation of their country naturally inclined them to navigation, so by the help of the monsoons they might make regular voyages to and from the Indies with great facility; nor is it at all unlikely that this discovery might be at first owing to chance, and to some of their vessels being blown by a strong gale to the opposite coast, from whence they might take the courage to return, by observing the regularity of the winds at certain seasons. All these reasons taken together seem to favour this opinion, that commerce flourished first among them; and as to its consequences in making them rich and happy, there is no dispute about them.

We find in the records of antiquity no nation celebrated more early for carrying all arts to perfection than the inhabitants of Egypt: and it is certain also, that no art was there cultivated more early, with more assiduity, or with greater success, than trade. It appears from the foregoing instance, that the richest commodities were carried there by land; and it is no less certain, that the most valuable manufactures were invented and brought to perfection there many ages before they were thought of in other countries; for, as the learned Dr Warburton very justly observes, at the time that Joseph came into Egypt, the people were not only possessed of all the conveniences of life, but were remarkable also for their magnificence, their politeness, and even for their luxury; which argues, that traffic had been of long standing amongst them. To say the truth, the great advantages derived from their country's lying along the Red sea, and the many benefits that accrued to them from the Nile, which they very emphatically called *The River*, or *The River of Egypt*, and of which they knew how to make all the uses that can be imagined, gave them an opportunity of carrying their inland trade not only to a greater height than in any country at that time, but even higher than it has been carried anywhere, China only excepted; and some people have thought it no trivial argument to prove the descent of the Chinese from the Egyptians, that they have exactly the same sort of genius, and with wonderful industry and care have drawn so many cuts and canals, that their country is almost in every part of it navigable. It was by such methods, by a wise and well-regulated government, and by promoting a spirit of industry amongst the people, that the ancient Egyptians became so numerous, so rich, so powerful; and that their country, for large cities, magnificent structures, and perpetual abundance, became the glory and wonder of the world.

The Phœnicians, though they possessed only a narrow slip of the coast of Asia, and were surrounded by nations so powerful and so warlike that they were never able to extend themselves on that side, became famous, by erecting the first naval power that makes any figure in history, and for the raising of which they took the most prudent and effectual measures. In order to this, they not only availed themselves of all the creeks, harbours, and ports, which nature had bestowed very liberally on their narrow territory, but improved them in such a manner, that they were no less remarkable for their strength than considerable for their conveniency; and so attentive were they to whatever might contribute to the increase of their power, that they were not more admired for the vast advantages they derived from their commerce, than they were formidable by their fleets and armies. They were likewise celebrated by antiquity as the inventors of arithmetic and astronomy; and in the last-mentioned science they must have been very considerable proficients, since they had the courage to undertake long voyages at a time when no other nation (the Arabians and Egyptians excepted) durst venture farther than their own coasts. By these arts Tyre and Sidon became the most famous marts in the universe, and were resorted to by all their neighbours, and even by people at a considerable distance, as the great storehouses of the world. We learn from the Scriptures how advantageous their friendship and alliance became to the two great kings of Israel, David and Solomon; and we see, by the application of the latter for architects and artists to Hiram king of Tyre, to what a prodigious height they had carried manufactures of every kind.

It is very certain that Solomon made use of their assistance in equipping his fleets at Elath and Eziongeber; and it is very probable that they put him upon acquiring those ports, and gave him the first hints of the amazing advantages that might be derived from the possession of them, and from the commerce he might from thence be able to carry on. These ports were most commodiously situated on the Arabian gulf; and from thence his vessels, manned chiefly by Phœnicians, sailed to Ophir and Tharsis, wherever those places were. Some writers will needs have them to be Mexico and Peru, which is certainly a wild and extravagant supposition; others believe that we are to look for Ophir on the coast of Africa, and Tharsis in Spain; but the most probable opinion is, that they were both seated in the East Indies. By this adventurous navigation, he brought into his country curiosities not only unseen, but unheard of before, and riches in such abundance, that, as the Scripture finely expresses it, "He made silver in Jerusalem as stones, and cedar-trees as sycamores that grow in the plains." The metaphor is very bold and emphatical; but when we consider that it is recorded in this History, that the return of one voyage only to Ophir produced 450 talents of gold, which makes 51,328 pounds of our Troy weight, about 2,463,744l. sterling, we cannot doubt of the immense profit that accrued from this commerce. It is also observable that the queen of Sheba, the Scilly islands, which are now so inconsiderable, were to them an Indies, the route to which they used the utmost industry to conceal. On the other hand, they discovered a great part of the coast of Africa, the Canary islands; and some there are who believe they first found the way to America. While they consigned themselves to trade, and the arts which belonged thereto, their power was continually increasing; but when industry gave way to luxury, and a spirit of ambition banished their old maxims of frugality and labour, their acquisitions remained at a stand. The Romans began to grow jealous of their naval power, which it cost them two obstinate wars of 40 years continuance to humble. When she was at length destroyed, her very ruins were majestic; for at the beginning of the third fatal Punic war, this city contained 700,000 inhabitants alone, and had 300 cities in Africa under her dominion. Such was the empire of Carthage, raised entirely by commerce: and to which, if she had been content to have applied herself with the same steadiness in her highest prosperity as in her early beginnings, there is no doubt she had preserved her freedom much longer than she did; for as economy, diligence, and good faith, are the pillars of a commercial state; so when these are once shaken, it is not only natural that she should decline, but also unavoidable.

The Ptolemies, who were the successors of Alexander in Egypt, entered deeply into that hero's scheme, and reaped the benefit of his wise establishment. Ptolemy Philadelphus, by encouraging trade, made his subjects immensely rich, and himself inexpressibly powerful. We are told by an ancient author, that he had 120 galleys of war of an enormous size, and upwards of 4000 other vessels, small and great. This would appear incredible, if other wonders were not related of him, which seem to explain and confirm these. He raised a new city on the coast of the Red sea; he was at an immense expence in opening harbours, constructing quays, in raising inns at proper distances on the road, and in cutting a canal from sea to sea. A prince who comprehended the importance of commerce to a degree that induced him to dare such expences as these, might have what treasures, what armies, what fleets he pleased. In his time, Alexandria appeared in pomp and splendour. She owed her birth to Alexander; but it was Ptolemy, who caught a double portion of his master's spirit, which raised her to that magnificence that ages could not deface. We may guess at what she was in her glory, by what we are told was the produce of her customs, which fell little short of two millions of our money annually; and yet we cannot suppose that Ptolemy, who understood trade so well, would cramp it by high duties, or extravagant impositions. When the revenue of the prince from a single port was so great, what must have been the riches of his subjects?

But what shows us Alexandria in the highest point of light, is the credit she maintained after Egypt sunk from an empire into a province. The Romans themselves were struck with the majesty of her appearance; and though till then they had little regarded traffic, yet they were not long before they comprehended the advantages of such a port, and such a mart as Alexandria: they confirmed her privileges, they protected her inhabitants, they took every measure possible to preserve her commerce; and this with so good an effect, that she actually preserved it longer than Rome herself could preserve her power. She followed, indeed, the fortune of the empire, and became at last dependant upon Constantinople, when its founder removed thither the capital of the empire; and his successor found means to transfer also a part of the trade of Alexandria to the same place. Yet this city continued still to hold up her head, and though she sunk under the barbarous power of the Arabs, yet they grew polished by degrees; by degrees she recovered somewhat of her ancient pre-eminence; and though she never rose to any thing like her former lustre, yet she remained the centre of what little trade there was in the world; which is more than can be said of almost any place that has fallen under the Mohammedan power.

When the Roman empire was overrun by barbarians, and arts and sciences sunk with that power which had cultivated and protected them, commerce also visibly declined; or, to speak with greater propriety, was overwhelmed and lost. When that irruption of various nations had driven the Roman policy out of the greatest part of Europe, some straggling people either forced by necessity, or led by inclination, took shelter in a few straggling islands that lay near the coast of Italy, and which would never have been thought worth inhabiting in a time of peace. This was in the 6th century; and at their first fixing there they had certainly nothing more in view than living in a tolerable state of freedom, and acquiring a subsistence as well as they could. These islands being divided from each other by narrow channels, and those channels so encumbered by shallows that it was impossible for strangers to navigate them, these refugees found themselves tolerably safe; and uniting amongst themselves for the sake of improving their condition, and augmenting their security, they became in the 8th century a well-settled government, and assumed the form of a republic.

Simple and mean as this relation may appear, yet it is a plain and true account of the rise, progress, and establishment of the famous and potent republic of Venice. Her beginnings were indeed weak and slow; but when the foundation was once well laid, her growth was quick, and the increase of her power amazing. She extended her commerce on all sides; and taking advantage of the barbarous maxims of the Mohammedan monarchies, she drew to herself the profits of the Indian trade, and might in some sense, be said to make Egypt a province, and the Saracens her subjects. By this means her traffic swelled beyond conception; she became the common mart of all nations; her naval power arrived at a prodigious height; and making use of every favourable conjuncture, she stretched her conquests not only over the adjacent terra firma of Italy, but though the islands of the Archipelago, so as to be at once mistress of the sea, of many fair and fruitful countries, and of part of the great city of Constantinople itself. But ambition, and the desire of lording it over her neighbours, brought upon her those evils which first produced a decay of trade and then a declension of power. General histories indeed ascribe this to the league of Cambray, when

when all the great powers in Europe combined against this republic: and in truth, from that period the sinking of her power is truly dated: but the Venetian writers very justly observe, that though this effect followed the league, yet there was another more latent, but at the same time a more effectual cause, which was, the falling off of their commerce; and they have ever since been more indebted to their wisdom than their power; to the prudent concealing of their own weakness, and taking advantage of the errors of their enemies, than to any other cause, for their keeping up that part which they still bear, and which had been lost long ago by any other nation but themselves.

At the same time that Venice rose, as it were, out of the sea, another republic was erected on the coast of Italy. There could not well be a worse situation than the narrow, marshy, unprofitable, and unwholesome islands in the Adriatic, except the rocky, barren, and inhospitable shores of Liguria; and yet as commerce raised Venice the Rich on the one, so she erected Genoa the Proud on the other. In spite of ambitious and warlike neighbours, in spite of a confined and unproducing country, and, which were still greater impediments, in spite of perpetual factions and successive revolutions, the trade of Genoa made her rich and great. Her merchants traded to all countries, and throve by carrying the commodities of the one to the other. Her fleets became formidable; and, besides the adjacent island of Corsica, she made larger and important conquests. She fixed a colony at Caffa, and was for some time in possession of the coasts on both sides of the Black sea. The emulation which is natural to neighbouring nations, and that jealousy which rises from the pursuit of the same mistress, commerce, begat continual wars between these rival republics; which, after many obstinate and bloody battles, were at last terminated in favour of Venice, by that famous victory of Chiozzo gained by her doge Andrew Contarini, from which time Genoa never pretended to be mistress of the sea. These quarrels were fatal to both; but what proved more immediately destructive to the Genoese, was their avarice, which induced them to abandon the fair profits of trade for the sake of that vile method of acquiring wealth by usury.

But we must now look to another part of the world. In the middle age of the German empire, that is, about the middle of the 13th century, there was formed a confederacy of many maritime cities, or at least of cities not far from the sea. This confederacy solely regarded commerce, which they endeavoured to promote and extend, by interesting therein a great number of persons, and endeavouring to profit by their different views and different lights. Though the cities of Germany held the principal rank in the Teutonic Hanse, they did not however forbear associating many other cities, as well in France as in England and in the Low Countries; the whole, however, without hurting the authority, without prejudice to the rights of the sovereign on whom they depended. This confederacy had its laws, its ordinances, and its judgments, which were observed with the same respect as the maritime code of the Rhodians, who passing for the ablest seamen in all antiquity, their constitutions were observed by the Greeks and Romans. The Teutonic Hanse grew in a short time to so high a rank in power and authority by the immense riches it acquired, that princes themselves rendered it a sincere homage from principles of esteem and admiration. Those of the north principally had frequent occasion for their credit, and borrowed of them considerable sums. The grand masters of the Teutonic order, who were at that time sovereigns of Livonia, declared themselves conservators of the rights and privileges of the Hanse: all succeeded, not only to, but beyond their wishes; and Germany, charmed with their progress, looked on them with the same eyes as a curious gardener does on certain rare plants, though not of his own raising and culture. The kings of France and England granted also various privileges to the Teutonic confederacy; they exempted their vessels in case of shipwreck from all demands whatsoever from the admiralty, or from private persons; they forbade any disturbance to their navigation at all times, and even when France was at war with the emperor, or the princes of the north. In fine, during the course of these unhappy wars which were styled *Croisades*, the Hanse was signally consulted, and gave always puissant succours in money and in ships to the Christians oppressed by infidels. It is astonishing that cities at so great a distance from each other, subject to different kings, sometimes in open war, but always jealous of their rights, should be able to confederate and live together in so strict an union. But when this union had rendered them very rich and powerful, it cannot seem at all strange, that on the one hand they grew arrogant and overbearing, took upon them not only to treat with sovereigns on the foot of equality, but even to make war with them, and more than once with success. It will, on the other hand, appear still less strange, that such behaviour as this awakened various princes to a more particular view of the dangers that such a league might produce, and the advantages that would naturally flow to their respective states, by recovering their trade, thus made over, at least in some part, to others, entirely to themselves; and these, in few words, were the causes of the gradual declension of the Hanseatic alliance, which is now totally dissolved, although the cities of Lubeck, Hamburgh, and Bremen, maintain sufficient marks of that splendour and dignity with which this confederacy was once adorned.

We must now turn our eyes to Portugal and Spain, where in the space of about 50 years there happened a train of events which gradually led on to such discoveries as changed the whole face of affairs in the commercial world, and gave to the knowledge of later ages what for some thousand years had been kept secret from all mankind; we mean a perfect and distinct notion of that terraqueous globe which they inhabit. The kingdom of Portugal was small, but well cultivated, very populous, and blessed with a variety of good ports; all which, however, had stood them in little stead, if they had not had a succession of wise princes, who, instead of involving themselves in war with their neighbours to gratify their ambition, endeavoured to extend the happiness and wealth of their subjects, and consequently their own power, in the softer and more successful method of protecting arts and sciences, encouraging

encouraging industry, and favouring trade. This, with the convenient situation of their country, in the beginning of the 15th century, prompted some lively spirits to attempt discoveries; and these, countenanced by a heroic young prince, pushed on their endeavours with such success, that step by step the coast of Africa was surveyed as far as the Cape of Good Hope, to which they gave that name. The point they had in view was a new route to the East Indies, which Vasquez de Gama happily discovered; and in a short space of time Portugal, from one of the least considerable, grew to be one of the richest powers in Europe, gained prodigious dominions in Asia and Africa, and raised a naval power superior to any thing that had been seen for many ages before.

See Columbus (Christopher).

But while this was doing, Christopher Columbus, a Genoese of great capacity, though of almost unknown original, who had been bred to the sea from his youth, and who had carefully studied what others made a trade, formed in his mind the amazing project of counteracting experience, and sailing to the Indies by a western course. He offered this project to the Portuguese, by whom it was considered and rejected as a chimera. He proposed it afterwards to other states, but with no better fortune; and at last owed the discovery of the New World to the high spirit of a heroine, the famous Isabella, queen of Castile, who almost at her own expence, and with very little countenance from her husband, who yet was styled *Ferdinand the Wise*, furnished the adventurous Columbus with that poor squadron, with which, at once, in spite of all the difficulties that the envy of his officers, and the obstinacy of his mutinous crew, threw in his way, he perfected his design, and laid open a new Indies, though in reality he aimed at the discovery of the old. Neither was this noble effort of his matchless understanding defeated; for after his decease, Ferdinand Magellan, a Portuguese, proposed to the emperor Charles V. the discovery of a passage to the spice islands by the South seas, which was what Columbus aimed at; and though Magellan lived not to return, yet in one voyage the discovery was perfected. It is inconceivable almost how many and how great benefits accrued to Europe from these discoveries; of which, however, it is certain, that the Portuguese made a very indifferent, and the Spaniards a much worse, use; the former making slaves of, and the latter rooting out the natives. This, as it was a most ungrateful return to divine Providence for so high a blessing; so it might have been easily foreseen it would prove, as experience has shown it did prove, highly prejudicial to their own interests, by depopulating very fine countries, which have been thereby turned into deserts: and though on their first discovery infinite treasures were returned from them, which were coined in the mints of Spain; yet by an obstinate pursuit of this false policy, the Spanish islands in the West Indies are now brought so low as to be scarce worth keeping. The consequences that naturally followed on the discovery of a passage by the Cape of Good Hope, and of a fourth part of the globe in the western hemisphere, were, as it has been already hinted, the cause of an entire change in the state of Europe, and produced, not only in Portugal and Spain, but in most other nations, a desire of visiting these remote parts; of establishing colonies and manufactures; of exporting and importing commodities, and of raising, settling, and protecting new manufactures. By this means, as the reader cannot but perceive, not only particular nations brought about signal advantages to themselves, but Europe in general received a lasting and invaluable benefit; for its potentates made themselves formidable, and even terrible in those distant parts of the earth, where their fame had hardly reached before. It is however true, that this has not been carried on as high as it might have been; for though there was room enough for every nation to have had its share, and though it might be demonstrated that the good of the whole would have contributed sufficiently to the profit of every state, the subjects of which had engaged in this traffic; yet instead of prosecuting so natural and so equitable a measure, they have taken a quite contrary course; and by decrying, attacking, and destroying each other, have very much lessened that prodigious reverence which the Asiatics, Africans, and Americans, at first had for the inhabitants of Europe.

The naval power of the Portuguese received an incurable wound by falling under the power of the Spaniards; and though human policy would have suggested, that this alone must have raised the latter to the monopoly of commerce, and the universal dominion of the sea; yet the very pursuit of a design so visibly detrimental to the interest of mankind, proved very quickly their ruin also. For the Spaniards, from the natural haughtiness of their temper, misled by the boundless ambition of their princes, and endeavouring to become the lords of Europe, forced other nations in their own defence to make a much quicker progress in navigation than otherwise they could have done. For the English and Dutch, who till this time seemed blind to the advantages of their situation, had their eyes opened by the injuries they received; and by degrees the passion of revenge inspired them with designs that possibly public spirit would never have excited. In short, the pains taken by Spain to keep all the riches that flowed from these discoveries to herself, and the dangerous, detestable, and destructive purposes to which she applied the immense wealth that flowed in upon her from them, produced effects directly opposite to those which she proposed, and made her enemies rich, great, powerful, and happy, in proportion as her commerce dwindled away, and as her naval power sunk and crumbled to pieces, merely by an improper display, an ill-managed exertion, and a wrong application of it.

It was from hence that the inhabitants of the Seven Provinces, whom her oppression had made poor, and her severities driven mad, became first free, then potent, and by degrees rich. Their distresses taught them the necessity of establishing a moderate and equal government; the mildness of that government, and the blessings which it procured to its subjects, raised their number and elevated their hopes. The consequences became quickly visible, and in a short time amazing both to friends and enemies; every fishing village improved into a trading town; their little towns grew up into large and magnificent cities; their inland boroughs were filled with manufactures; and in less than half a century the distressed States of Holland

Holland became high and mighty; nay, in spite of the dangers and expences which attended a war made all that time against a superior force, these people, surrounded with enemies, loaded with taxes, exposed to personal service, and to a thousand other disadvantages, grew up to such a strength as not only made the Spaniards despair of reducing them any more under their dominion, but inclined them to wish, and at last forced them to solicit, their friendship.

This, at least as far as ancient or modern histories inform us, was the quickest and strongest of all the productions of commerce that the world has ever seen. For it is beyond dispute that the republic of the United Provinces owes her freedom, her power, and her wealth, entirely to industry and trade. The greatest part of the country is far from being fertile: and what is so, produces not enough to suffice the tenth part of the inhabitants for the tenth part of the year: the climate is rather tolerable than wholesome; and its havens are rather advantageous from the difficulty of entering them, than from their commodiousness in any other respect. Of native commodities they have few or none; timber and maritime stores are entirely wanting; their country cannot boast so much as of a coal-mine; and yet these provinces, upon which nature has bestowed so little, in consequence of an extensive trade, are enriched with all things. Their store-houses are full of corn, even when the harvest in corn-countries fails; there is no commodity, however bulky, or scarce and hard to be come at, which may not be had from their magazines. The shipping of Holland is prodigious; and to see the quantities of naval stores with which their yards and ports abound, astonishes those who are unacquainted with the vigour of that cause which produces this abundance. But above all, the populousness of this country is the greatest miracle. That men should resort to a Canaan, and desire to live in a land flowing with milk and honey, is nothing strange; but that they should make it their choice to force nature, to raise palaces, lay out gardens, dig canals, plant woods, and ransack all the quarters of the earth for fruits and flowers, to produce an artificial paradise in a dead plain, or upon an ungrateful heath in the midst of fogs and standing lakes, would in so critical an age as this pass for a fable, if the country did not lie so near us as to put the truth of it out of question.

§ 2. *British History.*

We may easily conceive, that foreign commerce by the natives of this island must have been a work of time; for men first think of necessaries, then of conveniences, and last of superfluities. Those who came originally from the continent might have better notions of things; but as it must be presumed that either fear of indigence drove them hither, so it is easy to apprehend that succeeding generations must for some time sink much below their ancestors in their notions of the commodities of life; and, deriving their manners from their circumstances, become quite another sort of people. But those on the opposite continent, knowing that this island was inhabited, and having the use, though in ever so imperfect a degree, of vessels and of foreign traffic, came over hither, and bartered their goods for the raw commodities of the Britons, till by degrees perhaps they taught the latter to make some improvements in those slight leather and wicker boats, which they used for passing their own rivers, and creeping along their coasts, till at last they ventured themselves over to Gaul, and entered upon some kind of correspondence with their neighbours. All this is so deducible from the laws of nature, that we might have conceived thus much by the light of reason, if we had not the Commentaries of Cæsar to guide us, and to strengthen by the authority of history, the facts that might have been found out by the force of rational conjecture.

Things were precisely in this situation when the Romans invaded Britain; and there is no doubt that our ancestors falling under the power of that empire, and under its power at a time when, with respect to arts and sciences, it was in a most flourishing condition, was a great advantage to them; and though from their love of civil liberty, which, when under the direction of reason, is the most natural and laudable of all passions, they made a long and vigorous, and in some sense a noble and glorious, resistance; yet by degrees they caught the manners and customs of their conquerors, and grew content to be happy rather than free. With learning and politeness the Romans introduced foreign commerce; and according to the nature of their policy, as they made high roads through the island, established colonies in proper places, and fixed standing camps, which were a kind of fortresses, where they thought proper; so they were no less careful with regard to marts or emporiums for the conveniency of traders, and of which what they found was uncertain; but that they left many, is without question; and among the rest London, which is not more famous for her present extensive trade, than venerable for her unrecorded antiquity.

When the Romans unwillingly left Britain, and the Britons as unwillingly made way for the Saxons, a new deluge of barbarity overflowed this island; almost all the improvements of our civilized conquerors were effaced; and upon the establishment as it were of a new people, things were all to begin again. This necessarily took up a great deal of time; and before they were in any tolerable posture, the Saxons found themselves distressed by fresh swarms of barbarians. Yet there still remain some evidences of their having been acquainted with, inclined to, and, if their circumstances would have permitted, most certainly would have entered upon and carried foreign commerce to a great height. We have authentic testimonies, that Alfred the Great formed projects of vast discoveries to the North, as he actually sent persons of great prudence and abilities into the East; and the curiosities which they brought home were for many ages preserved in the treasury of the church of Salisbury.

As for the Danes, they were not long our masters; but as they became so by a maritime force, and as their countrymen had established themselves not only on the opposite shore of France, but in other parts of Europe, it is reasonable to believe that they held some correspondence with them from thence; and that, if their dominion had lasted longer, this might have been better regulated, and productive of many advantages. But they had soon to do with their brethren in nution of industry in every branch, in every part of the country. From this knowledge they regulate the prices they offer; and as they are many, they serve as a check upon one another, from the principles of competition.

From the current prices, the manufacturers are as well informed, as if they kept the correspondence themselves: the statesman feels perfectly where hands are wanting, and young people destined to industry, obey, in a manner, the call of the public, and fall naturally in to supply the demand.

Two great assistances to merchants, especially in the infancy of trade, are public markets for collecting the work of small dealers, and large undertakings in the manufacturing way by private hands. By these means the merchants come at the knowledge of the quantity of work in the market, as on the other hand the manufacturers learn, by the sale of the goods, the extent of the demand for them. These two things being justly known, the price of goods is easily fixed.

Public sales serve to correct the small inconveniences which proceed from the operations of trade. A set of manufacturers got all together into one town, and entirely taken up with their industry, are thereby as well informed of the rate of the market as if every one of them carried thither his work; and upon the arrival of the merchant, who readily takes it off their hands, he has not the least advantage over them from his knowledge of the state of demand. This man both buys and sells in what is called *wholesale;* and from him retailers purchase, who distribute the goods to every consumer throughout the country. These last buy from wholesale merchants in every branch, that proportion of every kind of merchandise which is suitable to the demand of their borough, city, or province.

Thus all inconveniences are prevented, at some additional cost to the consumer, who must naturally reimburse the whole expence. The distance of the manufacturer, the obscurity of his dwelling, the caprice in selling his work, are quite removed; the retailer has all in his shop, and the public buys at a current price.

§ 2. *How the price of Goods is determined by Trade.*

In the price of goods, two things must be considered as really existing, and quite different from one another; to wit, the real value of the commodity, and the profit upon alienation.

I. The first thing to be known of any manufacture, when it comes to be sold, is how much of it a person can perform in a day, a week, a month, according to the nature of the work, which may require more or less time to bring it to perfection. In making such estimates, regard is to be had only to what, upon an average, a workman of the country in general may perform, without supposing him the best or the worst in his profession, or having any peculiar advantage or disadvantage as to the place where he works.

Hence the reason why some people prosper by their industry, and others not; why some manufactures flourish in one place and not in another.

II. The second thing to be known is, the value of the workman's subsistence, and necessary expence, both for supplying his personal wants and providing the instruments belonging to his profession, which must be taken upon an average as above, except when the nature of the work requires the presence of the workman in the place of consumption; for although some trades, and almost every manufacture, may be carried on in places at a distance, and therefore may fall under one general regulation as to prices; yet others there are, which, by their nature, require the presence of the workman in the place of consumption; and in that case the prices must be regulated by circumstances relative to every particular place.

III. The third and last thing to be known, is the value of the materials, that is, the first matter employed by the workman; and if the object of his industry be the manufacture of another, the same process of inquiry must be gone through with regard to the first as the second; and thus the most complex manufactures may be at last reduced to the greatest simplicity.

These three articles being known, the price of manufacture is determined. It cannot be lower than the amount of all the three, that is, than the real value; whatever it is higher, is the manufacturer's profit. This will ever be in proportion to demand, and therefore will fluctuate according to circumstances.

Hence appears the necessity of a great demand, in order to promote flourishing manufactures.

By the extensive dealings of merchants, and their constant application to the study of the balance of work and demand, all the above circumstances are known to them, and are made known to the industrious, who regulate their living and expence according to their certain profit.

Employ a workman in a country where there is little trade or industry, he proportions his price always to the urgency of your want, or your capacity to pay, but seldom to his own labour. Employ another in a country of trade, he will not impose upon you, unless perhaps you be a stranger, which supposes your being ignorant of the value; but employ the same workman in a work not usual in the country, consequently not demanded, and therefore not regulated as to the value, he will proportion his price as in the first supposition.

We may therefore conclude, from what has been said, that in a country where trade has been established, manufactures must flourish, from the ready sale, the regulated price of work, and the certain profit resulting from industry. Let us next inquire into the consequences of such a situation.

§ 3. *How foreign Trade opens to an industrious People, and the consequences of it to the Merchants who set it on foot.*

The first consequence of the situation described in the preceding section is, that wants are easily supplied for the adequate value of the thing wanted.

The next consequence is, the opening of foreign trade, under its two denominations of passive and active. Strangers and people of distant countries, finding the difficulty of having their wants supplied at home, and the ease of having them supplied from this country, immediately have recourse to it. This is passive trade. The active is when merchants, who have executed this plan at home with success, begin to transport gence, in order to become able, in time, to purchase considerable cargoes at a high value; from which supposition is inferred a strong disposition in the people to become luxurious, since nothing but want of ability prevents them from complying with the highest demand: but still another circumstance must concur to engage the merchants not to lower their price. The great proportion of the goods they seek for in return, must be found in the hands of a few. This will be the case if slavery be established; for then there must be many poor and few rich; and they are commonly the rich consumers who proportion the price they offer, rather to their desires, than to the value of the thing.

The second thing which may be done is, to encourage a great demand; that is, to lower their prices. This will sink the value of the manufactures in the opinion of the inhabitants, and render profits less in proportion, although indeed, upon the voyage, the profits may be greater.

This part they will take, if they perceive the inhabitants do not incline to consume great quantities of the merchandise at a high value, either for want of abilities or inclination; and also, if the profits upon the trade depend upon a large consumption, as is the case in merchandise of a low value, and suited chiefly to the occasions of the lower sort. Such motives of expediency will be sufficient to make them relinquish a high demand, and prefer a great one; and the more, when there is a likelihood that the consumption of low-priced goods in the beginning may beget a taste for others of a higher value, and thus extend in general the taste of superfluity.

A third part to be taken is the least politic, and perhaps the most familiar. It is to profit by the competition between the buyers, and encourage the rising of demand as long as possible; when this comes to a stop, to make a kind of auction, by first bringing down the prices to the level of the highest bidders, and so to descend by degrees, in proportion as demand sinks. Thus we may say with propriety, that demand commonly becomes great, in proportion as prices sink. By this operation, the traders will profit as much as possible, and sell off as much of their goods as the profits will permit.

But this plan, in a new discovered country, is not politic, as it both discovers a covetousness and a want of faith in the merchants, and also throws open the secrets of their trade to those who ought to be kept ignorant of them.

Let us next suppose, that the large profits of our merchants shall be discovered by others, who arrive at the same ports in a separate interest, and who enter into no combination which might prevent the natural effects of competition.

Let the states of demand among the natives be supposed the same as formerly, both as to height and greatness, in consequence of the operation of the different principles, which might have induced our merchants to follow one or other of the plans we have been describing: we must, however, still suppose, that they have been careful to preserve considerable profits upon every branch.

If we suppose the inhabitants to have increased in numbers, wealth, and taste for superfluity, since the last voyage, demand will be found rather on the rising hand. Upon the arrival of the merchants in competition with the former, both will offer to sale; but if both stand at the same prices, it is very natural to suppose, that the former dealers will obtain a preference; as, *cæteris paribus*, it is always an advantage to know and to be known. The last comers, therefore, have no other way left to counterbalance this advantage, but to lower their prices.

This is a new phenomenon: here the fall of prices is not voluntary as formerly, nor consented to from expediency; not owing to a failure of demand, but to the influence of a new principle of commerce, to wit, a double competition, which we shall now examine.

§ 5. *Of double Competition.*

When competition is much stronger on one side of the contract than on the other, it is called *simple*. This is the species of competition which is implied in the terms *high demand*, or when it is said that *demand raises prices.*

Double competition is, when, in a certain degree, it takes place on both sides of the contract at once, or vibrates alternately from one to the other. This is what restrains prices to the adequate value of merchandise.

The great difficulty is to distinguish clearly between the principles of *demand* and those of *competition*: here then follow the principal differences between the two relatively to the effects they produce severally in the mercantile contract of buying and selling, which we here express shortly by the word *contract.*

Simple demand is what brings the quantity of commodity to market. Many demand, who do not buy; many offer, who do not sell. This demand is called *great* or *small*; it is said to increase, to augment, to swell; and is expressed by these and other synonymous terms, which mark an augmentation or diminution of quantity. In this species, two people never demand the same thing, but a part of the same thing, or things quite alike.

Compound demand is the principle which raises prices, and can never make them sink; because in this case more than one demands the very same thing. It is solely applicable to the buyers, in relation to the price they offer. This demand is called *high* or *low*, and is said to rise, to fall, to mount, to sink, and is expressed by these and other synonymous terms.

Simple competition, when between buyers, is the same as *compound* or *high demand*; but differs from it in so far, as this may equally take place among sellers, which compound demand cannot; and then it works a contrary effect: it makes prices sink, and is synonymous with low demand; it is this competition which overturns the balance of work and demand.

Double competition is what is understood to take place in almost every operation of trade; it is this which prevents the excessive rise of prices; it is this which prevents their excessive fall. While double competition prevails, the balance is perfect, trade and industry flourish.

The capital distinction, therefore, between the terms *demand* and *competition* is, that *demand* is constantly relative to the buyers; and when money is not the price, as more immediate and more general effects and revolutions produced by the opening of a foreign trade in a nation of industry.

The first and most sensible alteration will be an increase of demand for manufacturers, because by supplying the wants of strangers, the number of consumers will now be considerably augmented. What again will follow upon this, must depend upon circumstances.

If this revolution in the state of demand should prove too violent, the consequence of it will be to raise demand; if it should prove gradual, it will increase it. This distinction is well understood, and the consequence appears just; for, if the supply do not increase in proportion to the demand, a competition will ensue among the demanders; which is the common effect of such sudden revolutions. If, on the other hand, a gentle increase of demand should be accompanied with a proportional supply, the whole industrious society will grow in vigour, and in wholesome stature, without being sensible of any great advantage or inconveniency; the change of their circumstances will even be imperceptible.

The immediate effects of the violent revolution will, in this example, be flattering to some and disagreeable to others. Wealth will be found daily to augment, from the rising of prices, in many branches of industry. This will encourage the industrious classes, and the idle consumers at home will complain. We have already dwelt abundantly long upon the effect resulting from this to the lower classes of the people, in providing them with a certain means of subsistence. Let us now examine in what respect even the higher classes will be made likewise to feel the good effects of this general change, although at first they may suffer a temporary inconvenience from it.

Farmers, as has been observed, will have a greater difficulty in finding servants, who, instead of labouring the ground, will choose to turn themselves to manufactures. This we have considered in the light of purging the lands of superfluous mouths; but every consequence in this great chain of politics draws other consequences after it; and as they follow one another, things put on different faces, which affect classes differently. The purging of the land is but one of the first; here follows another.

The desertion of the hands employed in a trifling agriculture will at first, no doubt, embarrass the farmers; but in a little time every thing becomes balanced in a trading nation, because here every industrious man must advance in prosperity, in spite of all general combinations of circumstances.

In the case before us, the relative profits upon farming must soon become greater than formerly, because of this additional expence which must affect the whole class of farmers; consequently, this additional expence, instead of turning out to be a loss to either landlord or farmer, will, after some little time, turn out to the advantage of both, because the produce of the ground, being indispensably necessary to every body, must in every article increase in its value. Thus, in a short time, accounts will be nearly balanced on all hands; that is to say, the same proportion of wealth will, *cæteris paribus*, continue the same among the industrious. We say among the industrious; for those who are either idle, or even negligent, will be great losers.

A proprietor of land, inattentive to the causes of his farmer's additional expence, may very imprudently suffer his rents to fall, instead of assisting him on a proper occasion, in order to make them afterwards rise the higher.

Those who live upon a determined income in money, and who are nowise employed in traffic, nor in any scheme of industry, will, by the augmentation of prices, be found in worse circumstances than before.

In a trading nation every man must turn his talents to account, or he will undoubtedly be left behind in this universal emulation, in which the most industrious, the most ingenious, and the most frugal, will constantly carry off the prize.

This consideration ought to be a spur to every man. The richest men in a trading nation have no security against poverty; we mean proportional poverty; for though they diminish nothing of their income, yet, by not increasing it in proportion to others, they lose their rank in wealth, and from the first class in which they stood they will slide insensibly down to a lower.

There is one consequence of an additional beneficial trade, which raises demand and increases wealth; but if we suppose no proportional augmentation of supply, it will prove at best but an airy dream which lasts for a moment; and when the gilded scene is passed away, numberless are the inconveniences which are seen to follow.

We shall now point out the natural consequences of this augmentation of wealth drawn from foreign nations, when the statesman remains inattentive to increase the supply both of food and manufactures, in proportion to the augmentation of mouths, and of the demand for the produce of industry.

In such a situation profits will daily swell, and every scheme for reducing them within the bounds of moderation, will be looked upon as a hurtful and unpopular measure: be it so; but let us examine the consequences.

We have said, that the rise of demand for manufactures naturally increases the value of work: now we must add, that under such circumstances, the augmentation of riches in a country, either not capable of improvement as to the soil, or where precautions have not been taken for facilitating a multiplication of inhabitants, by the importation of subsistence, will be productive of the most calamitous consequences.

On one side, this wealth will effectually diminish the mass of the food before produced; and on the other, will increase the number of useless consumers. The first of these circumstances will raise the demand for food; and the second will diminish the number of useful free hands, and consequently raise the price of manufactures: here are shortly the outlines of this progress.

The more rich and luxurious a people are, the more delicate they become in their manner of living: if they fed on bread formerly, they will now feed on meat; if they fed on meat, they will now feed on fowl. The same ground which feeds a hundred with bread, and a proportional quantity of animal-food, will not maintain an equal number of delicate livers.

 Food

Commission.

20l.) will sign a certificate to that purport; the commissioners are then to authenticate such certificate under their hands and seals, and to transmit it to the lord chancellor: and he, or two judges whom he shall appoint, on oath made by the bankrupt that such certificate was obtained without fraud, may allow the same; or disallow it, upon cause shown by any of the creditors of the bankrupt.

If no cause be shown to the contrary, the certificate is allowed of course; and then the bankrupt is entitled to a decent and reasonable allowance out of his effects for his future support and maintenance, and to put him in a way of honest industry. This allowance is also in proportion to his former good behaviour, in the early discovery of the decline of his affairs, and thereby giving his creditors a large dividend. For if his effects will not pay one half of his debts, or 10s in the pound, he is left to the discretion of the commissioners and assignees, to have a competent sum allowed him, not exceeding 3 per cent.; but if they pay 10s. in the pound, he is to be allowed 5 per cent.; if 12s. 6d. then 7½ per cent.; and if 15s. in the pound, then the bankrupts shall be allowed 10 per cent.; provided that such allowance do not in the first case exceed 200l. in the second 250l. and in the third 300l.

Besides this allowance, he has also an indemnity granted him, of being free and discharged for ever from all debts owing by him at the time he became a bankrupt; even though judgment shall have been obtained against him, and he lies in prison upon execution for such debts; and, for that among other purposes, all proceedings on commission of bankrupt, are, on petition, to be entered on record, as a perpetual bar against actions to be commenced upon this account: though, in general, the production of the certificate properly allowed shall be sufficient evidence of all previous proceedings. Thus the bankrupt becomes a clear man again; and by the assistance of his allowance and his own industry, may become an useful member of the commonwealth; which is the rather to be expected, as he cannot be entitled to these benefits, but by the testimony of his creditors themselves of his honest and ingenuous disposition; and unless his failures have been owing to misfortunes, rather than to misconduct and extravagance.

2. As to the proceedings which affect the bankrupt's property.

By virtue of the statutes before mentioned, all the personal estate and effects of the bankrupt are considered as vested, by the act of bankruptcy, in the future assignees of his commissioners, whether they be goods in actual possession, or debts, contracts, and other choses in action; and the commissioners by their warrant may cause any house or tenement of the bankrupt to be broken open, in order to enter upon and seize the same. And when the assignees are chosen or approved by the creditors, the commissioners are to assign every thing over to them; and the property of every part of the estate is hereby as fully vested in them as it was in the bankrupt himself, and they have the same remedies to recover it.

The property vested in the assignees is the whole that the bankrupt had in himself, at the time he committed the first act of bankruptcy, or that has been vested in him since, before his debts are satisfied or agreed for. Therefore, it is usually said that once a bankrupt and always a bankrupt; by which is meant, that a plain direct act of bankruptcy once committed, cannot be purged, or explained away, by any subsequent conduct, as a dubious equivocal act may be; but that, if a commission is afterward awarded, the commission and the property of the assignees shall have a relation, or reference, back to the first and original act of bankruptcy. Insomuch that all transactions of the bankrupt are from that time absolutely null and void, either with regard to the alienation of his property, or the receipt of his debts from such as are privy to his bankruptcy; for they are no longer his property, or his debts, but those of the future assignees. And if an execution be sued out, but not served and executed on the bankrupt's effects till after the act of bankruptcy, it is void, as against the assignees. But the king is not bound by this fictitious relation, nor is within the statutes of bankrupts; for if, after the act of bankruptcy committed, and before the assignment of his effects, an extent issues for the debt of the crown, the goods are bound thereby. In France this doctrine of relation is carried to a very great length; for there, every act of a merchant, for ten days precedent to the act of bankruptcy, is presumed to be fraudulent, and is therefore void. But with us the law stands upon a more reasonable footing; for as these acts of bankruptcy may sometimes be secret to all but a few, and it would be prejudicial to trade to carry this notion to its utmost length, it is provided by stat. 19 Geo. II. c. 32. that no money paid by a bankrupt to a *bona fide*, or real creditor, in a course of trade, even after an act of bankruptcy done, shall be liable to be refunded. Now by stat. 1 Jac. I. c. 15. shall any debtor of a bankrupt that pays him his debt without knowing of his bankruptcy, be liable to account for it again. The intention of this relative power being only to reach fraudulent transactions, and not to distress the fair trader.

The assignees may pursue any legal method of recovering this property so vested in them by their own authority; but cannot commence a suit in equity, nor compound any debts owing to the bankrupt, nor refer any matters to arbitration, without the consent of the creditors, or the major part of them in value, at a meeting to be held in pursuance of notice in the gazette.

When they have got in all the effects they can reasonably hope for, and reduced them to ready money, the assignees must, within 12 months after the commission issued, give 21 days notice to the creditors, of a meeting for a dividend or distribution; at which time they must produce their accounts, and verify them upon oath, if required. And then the commissioners shall direct a dividend to be made, at so much in the pound, to all creditors who have before proved, or shall then prove their debts. This dividend must be made equally, and in a rateable proportion, to all the creditors, according to the quantity of their debts; no regard being paid to the quality of them. Mortgages, indeed, for which the creditor has a real security in his own hands, are entirely safe; for the commission of bankrupt reaches only the equity of redemption. So are all personal debts, where the creditor

COMMODATE, COMMODATUM, in the civil jurisprudence, the loan or free concession of any thing moveable or immoveable, for a certain time, on condition of restoring again the same individual after a certain term. The commodate is a kind of loan; there is this difference, however, between a loan and a commodate, that the latter is gratis, and does not transfer the property: the thing must be returned in essence, and without impairment; so that things which consume by use or time cannot be objects of a commodate, but of a loan; in regard they may be returned in kind, though not in identity. See LAW *Index*.

COMMODIANUS, GAZEUS, a Christian author in the 4th century, who wrote a work in Latin verse, entitled Instructions; the moral of which is excellent, but the verse extremely heavy. M. Davies published a fine edition of it in 1711, at the end of Minucius Felix.

COMMODITY, in a general sense, denotes all sorts of wares and merchandises whatsoever that a person deals or trades in.

Staple COMMODITIES, such wares and merchandises as are commonly and readily sold in a market, or exported abroad; being for the most part the proper produce or manufacture of the country.

COMMODORE, a general officer in the British marine, invested with the command of a detachment of ships of war, destined on any particular enterprise, during which time he bears the rank of brigadier-general in the army, and is distinguished from the inferior ships of his squadron by a broad red pendant tapering towards the outer end, and sometimes forked. The word is corrupted from the Spanish *comendador*.

COMMODORE is also a name given to some select ship in a fleet of merchantmen, who leads the van in time of war, and carries a light in his top to conduct the rest and keep them together. He is always the oldest captain in the fleet which he commands.

COMMODUS, L. AURELIUS ANTONINUS, son of M. Antoninus, succeeded his father in the Roman empire. He was naturally cruel and fond of indulging his licentious propensities. He wished to be called Hercules; and, like that hero, he adorned his shoulders with a lion's skin, and armed his hand with a knotted club. He publicly fought with the gladiators, and boasted of his dexterity in killing the wild beasts in the amphitheatre. He required divine honours from the senate, and they were granted. He was wont to put such an immense quantity of gold dust in his hair, that when he appeared bareheaded in the sunshine his head glittered as if surrounded with sun-beams. Martia, one of his concubines, whose death he had prepared, poisoned him: but as the poison did not quickly operate, he was strangled by a wrestler. He died in the 31st year of his age, and the 13th of his reign. It has been observed, that he never trusted himself to a barber; but always burnt his beard, in imitation of the tyrant Dionysius. A. D. 192.

COMMON, COMMUNIS, something that belongs to all alike; is owned or allowed by all; and not confined to this more than that. In this sense, *common* stands opposed to *proper*, *peculiar*, &c. Thus, the earth is said to be our *common* mother; in the first or golden age all things were in *common*, as well as the sun and elements: the name animal is *common* to man and beast; that of substance to body and spirit.

COMMON, *Communia*, (i. e. *quod ad omnes pertinet*), in law, signifies that soil, the use whereof is common to a particular town or lordship; or it is a profit that a man hath in the land of another person, usually in common with others; or a right which a person hath to put his cattle to pasture into ground that is not his own. And there is not only common of pasture, but also common of piscary, common of estovers, common of turbary, &c. And in all cases of common, the law much respects the custom of the place; for there the rule is, *consuetudo loci est observanda*. See COMMONTY.

COMMON Council. See COUNCIL.

COMMON Law, that body of law received as rules in parliament to alter the same. See LAW, Part II. N° 36.

COMMON-Place Book, is a register of what things occur, worthy to be noted, in the course of a man's thinking or study, so disposed as that among a number of subjects any one may be easily found. The advantages of making a common-place book are many: it not only makes a man read with accuracy and attention, but induces him insensibly to think for himself, provided he considers it not so much as a register of sentiments that strike him in the course of reading, but as a register of his own thoughts upon various subjects. Many valuable thoughts occur even to men of no extraordinary genius. These, without the assistance of a common-place book, are generally lost both to himself and others. There are various methods of arranging common-place books; that of Mr Locke is as good as any that have hitherto been contrived.

The first page of the book you intend to take down their common-place in, is to serve as a kind of index to the whole, and to contain references to every place or matter therein: in the commodious contrivance of which index, so as it may admit of a sufficient copia or variety of materials, without any confusion, all the secret of the method consists.

In order to this, the first page, as already mentioned, or, for more room, the two first pages that front each other, are to be divided by parallel lines into 25 equal parts; whereof every fifth line is to be distinguished by its colour or other circumstance. These lines are to be cut perpendicularly by others, drawn from top to bottom: and in the several spaces thereof the several letters of the alphabet, both capital and minuscle, are to be duly written.

The form of the lines and divisions, both horizontal and perpendicular, with the manner of writing the letters therein, will be conceived from the following specimen; wherein, what is to be done in the book for all the letters of the alphabet, is here shown in the first four, *A*, *B*, *C*, and *D*.

A	a		C	a	
	e			e	
	i			i	
	o			o	
	u			u	
B	a		D	a	
	e	2, 3.		e	
	i			i	
	o			o	
	u			u	

The index to the common-place book thus formed, matters are ready for the taking down any thing therein.

In order to this, consider to what head the thing you would enter is most naturally referred; and under which one would be led to look for such a thing; in this head, or word, regard is had to the initial letter, and the first vowel that follows it; which are the characteristic letters whereon all the use of the index depends.

Suppose *(e. gr.)* I would enter down a passage that refers to the head *beauty*. *B*, I consider, is the initial letter, and *e* the first vowel: then looking upon the index for the partition *B*, and therein the line *e* (which is the place for all words whose first letter is *b*, and the first vowel *e; as beauty*, *beneficence*, *bread*, *breeding*, *blemishes*), and finding no numbers already down to direct me to any page of the book where words of this characteristic have been entered, I turn forward to the first blank page I find (which, in a fresh book, as this is supposed to be, will be page 2d), and here write what I have occasion for on the head *beauty;* beginning the head in the margin, and indenting all the other subservient lines, that the head may stand out, and show itself; this done, I enter the page where it is written, viz. 2. in the index in the space B *e;* from which time the class *b e* becomes wholly in possession of the 2d and 3d pages, which are consigned to letters of this characteristic.

Had I found any page or number already entered in the space *B e*, I must have turned to the page, and have written my matter in what room was left therein: so, if after entering the passage on beauty, I should have occasion for *benevolence*, or the like, finding the number 2 already possessed of the space of this characteristic, I begin the passage on benevolence in the remainder of the page; which not containing the whole, I carry it on to page 3d, which is also for *be;* and add the number 3 in the index.

Common Pleas is one of the king's courts now held constantly in Westminster-hall, but in former times was moveable.

All civil causes, as well real as personal, are, or were formerly, tried in this court, according to the strict law of the land. In personal and mixed actions it has a concurrent jurisdiction with the king's bench, but has no cognizance of pleas of the crown. The actions belonging to the court of common-pleas come thither by original, as arrests and outlawries; or by privilege, or attachment for or against privileged persons; or out of inferior courts, not of record, by *pone*, *recordari*, *accedas ad curiam*, writ of false judgment, &c. The chief judge of this court is called *lord chief justice of the common pleas*, who is assisted by three other judges. The other officers of the court are the *custos brevium*, who is the chief clerk; three prothonotaries, and their secondaries; the clerk of the warrants, clerk of the essoins, 14 filazers, 4 exigentors, a clerk of the juries, the chirographer, the clerk of the king's silver, clerk of the treasury, clerk of the seal, clerk of the outlawries, clerk of the inrolment of fines and recoveries, and clerk of the errors.

Common Prayer is the liturgy in the church of England: (See Liturgy.) Clergymen are to use the public form of prayers prescribed by the Book of Common Prayer: and refusing to do so, or using any other public prayers, are punishable by stat. 1 Eliz. c. ii.

Common, in *Grammar*, denotes the gender of nouns which are equally applicable to both sexes; thus *parens*, "a parent," is of the common gender.

Common, in *Geometry*, is applied to an angle, line, or the like, which belongs equally to two figures.

Common Divisor, a quantity or number which exactly divides two or more other quantities or numbers, without leaving any remainder.

COMMONALTY, the lower of the two divisions of the civil state. See *Civil State*.

The commonalty, like the nobility, are divided into several degrees: and as the lords, though different in rank, yet all of them are peers in respect of their nobility; so the commoners, though some are greatly superior to others, yet all are in law commonalty, in respect of their want of nobility.

1. The first name of dignity next beneath a peer was anciently that of *vidames*, *vice-domini*, or *valvasors:* who are mentioned by our ancient lawyers as *viri magnæ dignitatis;* and Sir Edward Coke speaks highly of them. Yet they are now quite out of use; and our legal antiquarians are not agreed upon even their original or ancient office.

2. Now, therefore, the first personal dignity after the nobility is a knight of the order of St George or of the Garter, first instituted by Edw. III. A. D. 1344.

3. Next (but not till after certain official dignities, as privy-counsellors, the chancellors of the exchequer and duchy of Lancaster, the chief justice of the king's bench, the master of the rolls, and the other English judges), follows a *knight banneret;* who indeed, by statutes 5 Richard II. stat. 2. c. 4. and 14 Richard II. c. 11. is ranked next after barons; and his precedence before the younger sons of viscounts was confirmed to him by order of King James I. in the tenth year of his reign.

reign. But in order to entitle him to this rank, he must have been created by the king in person, in the field, under the royal banners, in time of open war; else he ranks after,

4. *Baronets;* who are the next in order: which is a dignity of inheritance, created by letters patent, and usually descendible to the issue-male. See BARONETS.

5. Next follow *knights of the Bath.* See BATH.

6. The last of these inferior nobility are *knights bachelors;* the most ancient, though the lowest, order of knighthood amongst us. See BACHELOR.

7. The above, with those enumerated under the article NOBILITY, Sir Edward Coke says, are all the names of *dignity* in this kingdom; *esquires* and *gentlemen* being only names of *worship.* But before these last the heralds rank all colonels, sergeants at law, and doctors in the three learned professions.

8. *Esquires* and *gentlemen* are confounded together by Sir Edward Coke: who observes, that every esquire is a gentleman, and a gentleman is defined to be one *qui arma gerit,* "who bears coat-armour;" the grant of which adds gentility to a man's family: in like manner as civil nobility among the Romans was founded in the *jus imaginum,* or having the image of one ancestor at least who had borne some curule office. It is indeed a matter somewhat unsettled what constitutes the distinction, or who is a real esquire; for it is not an estate, however large, that confers this rank upon its owner. Camden, who was himself a herald, distinguishes them the most accurately; and he reckons up four sorts of them: 1st, The eldest sons of knights, and their eldest sons in perpetual succession. 2dly, The eldest sons of younger sons of peers, and their eldest sons, in like perpetual succession: both which species of esquires Sir Henry Spelman entitles *armigeri natalitii.* 3dly, Esquires created by the king's letters patent, or rather investiture; and their eldest sons. 4thly, Esquires by virtue of their office: as justices of the peace and others who bear any office of trust under the crown. To these may be added the esquires of the knights of the Bath, each of whom constitutes three at his installation; and all foreign, nay, Irish peers; for not only these, but the eldest sons of peers of Great Britain, though frequently titular lords, are only esquires in the law, and must be so named in all legal proceedings.

9. As for *gentlemen,* says Sir Thomas Smith, they be made good cheap in this kingdom; for whosoever studieth the laws of the realm, who studieth in the universities, who professeth liberal sciences, and (to be short) who can live idly and without manual labour, and will bear the part, charge, and countenance of a gentleman, he shall be called master, and shall be taken for a gentleman.

10. A *yeoman* is he that hath free land of 40s. by the year; who is thereby qualified to serve on juries, vote for knights of the shire, and do any other act where the law requires one that is *probus et legalis homo.*

11. The rest of the commonalty are *tradesmen, artificers,* and *labourers;* who (as well as all others) must, in pursuance of the statute 1 Henry V. c. 5. be styled by the name and addition of their estate, degree, or mystery, in all actions and other legal proceedings.

COMMONER, or GENTLEMAN-COMMONER, in the universities, a student entered in a certain rank.

COMMONS, or HOUSE OF COMMONS, a denomination given to the lower house of parliament. See PARLIAMENT.

The commons consist of all such men of any property in the kingdom as have not seats in the house of lords, every one of whom has a voice in parliament, either personally or by his representatives. In a free state, every man who is supposed a free agent, ought to be in some measure his own governor: and therefore a branch at least of the legislative power should reside in the whole body of the people. And this power, when the territories of the state are small and its citizens easily known, should be exercised by the people in their aggregate or collective capacity, as was wisely ordained in the petty republics of Greece, and the first rudiments of the Roman state. But this will be highly inconvenient when the public territory is extended to any considerable degree, and the number of citizens is increased. Thus when, after the Social war, all the burghers of Italy were admitted free citizens of Rome, and each had a vote in the public assemblies, it became impossible to distinguish the spurious from the real voter, and from that time all elections and popular deliberations grew tumultuous and disorderly; which paved the way for Marius and Sylla, Pompey and Cæsar, to trample on the liberties of their country, and at last to dissolve the commonwealth. In so large a state as ours, therefore, it is very wisely contrived, that the people should do that by their representatives which it is impracticable to perform in person: representatives chosen by a number of minute and separate districts, wherein all the voters are or may be easily distinguished. The counties are therefore represented by knights, elected by the proprietors of lands; and cities and boroughs are represented by citizens and burgesses chosen by the mercantile or supposed trading interest of the nation; much in the same manner as the burghers in the diet of Sweden are chosen by the corporate towns, Stockholm sending four, as London does with us, other cities two, and some only one. The number of English representatives is 513, of Scots 45, of Irish 100; in all 658, and every member, though chosen by one particular district, when elected and returned, serves for the whole realm; for the end of his coming thither is not particular, but general; not barely to advantage his constituents, but the commonwealth; to advise his majesty, as appears from the writ of summons, "de communi consilio super negotiis quibusdam arduis et urgentibus, regem, statum, et defensionem regni Angliæ et ecclesiæ Anglicanæ concernentibus." And therefore he is not bound, like a deputy in the United Provinces, to consult with, or take the advice of, his constituents upon any particular point, unless he himself thinks it proper or prudent so to do.

The peculiar laws and customs of the house of commons relate principally to the raising of taxes, and the elections of members to serve in parliament. See TAXES and ELECTIONS.

sacrament, extracted from several ancient liturgies, as those of St Basil, St Ambrose, &c.

By the last rubric, part of this service is appointed to be read every Sunday and holiday, after the morning prayer, even though there be no communicants.

COMMUNITY, denotes a society of men living in the same place, under the same laws, the same regulations, and the same customs.

COMMUTATION, in *Law*, the changes of a penalty or punishment from a greater to a less; as when death is commuted for banishment, &c.

COMNENA, Ann, daughter of Alexius Comnenus emperor of the East; memorable for her great learning and virtue, and for her history of the life and actions of her father, which is highly esteemed. She flourished about the year 1117. The history, which is in 15 books, was first published very imperfectly by Heschelius in 1610; and afterwards printed in the collection of the Byzantine historians, with a diffuse and incorrect Latin version by the Jesuit Possimus, but with excellent notes by the learned Du Fresne.

COMO, a strong and populous town of Italy, in the duchy of Milan, and in the Comasco, with a bishop's see. It was taken by the Imperialists in 1706, and is seated on a lake of the same name, in E. Long. 8. 57. N. Lat. 45. 45.

Como, the lake so called, is the largest in Italy. It is situated in the duchy of Milan, in the Comasco, on the confines of Switzerland and the Grisons. It is 88 miles in circumference, yet is not above 6 miles over in any part.

COMORA islands lie between the north end of the island of Madagascar and the coast of Zanguebar, from 10 to 15 degrees south latitude. Authors differ greatly with regard to their number, some speaking of three, others of five, and some of eight of these islands. They all abound in horned cattle, sheep, hogs, and a variety of fruits common in warm countries. They are said also to produce a kind of rice which turns of a violet colour when boiled. The most remarkable of them, and which the Europeans are best acquainted with, is the island of Johanna. See that article.

COMORIN, or Cape Comorin, the most southerly promontory of the Hither India, lying north-west of the island of Ceylon.

COMORRA, a handsome and large town of Lower Hungary, and capital of a territory of the same name. It is so well fortified, that the Turks could never take it. The greatest part of the inhabitants are Hungarians or Russians, who are very rich, and are of the Greek religion. It is seated on the river Danube, in the island of Silbut. E. Long. 18. 5. N. Lat. 47. 46.

COMOSÆ, in *Botany*, from *Coma*; an order of plants in the former edition of Linnæus's Fragments of a Natural Method, consisting of the spiked willow or spiræa frutex, dropwort, and greater meadow-sweet. These, though formerly distinct genera, are by Linnæus collected into one, under the name of *spiræa*. The flowers growing in a head resemble a bush, or tuft of hair, which probably gave rise to the epithet *Comosæ*.

COMPACT, in *Philosophy*, is said of bodies which are of a close, dense, and heavy texture, with few pores, and those very small.

Compact, in a legal sense, signifies an agreement or contract stipulated between several parties.

COMPANION, one with whom a man frequently converses.

As the human mind cannot always be on the stretch, nor the hand always employed in labour, recreation becomes both agreeable and necessary. Of all recreations, that of the company of a few chosen companions must be allowed to be the most manly and most improving: but as in those hours of recreation we are most in danger of being misled, being generally at such seasons more off our guard than usual, the greatest care should be taken in making choice of whom to associate with; for according to our choice of them, both our character and disposition will receive a tincture, as waters passing through minerals partake of their taste and efficacy. This is a truth so universally received, that it is become a proverb both in the natural and moral world, That a man is known by his company. As by chemistry we learn, that discordant mixtures produce nothing but broil and fermentation till one of them gets the ascendency of the rest; so from Scripture we learn, that two cannot walk together except they be agreed. From which we may see, how impossible it is for any one to be thought a person of real goodness and integrity, whilst he chooses for his companions the abandoned and licentious.

By associating with such, he will not only lose his character, but his virtue; for whatever fallacious distinction he may be pleased to make between the men and their vices, in the end the first generally qualifies the last; and by ceasing to hate them he will soon learn both to love and practise them. In short, the society of sensual men is peculiarly ensnaring. The malignity of their contagion doth not appear all at once. Their frolics first appear harmless; then, when partaken of, they leave a longing relish behind them; and one appointment makes way for another, one expence leads on to a second; and so time and fortune are wasted away to very bad purpose. The one appetite craves, and another must be gratified, till all become too importunate to be denied; which verifies what the wisest of men long since said, "That the beginning of sin is like the breaking forth of waters, which when it once makes an entrance, carries all before it with rushing impetuosity." Some pangs of remorse may be felt by the infatuated creature on the first degeneracy, and some faint resolutions against being seduced any more; which will no sooner be discovered by those leaders to destruction, than all arts will be used to allure him back to bear them company in the broad beaten path to ruin. Of all which methods, none is more to be dreaded than raillery; for this is generally exercised with all its force, and too often proves fatal. Another method used to mislead the young novice not yet hackneyed in vice, and no less dangerous than the other, is to call evil good, and good evil. Lust and sensuality must pass for love and gallantry; revenge and malice, for heroism. But steadiness should be shown, by holding such pests of society in derision, and looking on them with contempt; by appearing unmoved

Company. ved by their ill-founded banters, and unstung by their impious jests.

Upon the whole, in order to escape the danger which attends the keeping of evil company, let those you associate with be persons as carefully educated and as honestly disposed as yourself; of a good moral character, not given to any known vice; whose lives are temperate, and whose expences are moderate: with such company as these, you will neither get discredit, nor degenerate into excess. You will be a mutual check to each other; and your reputation will be so established, that it will be the ambition of others to be admitted members of your society. Select those for your companions who are men of good sense and understanding; and, if possible, who excel in some art, science, or accomplishment; that so, in the course of your acquaintance, your very hours of amusement may contribute to your improvement; and for the most part such are open and communicative, and take as much pleasure in being heard as you to be informed. By pursuing such a conduct, you will be an ornament and useful member of society.

COMPANY, a collective term, understood of several persons assembled together in the same place, or with the same design. The word is formed of the French *compagnie*, and that of *companio*, or *companies*, which Chifflet observes, are found in the Salic law, tit. 66. and are proper military words, understood of soldiers, who, according to the modern phrase, are comrades or mess-mates, i. e. lodge together, eat together, &c. of the Latin, *cum*, "with," and *panis*, "bread." It may be added, that in some Greek authors under the western empire, the word κυμπανια occurs in the sense of society.

COMPANY, in a familiar or fashionable sense, is used for an assemblage of persons met for the purpose of conversation, pastime, or festivity.

The love of company and of social pleasures is natural, and attended with some of the sweetest satisfactions of human life; but, like every other love, when it proceeds beyond the bounds of moderation, it ceases to produce its natural effect, and terminates in disgustful satiety. The foundation-stone and the pillar on which we build the fabric of our felicity, must be laid in our own hearts. Amusement, mirth, agreeable variety, and even improvement, may be sometimes sought in the gaiety of mixed company, and in the usual diversions of the world; but if we found our general happiness on these, we shall do little more than raise castles in the air, or build houses on the sand.

To derive the proper pleasure and improvement from company, it ought to be select, and to consist of persons of character, respectable both for their morals and their understandings. Mixed and undistinguished society tends only to dissipate our ideas, and induce a laxity of principles and practice. The pleasure it affords is of a coarse, mixed, noisy, and rude kind. Indeed, it commonly ends in weariness and disgust, as even they are ready to confess who yet constantly pursue it, as if their chief good consisted in living in a crowd.

Among these, indeed, who are exempted by their circumstances from professional and official employments, and who professedly devote themselves to a life of pleasure, little else seems to constitute the idea of it, but an unceasing succession of company, public or private. The dress, and other circumstances preparatory to the enjoyment of this pleasure, scarcely leave a moment for reflection. Day after day is spent in the same toilsome round, till a habit is formed, which renders dissipation necessary to existence. One week without it would probably induce a lowness of spirits, which might terminate in despair and suicide. When the mind has no anchor, it will suffer a kind of shipwreck; it will sink in whirlpools, and be dashed on rocks. What, indeed, is life or its enjoyments without settled principles, laudable purposes, mental exertions, and internal comfort? It is merely a vapour, or, to drop the language of figure on so serious a subject, it is a state worse than non-entity, since it possesses a restless power of action, productive of nothing but misery.

It is recommended, therefore, to all who wish to enjoy their existence (and who entertains not that wish?) that they should acquire a power not only of bearing, but of taking a pleasure in, temporary solitude. Every one must, indeed, sometimes be alone. Let him not repine when he is alone, but learn to set a value on the golden moments. It is then that he is enabled to study himself and the world around him. It is then that he has an opportunity of seeing things as they are, and of removing the deceitful veil, which almost every thing assumes in the busy scene of worldly employments. The soul is enabled to retire into herself, and to exert those energies which are always attended with sublime pleasure. She is enabled to see the dependent, frail, and wretched state of man as the child of nature; and incited by her discovery, to implore grace and protection from the Lord of the universe. They, indeed, who fly from solitude, can seldom be religious; for religion requires meditation. They may be said to "live without God in the world;" not, it is true, from atheistical principles, but from a carelessness of disposition; a truly deplorable state, the consciousness of which could not fail to cloud the gaiety of those halcyon beings who sport in the sunshine of unremitted pleasure.

There is no doubt that man is made for action, and that his duties and pleasures are often most numerous and most important amidst the busy hum of men. Many vices, and many corrupt dispositions, have been fostered in a solitary life. Monkery is not favourable to human nature or human happiness; but neither is unlimited dissipation.

In short, let there be a sweet interchange of retirement and association, of repose and activity. A few hours spent every day by the votaries of pleasure in serious meditation, would render their pleasure pure, and more unmixed with misery. It would give them knowledge, so that they would see how far they might advance in their pursuit without danger; and resolution, so that they might retreat when danger approached. It would teach them how to live, a knowledge which indeed they think they possess already; and it would also teach them, what they are often too little solicitous to learn, how to die.

COMPANY,

IN a commercial sense, is a society of merchants, mechanics, or other traders, joined together in one common interest.

When there are only two or three joined in this manner, it is called a partnership; the term *company* being restrained to societies consisting of a considerable number of members, associated together by a charter obtained from the prince.

The mechanics of all corporations, or towns incorporated, are thus erected into companies, which have charters of privileges and large immunities.

COMPANY seems more particularly appropriated to those grand associations set on foot for the commerce of the remote parts of the world, and vested by charter with peculiar privileges.

When companies do not trade upon a joint stock, but are obliged to admit any person, properly qualified, upon paying a certain fine, and agreeing to submit to the regulations of the company, each member trading upon his own stock and at his own risk, they are called *Regulated Companies*. When they trade upon a joint stock, each member sharing in the common profit or loss in proportion to his share in this stock, they are called *Joint-stock Companies*. Such companies, whether regulated or joint-stock, sometimes have, and sometimes have not, exclusive privileges.

However injurious companies with joint-stock, and incorporated with exclusive privileges, may at this time be reckoned to the nation in general, it is yet certain that they were the general parent of all our foreign commerce; private traders being discouraged from hazarding their fortunes in foreign countries, until the method of traffic had been first settled by joint-stock companies. But since the trade of this kingdom and the number of traders have increased, and the methods of assurance of shipping and merchandise, and the navigation of all parts of the known world have become familiar to us, these companies, in the opinion of most men, have been justly looked upon in the light of injurious monopolies.

I. REGULATED Companies resemble, in every respect, the corporations of trades, so common in the cities and towns of all the different countries of Europe; and are a sort of enlarged monopolies of the same kind. As no inhabitant of a town can exercise an incorporated trade, without first obtaining his freedom in the corporation; so in most cases no subject of the state can lawfully carry on any branch of foreign trade, for which a regulated company is established, without first becoming a member of that company. The monopoly is more or less strict according as the terms of admission are more or less difficult; and according as the directors of the company have more or less authority, or have it more or less in their power to manage in such a manner as to confine the greater part of the trade to themselves and their particular friends. In the most ancient regulated companies the privileges of apprenticeship were the same as in other corporations; and entitled the person who had served his time to a member of the company, to become himself a member, either without paying any fine, or upon paying a much smaller one than what was exacted from other people. The usual corporation spirit, wherever the law does not restrain it, prevails in all regulated companies. When they have been allowed to act according to their natural genius, they have always, in order to confine the competition to as small a number of persons as possible, endeavoured to subject the trade to many burdensome regulations. When the law has restrained them from doing this, they have become altogether useless and insignificant.

The regulated companies for foreign commerce, which at present subsist in Great Britain, are, The Hamburgh Company, the Russia Company, the Eastland Company, the Turkey Company, and the African Company.

1. *The Hamburgh Company* is the oldest trading establishment in the kingdom; though not always known by that name, nor restrained to those narrow bounds under which it is now confined. It was first called the *Company of Merchants trading to Calais, Holland, Zealand, Brabant, and Flanders:* then it acquired the general title of *Merchant-adventurers of England:* as being composed of all the English merchants who traded to the Low Countries, the Baltic, and the German ocean. Lastly, it was called the *Company of Merchant-adventurers of England trading to Hamburgh.*

This company was first incorporated by Edward I. in 1296; and established again, by charter, in 1406, under the reign of King Henry IV. It was afterwards confirmed, and augmented with divers privileges, by many of his successors. Before the charter of Henry IV. all the English merchants who trafficked out of the realm, were left to their own discretion, and managed their affairs with foreigners as might be most for their respective interests, without any regard to the general commerce of the nation. Henry, observing this disorder, endeavoured to remedy it, by uniting all the merchants in his dominions into one body; wherein, without losing the liberty of trading each for himself, they might be governed by a company still subsisting; and be subject to regulations, which should secure the general interest of the national commerce, without prejudice to the interest of particulars. With this view, he granted all the merchants of his states, particularly those of Calais, then in his hands, a power of associating themselves into a body politic, with directors and governors, both in England and abroad; to hold assemblies, both for the direction of business and the deciding of controversies among merchants; make laws; punish delinquents; and impose moderate duties and taxes on merchandises, and merchants, to be employed in the service of the corporation. These few articles of the charter of Henry IV. were afterwards much augmented by Henry VII. who first gave them the title of *Merchant-adventurers to Calais, Holland,* &c. gave them a power of proclaiming and continuing free fairs at Calais; and ordered, that to be reputed a member of the society, each person pay 20 marks sterling; and that the several members should attend the general meetings, or courts, appointed by the directors, whether at London, Calais, or elsewhere.

A petition being made to Queen Elizabeth, in 1564, for

for an explanation of certain articles in the charter of Henry VII. and a confirmation of the rest granted by other kings; that princess, by a charter of the same year declares that, to end all disputes, they shall be incorporated anew, under the title of the *Company of Merchant-adventurers of England;* that all who were members of the former company should, if they desired it, be admitted members of this; that they should have a common seal; that they should admit into their society what other persons, and on what terms, they pleased, and expel them again on misbehaviour; that the city of Hamburgh and neighbouring cities should be reputed within their grant, together with those of the Low Countries, &c. in that of the former company: that no member should marry out of the kingdom, nor purchase lands, &c. in any city beyond sea; and that those who do, shall be, *ipso facto*, excluded for ever. Twenty-two years after this first charter, Queen Elizabeth granted them a second; confirming the former, and further granting them a privilege of exclusion; with a power of erecting in each city within their grant a standing council.

The revolutions which happened in the Low Countries towards the end of the sixteenth century, and which laid the foundation of the republic of Holland, having hindered the company from continuing their commerce with their ancient freedom; it was obliged to turn it almost wholly to the side of Hamburgh, and the cities on the German ocean; from which change, some people took occasion to change its name to that of the *Hamburgh Company;* though the ancient title of *Merchant-adventurers* is still retained in all their writings.

About the middle of the last century, the fine for admission was fifty, and at one time one hundred pounds, and the conduct of the company was said to be extremely oppressive. In 1643, in 1645, and in 1661, the clothiers and free traders of the west of England complained of them to parliament, as of monopolists who confined the trade and oppressed the manufactures of the country. Though those complaints produced no act of parliament, they had probably intimidated the company so far, as to oblige them to reform their conduct. The terms of admission are now said to be quite easy; and the directors either have it not in their power to subject the trade to any burdensome restraint or regulations, or at least have not of late exercised that power.

2. *The Russia Company*, was first projected towards the end of the reign of King Edward VI. executed in the first and second years of Philip and Mary; but had not its perfection till its charter was confirmed by act of parliament, under Queen Elizabeth, in 1566. It had its rise from certain adventurers, who were sent in three vessels on the discovery of new countries; and to find out a north-east passage to China; these, falling into the White sea, and making up to the port of Archangel, were exceedingly well received by the Muscovites; and, at their return, solicited letters patent to secure to themselves the commerce of Russia, for which they had formed an association.

By their charter, the association was declared a body politic, under the name of the *Company of Merchant-adventurers of England, for the discovery of lands, territories, islands,* &c. *unknown or unfrequented.* Their privileges were, to have a governor, four consuls, and 24 assistants, for their commerce; for their policy, to make laws, inflict penalties, send out ships, to make discoveries, take possession of them in the king's name, set up the banner royal of England, plant them; and lastly, the exclusive privilege of trading to Archangel, and other ports of Muscovy, not yet frequented by the English.

This charter not being sufficiently guarded, was confirmed by parliament in the 8th year of Queen Elizabeth; wherein it was enacted, that in regard the former name was too long, they should now be called *Company of English Merchants for discovering new trades;* under which name, they should be capable of acquiring and holding all kinds of lands, manors, rents, &c. not exceeding 100 marks per annum, and not held of her majesty; that no part of the continent, island, harbour, &c. not known or frequented before the first enterprise of the merchants of their company, situated to the north, or north-west, or north-east of London; nor any part of the continent, islands, &c. under the obedience of the emperor of Russia, or in the countries of Armenia, Media, Hyrcania, Persia, or the Caspian sea, should be visited by any subjects of England to exercise any commerce, without the consent of the said company, on pain of confiscation. The said company shall use no ships in her new commerce but those of the nation; nor transport any cloths, serges, or other woollen stuffs, till they have been dyed and pressed. That in case the company discontinue of itself to unload commodities in the road of the abbey of S. Nicolas, in Russia, or some other port on the north coasts of Russia, for the space of three years, the other subjects of England shall be allowed to traffic to Narva, while the said company discontinues its commerce into Russia, only using English vessels.

This company subsisted with reputation almost a whole century, till the time of the civil wars. It is said, the czar then reigning, hearing of the murder of King Charles I. ordered all the English in his states to be expelled; which the Dutch taking the advantage of, settled in their room. After the Restoration, the remains of the company re-established part of their commerce at Archangel, but never with the same success as before; the Russians being now well accustomed to the Dutch merchants and merchandise.

This company subsists still, under the direction of a governor, four consuls, and assistants. By the 10th and 11th of William III. c. 6. the fine for admission was reduced to 5l.

3 *The Eastland Company* was incorporated by Queen Elizabeth. Its charter is dated in the year 1579. By the first article the company is erected into a body politic under the title of the *Company of Merchants of the East;* to consist of Englishmen, all real merchants, who have exercised the business thereof, and trafficked through the Sound before the year 1568, into Norway, Sweden, Poland, Livonia, Prussia, Pomerania, &c. as also Revel, Coningsberg, Dantzick, Copenhagen, &c. excepting Narva, Muscovy, and its dependencies. Most of the following articles grant them the usual prerogatives of such companies, as a seal, govenor, courts, laws, &c.

The privileges peculiar to this company are, that none shall be admitted a member who is already a member

member of any other company; nor any retail-dealer at all. That no merchant qualified be admitted without paying six pounds thirteen shillings and sixpence. That a member of another company desiring to renounce the privileges thereof, and to be received into that of the East shall be admitted *gratis;* provided he procures the same favour for a merchant of the East willing to fill his place. That the merchant-adventurers who never dealt in the East, in the places expressed in the charter, may be received as members of the company on paying 40 marks; that, notwithstanding this union of the adventurers of England with the company of the East, each shall retain its rights and privileges. That they shall export no cloths but what are dyed and pressed, except a hundred pieces per annum, which are allowed them *gratis*. This charter was confirmed by Charles II. in 1629, with this addition, that no person, of what quality soever, living in London, should be admitted a member, unless he were free of the city. This company was complained of as a monopoly, and first curtailed by legal authority in 1672; and since the declaration of rights in 1689, exist only in name; but still continue to elect their annual officers, who are a governor, a deputy, and twenty-four assistants.

7. *The Turkey* or *Levant Company*, had its rise under Queen Elizabeth, in 1581. James I. confirmed its charter in 1605, adding new privileges. During the civil wars, there happened some innovations in the government of the company; many persons having been admitted members, not qualified by the charters of Queen Elizabeth and King James, or that did not conform to the regulations prescribed. Charles II. upon his restoration, endeavoured to set it upon its ancient basis; to which end, he gave them a charter, containing not only a confirmation of their old one, but also several new articles of reformation. By this, the company is erected into a body politic, capable of making laws, &c. under the title of the *Company of Merchants of England trading to the seas of the Levant*. The number of members is not limited, but is ordinarily about three hundred. The principal qualification required is, that the candidate be a freeman of London, and a wholesale merchant, either by family or by serving an apprenticeship of seven years. Those under 25 years of age pay 25l. sterling at their admission; those above, twice as much. The fine was reduced by act of parliament, in 1753, to 20l. and the privilege of admission extended to every British subject. Each makes oath at his entrance not to send any merchandise to the Levant but on his own account; and not to consign them to any but the company's agents or factors. This restriction is likewise enlarged by the above-mentioned statute.

The company has a court or board at London, which is composed of a governor, deputy-governor, and fifteen directors or assistants, who are all actually to live in London or the suburbs. They have also a deputy-governor in every city and port, where there are any members of the company. The assembly at London sends out the vessels, regulates the tariff for the price at which the European merchandises sent to the Levant are to be sold, and for the quality of those returned. It raises taxes on merchandises, to defray impositions, and the common expences of the company; presents the ambassador which the king is to keep at the Porte, elects two consuls for Smyrna and Constantinople, &c.

One of the best regulations of the company is, not to leave the consuls, or even ambassador, to fix the imposition on vessels for defraying the common expences (a thing fatal to the companies of most other nations); but to allow a pension to the ambassador and consuls, and even to the chief officers, as secretary, chaplain, interpreters, and janizaries, that there may not be any pretence for their raising any sum at all on the merchants or merchandises.

In extraordinary cases, the consuls, and even the ambassador, have recourse to two deputies of the company, residing in the Levant; or, if the affair be very important, they assemble the whole body. Here are regulated the presents to be given, the voyages to be made, and every thing to be deliberated; and on the resolutions here taken, the deputies appoint the treasurer to furnish the moneys, &c. required.

The ordinary commerce of this company employs from 20 to 25 vessels, carrying from 25 to 30 pieces of cannon. The merchandises exported thither are, cloths of all kinds and colours, pewter, lead, pepper, cochineal, and a great deal of silver, which they take up at Cadiz: the returns are in raw silk, galls, camlets, wools, cottons, Morocco leather, ashes for making glass and soap, and several gums and medicinal drugs. The commerce to Smyrna, Constantinople, and Scanderoon, is not esteemed much less considerable than that of the East India Company; but is, doubtless, more advantageous to Britain, because it takes off much more of the British manufactures than the other, which is chiefly carried on in money. The places reserved for the commerce of this company are, all the states of Venice, in the gulf of Venice; the state of Ragusa; all the states of the grand seignior, and the ports of the Levant and Mediterranean; excepting Carthagena, Alicant, Barcelona, Valencia, Marseilles, Toulon, Genoa, Leghorn, Civita Vecchia, Palermo, Messina, Malta, Majorca, Minorca, and Corsica; and other places on the coasts of France, Spain, and Italy.

5. *The Company of Merchants trading to Africa*, established in 1750. Contrary to the former practice with regard to regulated companies, who were reckoned unfit for such sort of service, this company was subjected to the obligation of maintaining forts and garrisons. It was expressly charged at first with the maintenance of all the British forts and garrisons that lie between Cape Blanc and the Cape of Good Hope, and afterwards with that of those only which lie between Cape Rouge and the Cape of Good Hope. The act which establishes this company (the 23d of George II. c. 31.) seems to have had two distinct objects in view; first, to restrain effectually the oppressive and monopolizing spirit which is natural to the directors of a regulated company; and secondly, to force them as much as possible to give an attention, which is not natural to them, towards the maintenance of forts and garrisons.

For the first of these purposes, the fine for admission is limited to forty shillings. The company is prohibited from trading in their corporate capacity, or upon a joint stock; from borrowing money upon common obliged by stat. 9 and 10 Will. to pay ten per cent. in order to assist the company in maintaining their forts and factories. But notwithstanding this heavy tax, the company were still unable to maintain the competition; their stock and credit gradually declined. In 1712, their debts had become so great, that a particular act of parliament was thought necessary, both for their security and for that of their creditors. It was enacted, that the resolution of two-thirds of these creditors in number and value should bind the rest, both with regard to the time which should be allowed to the company for the payment of their debts, and with regard to any other agreement which it might be thought proper to make with them concerning those debts. In 1730, their affairs were in so great disorder, that they were altogether incapable of maintaining their forts and garrisons; the sole purpose and pretext of their institution. From that year till their final dissolution, the parliament judged it necessary to allow the annual sum of ten thousand pounds for that purpose. In 1732, after having been for many years losers by the trade of carrying negroes to the West Indies, they at last resolved to give it up altogether; to sell to the private traders to America the negroes which they purchased upon the coast; and to employ their servants in a trade to the inland parts of Africa for gold dust, elephants teeth, dyeing drugs, &c. But their success in this more confined trade was not greater than in their former extensive one. Their affairs continued to go gradually to decline, till at last being in every respect a bankrupt company, they were dissolved by act of parliament, and their forts and garrisons vested in the present *Regulated Company of Merchants trading to Africa.*

II. *Joint-Stock Companies*, established either by royal charter or by act of parliament, differ in several respects not only from regulated companies, but from private copartneries. 1. In a private copartnery, no partner, without the consent of the company, can transfer his share to another person, or introduce a new member into the company. Each member, however, may, upon proper warning, withdraw from the copartnery, and demand payment from them of his share of the common stock. In a joint-stock company, on the contrary, no member can demand payment of his share from the company: but each member can, without their consent, transfer his share to another person, and thereby introduce a new member. The value of a share in a joint-stock is always the price which it will bring in the market; and this may be either greater or less, in any proportion, than the sum which its owner stands credited for in the stock of the company. 2. In a private copartnery, each partner is bound for the debts contracted by the company to the whole extent of his fortune. In a joint-stock company, on the contrary, each partner is bound only to the extent of his share.

The trade of a joint-stock company is always managed by a court of directors. This court indeed is frequently subject, in many respects, to the controul of a general court of proprietors. But the greater part of those proprietors seldom pretend to understand any thing of the business of the company; and when the spirit of faction happens not to prevail among them, give themselves no trouble about it, but receive contentedly such half-yearly or yearly dividend as the directors think proper to make to them. This total exemption from trouble and from risk, beyond a limited sum, encourages many people to become adventurers in joint-stock companies, who would upon no account hazard their fortunes in any private copartnery. Such companies, therefore, commonly draw to themselves much greater stocks than any private copartnery can boast of. The trading stock of the South-Sea Company, at one time, amounted to upwards of thirty-three millions eight hundred thousand pounds. The directors of such companies, however, being the managers rather of other people's money than of their own, it cannot well be expected that they should watch over it with the same anxious vigilance with which the partners in a private copartnery frequently watch over their own. Like the stewards of a rich man, they are apt to consider attention to small matters as not for their master's honour, and very easily give themselves a dispensation from having it. Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company. It is upon this account that joint-stock companies for foreign trade have seldom been able to maintain the competitions against private adventurers. They have, accordingly, very seldom succeeded without an exclusive privilege; and frequently have not succeeded with one. Without an exclusive privilege they have commonly mismanaged the trade. With an exclusive privilege they have both mismanaged and confined it.

The principal joint-stock companies presently subsisting in Great Britain are, the *South Sea* and the *East India* companies; to which may be added, though of very inferior magnitude, the *Hudson's Bay* Company.

1. *The South-Sea Company.* During the long war with France in the reign of Queen Anne, the payment of the sailors of the royal navy being neglected, they received tickets instead of money, and were frequently obliged, by their necessities, to sell these tickets to avaricious men at a discount of 40 and sometimes 50 per cent. By this and other means, the debts of the nation unprovided for by parliament, and which amounted to 9,471,321l. fell into the hands of these usurers. On which Mr Harley, at that time chancellor of the exchequer, and afterwards earl of Oxford, proposed a scheme to allow the proprietors of these debts and deficiencies 6 per cent. per annum, and to incorporate them for the purpose of carrying on a trade to the South Sea; and they were accordingly incorporated under the title of "the Governor and Company of Merchants of Great Britain trading to the South Seas, and other parts of America, and for encouraging the Fishery," &c.

Though this company seemed formed for the sake of commerce, the ministry never thought seriously, during the course of the war, about making any settlement on the coast of South America, which was what flattered the expectations of the people; nor was it ever carried into execution by this company.

Some other sums were lent to the government in the reign of Queen Anne at 6 per cent. In the third of George I. the interest of the whole was reduced to 5 per cent. and the company advanced two millions more to the government at the same interest. By the statute son is qualified to be governor, his majesty excepted, unless such governor has in his own name and right 5000l. in the trading stock; the sub-governor is to have 4000l. the deputy-governor 3000l. and a director 2000l. in the same stock. In every general court, every member having in his own name and right 500l. in trading stock, has one vote; if 2000l. two votes; if 3000l. three votes; and if 5000l. four votes.

2. *The East India Company.* The first, or as it is called the *Old East India Company*, was established by a charter from Queen Elizabeth in 1600; but for some time the partners seem to have traded with separate stocks, though only in the ships belonging to the whole company. In 1612, they joined their stocks into one common capital: and though their charter was not as yet confirmed by act of parliament, it was looked upon in that early period to be sufficiently valid, and nobody ventured to interfere with their trade. At this time their capital amounted to about 740,000l. and the shares were as low as 50l.: their trade was in general successful, notwithstanding some heavy losses, chiefly sustained through the malice of the Dutch East India Company. In process of time, however, it came to be understood that a royal charter could not by itself convey an exclusive privilege to traders, and the company was reduced to distress by reason of the multitude of interlopers who carried off the most of their trade. This continued during the latter part of the reign of Charles II. the whole of that of James II. and part of William III. when in 1698 a proposal was made to parliament for advancing the sum of 2,000,000l. to government, on condition of erecting the subscribers into a new company with exclusive privileges. The old company endeavoured to prevent the appearance of such a formidable rival, by offering government 700,000l. nearly the amount of their capital at that time; but such were the exigencies of the state, that the larger sum, though at eight per cent. interest, was preferred to the smaller at one half the expence.

Thus were two East India Companies erected in the same kingdom, which could not but be very prejudicial to each other. Through the negligence of those who prepared the act of parliament also, the new company were not obliged to unite in a joint-stock. The consequence of this was, that a few private traders, whose subscriptions scarce exceeded 7200l. insisted on a right of trading separately at their own risk. Thus a kind of third company was established; and by their mutual contentions with one another, all the three were brought to the brink of ruin. Upon a subsequent occasion, in 1730, a proposal was made to parliament for putting the trade under the management of a regulated company, and thus laying it in some measure open. This, however, was opposed by the company, who represented in strong terms the mischiefs likely to arise from such a proceeding. "In India (they said), it raised the price of goods so high, that they were not worth the buying; and in England, by overstocking the market, it sunk the price to such a degree that no profit could be made of them." Here Dr Smith remarks, that by a more plentiful supply, to the great advantage and conveniency of the public, it must have reduced very much the price of Indian goods in the English market, cannot well be doubted; but that it should have raised very much their price in the Indian market, seems not very probable, as all the extraordinary demand which that competition could occasion, must have been but as a drop of water in the immense ocean of Indian commerce. The increase of demand, adds he, though in the beginning it may sometimes raise the price of goods, never fails to lower it in the issue. It encourages production, and thereby increases the competition of the producers, who, in order to undersell one another, have recourse to new divisions of labour and new improvements of art, which might never otherwise have been thought of. The miserable effects of which the company complained, were the cheapness of consumption and the encouragement given to production, precisely the two effects which it is the business of political economy to promote. The competition, however, of which they gave this doleful account, had not been allowed to continue long. In 1702 the two companies were, in some measure, united by an indenture tripartite, to which the queen was the third party; and in 1708, they were, by act of parliament, perfectly consolidated into one company by their present name of "The United Company of Merchants trading to the East Indies." Into this act it was thought worthy to insert a clause, allowing the separate traders to continue their traffic till Michaelmas 1711, but at the same time empowering the directors, upon three years notice, to redeem their capital of 7200l. and thereby convert the whole capital of the company into a joint-stock. By the same act, the capital of the company, in consequence of a new loan to government, was augmented from 2,000,000l. to 3,200,000l. In 1743, another million was advanced to government. But this being raised, not by a call upon the proprietors, but by selling annuities and contracting bond-debts, it did not augment the stock upon which the proprietors could claim a dividend. Thus, however, their trading stock was augmented; it being equally liable with the other 3,200,000l. to the losses sustained, and debts contracted, by the company in the prosecution of their mercantile projects. From 1708, or at least from 1711, this company being freed from all competitors, and fully established in the monopoly of the English commerce to the East Indies, carried on a successful trade; and from their profits made annually a moderate dividend to their proprietors. Unhappily, however, in a short time, an inclination for war and conquest began to take place among their servants; which, though it put them in possession of extensive territories and vast nominal revenues, yet embarrassed their affairs in such a manner, that they have not to this day been able to recover themselves. The particulars of these wars are given under the articles BRITAIN, and INDOSTAN. Here it will be sufficient to observe, that they originated during the war in 1741 through the ambition of M. Dupleix the French governor of Pondicherry, who involved the company in the politics and disputes of the Indian princes. After carrying on hostilities for some time with various success, they at last lost Madras, at that time the principal settlement in the East Indies, but it was restored by the treaty of Aix-la Chapelle. During the war of

Smith's Wealth of Nations, vol. iii. p. 134.

of 1755, they acquired the revenues of a rich and extensive territory, amounting, as was then said, to near 3,000,000l. per annum.

For several years they remained in quiet possession of the revenue arising from this territory, though it certainly never answered the expectations that had been formed concerning it. But in 1767 the British ministry laid claim to the territorial possessions of the company, and the revenue arising from them, as of right belonging to the crown; and the company, rather than yield up their territories in this manner, agreed to pay government a yearly sum of 400,000l. They had before this gradually augmented their dividend from about six to ten per cent.; that is, on their capital of 3,200,000l. they had raised it from 192,000l. to 320,000l. a-year. About this time also they were attempting to raise it still farther, viz. from 10 to 12½ per cent.; but from this they were prevented by two successive acts of parliament, the design of which was to enable them to make a more speedy payment of their debts, at this time estimated at more than six or seven millions sterling. In 1769 they renewed their agreement with government for five years more, stipulating, that during the course of that period they should be allowed gradually to augment their dividend to 12½ per cent.; never increasing it, however, more than one per cent. annually. Thus their annual payments could only be augmented by 608,000l. beyond what they had been before their late territorial acquisitions. By accounts from India in the year 1768, this revenue, clear of all deductions and military charges, was stated at 2,048,747l. At the same time they were said to possess another revenue, arising partly from lands, but chiefly from the customs established at their different settlements, amounting to about 439,000l. The profits of their trade, too, according to the evidence of their chairman before the house of commons, amounted to at least 400,000l per annum; their account made it 500,000l.; and the lowest account stated it at least equal to the highest dividend paid to their proprietors. Notwithstanding this apparent wealth, however, the affairs of the company from this time fell into disorder; insomuch that in 1773 their debts were augmented by an arrear to the treasury in the payment of the 400,000l. stipulated; by another to the customhouse for duties unpaid; by a large sum borrowed from the bank; and by bills drawn upon them from India to the amount of more than 1,200,000l. Thus they were not only obliged to reduce their dividend all at once to six per cent. but to apply to government for assistance. A particular account of this transaction is given under the article BRITAIN. Here it may be mentioned in general, that the event proved very unfavourable to the company, as they were now subjected to an interference of government altogether unknown before. Several important alterations were made in their constitution both at home and abroad. The settlements of Madras, Bombay, and Calcutta, which had hitherto been entirely independent of one another, were subjected to a governor-general; assisted by a council of four assessors. The nomination of the first governor and council, who were to reside at Calcutta, was assumed by parliament; the power of the court of Calcutta, which had gradually extended its jurisdiction over the rest, was now reduced and confined to the trial of mercantile causes, the purpose for which it was originally instituted. Instead of it a new supreme court of judicature was established, consisting of a chief justice and three judges to be appointed by the crown. Besides these alterations, the stock necessary to entitle any proprietor to vote at the general courts was raised from 500l. to 1000l. To vote on this qualification, too, it was necessary that he should have possessed it, if acquired by his own purchase and not by inheritance, for at least one year, instead of six months, the term requisite formerly. The court of 24 directors had before been chosen annually; but it was now enacted, that each director should for the future be chosen for four years; six of them, however, to go out of office by rotation every year, and not to be capable of being rechosen at the election of the six new directors for the ensuing year. It was expected that, in consequence of these alterations, the courts both of the proprietors and directors would be likely to act with more dignity and steadiness than formerly. But this was far from being the case. The company and its servants showed the utmost indifference about the happiness or misery of the people who had the misfortune to be subjected to their jurisdiction. This indifference, too, was more likely to be increased than diminished by some of the new regulations. The house of commons, for instance, had resolved, that when the 1,600,000l. lent to the company by government should be paid, and their bond debts reduced to 1,500,000l. they might then, and not till then, divide eight per cent. upon their capital; and that whatever remained of their revenues and nett profits at home should be divided into four parts; three of them to be paid into the exchequer for the use of the public, and the fourth to be reserved as a fund, either for the further reduction of their bond debts, or for the discharge of other contingent exigencies which the company might labour under. But it could scarce be expected that, if the company were bad stewards and bad sovereigns when the whole of their nett revenue and profits belonged to themselves, they would be better when three-fourths of these belonged to other people. The regulations of 1773, therefore, did not put an end to the troubles of the company. Among other institutions, it had been at this time enacted, that the presidency of Bengal should have a superiority over the other presidencies in the country; the salary of the chief justice was fixed at 8000l. per annum, and those of the other judges at 6000l. each. In consequence of this act, Sir Elijah Impey, who was created a baronet on the occasion, set sail with three other judges, for India, in the year 1774. The powers with which they were invested were very extraordinary. They had the title of his Majesty's Supreme Court of Judicature in India. Civil law, common law, ecclesiastical, criminal, and admiralty jurisdiction, belonged of right to them. They were empowered to try Europeans on personal actions, and to assess damages without a jury. Every native, either directly or indirectly in the service of the company, or in their territories, was made subject to their jurisdiction, with a view to prevent the Europeans from eluding justice under the pretence of employing

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by jury might be granted to the British subjects in Bengal, in all cases where it was established by law in England; that the retrospective powers of the supreme court might be limited to the time of its establishment in Bengal; that it should be defined beyond the power of discretional distinction who the persons were that properly came under the jurisdiction of the court, and who did not; that it should be expressly declared what statutes should, and what should not, be in force in Bengal; that distinct and separate judges for the law and equity sides of the court should be appointed; and that a power of delaying executions in criminal cases until his majesty's pleasure was known, should be lodged in the governor and council.

This petition was soon followed by another signed by Warren Hastings, Esq. governor-general, Philip Francis and Edward Wheeler, Esqs. counsellors for the government and presidency of Fort-William in Bengal; in which they represented, "that, though the jurisdiction of the supreme court of judicature at Calcutta, as well as the powers granted to the governor-general and council, were clearly limited by parliament and the king's letters patent, yet the chief justice and judges of that court had exercised authority over persons not legally within their jurisdiction, and had illegally and improperly advised and admitted suits against the governor-general and council: that they had attempted to execute their writs upon natives of high rank in the kingdom of Bengal, who were not within their jurisdiction: the governor and council therefore had found themselves under a necessity of opposing them, and of affording protection to the country and people, who were placed under their own immediate inspection, and freeing them from the terrors of a new and usurped dominion. They had even been obliged to make use of a military force, in order to resist the proceedings of the judges and their officers: And they declared, that no other conduct could have saved those provinces, and the interests of the company, or of the British nation itself, from the ruin with which they were threatened. They also declared themselves to be of opinion, that the attempt to extend, to the inhabitants of these provinces, the jurisdiction of the supreme court of judicature, and the authority of the English law, which were still more intolerable than the law itself, would be such a restraint on the minds of the people of those provinces, by the difference of such laws and forms from their laws, that they might at last inflame them, notwithstanding their known mildness and patience, into an open rebellion." The petition was concluded, by soliciting an indemnity from the legal consequences of the resistance they had been obliged to make to that court.

While the British were thus expressing their displeasure against the conduct of these judges, the natives were thrown into the utmost consternation and despair by the acts of oppression and violence committed by them. A prosecution for forgery had been commenced against Nundcomar, a bramin of the first rank in Bengal. The crime was not capital by the laws of Indostan, and had been committed many years before; yet with the utmost cruelty and injustice was this man condemned and executed on the British statute, by which forgery is made capital; a statute which, at the commission of the crime, he had never heard of, nor could ever dream that he would be subjected to its power. What rendered this execution the more remarkable was, that, at the very time when the charge of forgery was brought against him, Nundcomar had been employed in exhibiting an accusation against Mr Hastings. This, together with the hurry in which the court were to have him put to death (for the court refused to allow him a respite till his majesty's pleasure was known), made the natives conclude that he was executed, not on account of the forgery, but for having ventured to prefer an accusation against an English governor. In other respects they were terrified to such a degree, that many of them ran into the river on seeing a bramin put to death with such circumstances of ignominy.

The alarm excited by the execution of Nundcomar was kept up by fresh decisions of the supreme court: Among those the Patna cause, as it is commonly called, was one of the most remarkable. An adventurer, named Shahaz Beg Cawn, had come from Cabul in Persia to Bengal, where he entered himself in the service of the company, and was preferred to the command of a body of horse. Having gained a competent fortune, and obtained from the Mogul a grant of lands called an *Ultumghaw* in the province of Bahar, he retired from the army, and settled in Patna. About this time, when advanced in years, he married a woman of low rank, named *Nadara Begum*, by whom he had no children. His brother, Allum Beg, came likewise to Patna; and on his leaving the place some time after, committed the care of one of his sons, named *Behader Beg*, to his brother Shahaz Beg Cawn. On the death of the latter in 1776, a dispute ensued concerning the inheritance betwixt the widow and Behader Beg. The widow having taken possession of the whole property of Shahaz, the nephew, as adopted son and heir, give in a petition to the provincial council at Patna, on the 2d of January 1777, setting forth his claim. In this petition he stated, that the widow was removing and secreting the effects of the deceased; and concluded with a prayer, that orders should be given to prevent their removal; to recover such as had already been carried away; and that the cadi or Indian judge should be directed to ascertain his right. As the parties were Mahometans, the council of course referred the cause to the cadi and two mufties, the proper officers for determining it according to the established laws of the country. These having inquired into the matter, reported, that the title-deeds, on which the widow pretended to found her right, appeared to be forged; and that, even if they had appeared in the life-time of Shahaz, they were still informal, on account of a point of the Mahometan law, which requires, that to make deeds of gift valid, possession should be entered into at the time of executing or delivering them over; but that, as no possession of this kind had been given, the estate ought to be divided according to the Mahometan law; viz. one-fourth to the wife, and three-fourths to the nephew, as the representative of his father Allum Beg, who was considered as the more immediate heir of the deceased. This decision was confirmed by the council of Patna, with the following exception in favour of the widow, that the heir-at-law should pay her one-fourth of the rents of the ultumghaw, or royal grant, for

for her support during life. The widow, however, refused to submit to the decision, or to deliver up the effects of her husband; in consequence of which compulsatory methods were used; when by the advice of some English lawyers, an action of trespass was brought, according to the law of England, against the cadi and two mufties for their proceedings against her, laying the damages at about 66,000l. sterling. This process being brought before the supreme court, was by them conducted in such a manner as must entail everlasting infamy on the actors. They began with obliging the cadi and mufties to find bail in no less than 40,000 pounds for their appearance, which was immediately given by the council at Patna. The supreme court then having entered into the merits of the cause, and decided the matter in the most rigorous manner, according to all the forms of English law, assessed the cadi and mufties in damages no less than 30,000l. sterling. Their houses and effects were seized by the sheriff's officers, and publicly put up to sale; the cadi, who was upwards of 60 years of age, and had been in office for many years with great applause, died on his way to the common gaol at Calcutta, to which the nephew and two mufties were conveyed, being a distance of no less than 400 miles from their former residence at Patna. A suit, however, was commenced against the widow, on account of having forged the title-deeds by which she claimed her husband's estate; but it was suppressed on account of some informality.

Another decision, by which the supreme court likewise incurred much censure, was that against Jaggernaut, the principal public officer of a Mahometan court at Dacca. The action was brought at the instigation of an English attorney, in behalf of one Khyne, a servant or messenger, who had been fined and imprisoned for a misdemeanor, in which Jaggernaut had concurred in virtue of his office as judge of the Nizamut (the name of the Mahometan court just mentioned). The sheriff-officers attempted to arrest the judge as he sat on the tribunal; which could not fail to produce much disturbance. Jaggernaut, with his officers, denied the authority of the supreme court over the Nizamut, and refused to comply with the writ. The English sheriff-officers proceeded to force; and a violent scuffle ensuing, Jaggernaut's father was wounded in the head with a sword by one of the under-sheriff's attendants, while his brother-in-law was very dangerously wounded with a pistol bullet by the under-sheriff himself. The immediate consequence of this was an absolute refusal of the judge to take cognizance of any criminal matter; and this was intimated in a letter from the council at Dacca to the English governor and council of India; wherein they declared that all criminal justice was at a stand.

The supreme court, having proceeded in this arbitrary and oppressive manner for some time, at length attempted to extend their jurisdiction over the hereditary zemindars of Bengal. These are a kind of tributary lords, or great landholders, who are answerable to the company for the revenues or rents of the districts; and excepting the circumstances of remitting their revenues to the company, have not the least connection with the English in any respect. At the time we speak of, however, a writ upon an action of debt was issued out to arrest one of these zemindars in his palace. Timely notice, however, was given, by one of the company's collectors, of this attempt to the governor and council, and application made to protect a man of such quality from the disgrace of an arrest. They being unanimously of opinion that the zemindar was not within the jurisdiction of the court of Calcutta, desired him to pay no regard to the writ. The court, however, determined to enforce their process by a writ of sequestration; upon which the natives, who are superstitiously attached to their zemindars, rose in his defence, and insulted the sheriff's officers. The latter having obtained a reinforcement, the zemindar's palace was entered by 86 men armed with bludgeons, cutlasses, and muskets; the apartment of his women, always held inviolably sacred by the Asiatics, was broken open; his temple profaned; and the image which was the object of his worship, put into a basket, and carried off with some common lumber. This roused the attention of the governor and council; who, from a full conviction of the ruinous tendency of these proceedings, determined at last to oppose it force by force. They accordingly sent a party of military to apprehend the sheriff's people, and they were all conducted prisoners to Calcutta. The judges ordered attachments against the officers who commanded the troops, and against two other servants of the company; while the governor and council endeavoured to justify their proceedings, by writing to England as already mentioned.

Besides all this, the natives themselves testified their disapprobation of the conduct of the supreme court in very strong terms. A petition to his Britannic majesty was sent by the natives of Patna; in which are the following remarkable passages: "When the ordinances of this court of judicature were issued, as they were all contrary to the customs, modes, usages, and institutions, of this country, they occasioned terror in us; and day by day, as the powers of this court have become more established, our ruin, uneasiness, dishonour, and discredit, have accumulated; till at last we are reduced to such a situation, that we consider death to us as infinitely preferable to the dread we entertain of the court: for from this court no credit, no character is left to us, and we are now driven to the last extremity. Several who possessed means and ability, deeming flight as their only security, have banished themselves from the country; but bound as we are by poverty and inability, and fettered by the dearest ties of consanguinity, we do not all of us possess the means of flight, nor have we power to abide the oppression of this court."—"If, which God forbid! it should so happen, that this our petition should not be accepted, and should be rejected at the chamber of audience, those amongst us who have power and ability, discarding all affection for our families, will fly to any quarter we can; whilst the remainder, who have no means or ability, giving themselves up with pious resignation to their fate, will sit down in expectation of death."

These repeated complaints could not but be taken notice of in parliament. On the 12th of February 1781, General Smith made a motion in the house of commons, that the petition from the British inhabitants of Bengal, Bahar, and Orissa, should be taken into consideration by a select committee, consisting of 15 persons, chosen by ballot. In the introduction to his

his motion, he stated briefly the bad conduct of the supreme court in the particulars already related; and concluded, that the affairs of Bengal required the immediate attention and consideration of parliament. The matter was accordingly debated; when, after various proposals, a motion was at length made by General Smith, for leave to bring in a bill "to explain and amend so much of an act passed in the 13th year of his present majesty, for the better regulation of the East India Company, as related to the administration of justice in Bengal: and also to indemnify the governor and council of Bengal for having resisted by force of arms the execution of an order of the supreme court of judicature in that kingdom." Leave was accordingly given to bring in the bill. The house having resolved itself into a committee, Lord North observed, "that it had been much his wish that an agreement for the renewal of the company's charter had been made in an amicable manner; and that voluntary propositions should have come from themselves, offering terms for the benefit of the exclusive trade and the territorial acquisitions. No such terms, however, had been proposed, nor any agreement made. A negotiation had indeed taken place between him and the chairman and deputy-chairman; but the propositions made by them were neither such as the public might expect, nor had the company any right to them. With regard to the territorial possessions, he was clearly of opinion, that they of right belonged to the public; though how far it might be proper to allow the revenue of them to remain in the possession of the company was quite another matter. In his opinion it would be proper to allow it to remain in their hands as long as they possessed an exclusive trade, but he never would consent to forego the claim of the public. He made a motion, therefore, "that it was the opinion of the committee, that three-fourths of the surplus of the nett profits of the East India Company, ever since the company's bond debt was reduced to 1,500,000l. and the company's dividends had been eight per cent. per annum, belong to the public; and that 600,000l. in lieu thereof, and in discharge of all claims on that part of the public, be paid into his majesty's exchequer by instalments, in such manner, and at such times, as shall be agreed on." This proposal was vehemently opposed by the minority. Mr Burke called it the daring effort of a minister determined on rapine and plunder, without regard to truth, honour, or justice. Mr Hussey reprobated the idea of taking 600,000l. from the company in their circumstances at that time. He produced a paper full of arithmetical calculations, which he read to the house; asserting that they contained an exact state of the amount of the company's exports and imports, the expences of their trade at home, and the balance of profit of each year, for many years past, distinguishing the territorial from the commercial income and expences. From these he showed, that the commercial and territorial revenues of the company had, upon an average for 16 years, constituted a sum equivalent to a proportion of 16 per cent.; that 9 per cent. of this had arisen from the commercial profits accruing to the company; and therefore, that there had not been 8 per cent. divided upon that part of the profits to which the public had any claim or pretension. The accession of territorial possessions, he observed, had brought along with it additional expences; and the public had already received a very large share of the company's profits. He declared it to be his opinion, that the company should always make it a rule to give as ample and full relief to the public burdens as their situation would allow; and if they did this, he saw no reason why the minister should exact any more. Mr Dempster reminded the house of the consequences of violating the American charters; and added, that to tear from the company by force what was not stipulated in any act of parliament, would be a breach of public faith disgraceful to the nation, and such as would damp the spirit of enterprise and adventure, which had been productive of such happy effects.—Notwithstanding these remonstrances, however, the bill was at last passed into a law; only with this mitigation, that the company should pay only 400,000l. instead of 600,000l. demanded originally by the minister.—Another bill was also passed the same year, in consequence of the motion made by General Smith. This act declared, that the governor-general and council of Bengal were not subject to the jurisdiction of the supreme court, and indemnified the former for the resistance they had made to the orders of that court. It enacted also, that no person should be subject to the jurisdiction of that court on account of his being a landholder or farmer of land in the provinces of Bengal, Bahar, or Orissa; that no judicial officers in the country courts should be liable to actions in the supreme court for their decisions; and the two mufties, with Behader Beg, who were then in prison, in consequence of the decision of that court in the Patna cause, were ordered to be set at liberty.

The debates on this subject were attended with the most violent charges against the minister, and assertions the most humiliating and disgraceful to the British nation. Mr Townshend affirmed, that it was from the minister's screening the delinquents who came from India that all the evils in that quarter had originated; and if matters were suffered to go on in that country as they had done for some time past, the conduct of the British in the East Indies must be viewed in a light still more detestable than that of the Spaniards in America. It was reported, that the nabob of Arcot had several members in the house of commons! If it were true, that by sending over a sum of money to England he could seat eight or ten members in that house, then Mr Townshend declared, that in his opinion they were the most abject and contemptible beings in the world.—The bill for regulating the powers of the supreme court, also, though so evidently founded in reason and justice, did not pass without opposition, particularly from Mr Dunning; who was thought on this occasion to have allowed his regard for his friend Sir Elijah Impey, the chief justice, to bias him too much.

The regulations just mentioned did not yet put an end to the troubles of the East India Company, nor allay the ferment which had been so effectually excited. Their affairs were still a subject of parliamentary discussion; and in the month of April 1782, a motion was made by Mr Dundas, then lord advocate of Scotland, for taking into consideration the several reports concerning affairs, which had been made by the secret committee appointed to inquire into them during the last and present

present session of parliament. In his speech on this occasion, he remarked, that the opinion of Lord Clive had been against keeping too extensive a territory in that country. Instead of this he had restored Sujah Dowlah to the possession of his country; considering the British territories in Hindostan, with those on the coast of Coromandel and Bombay, as sufficient for all the purposes by which this country could be benefited; but instead of adhering to the maxims of sound policy laid down by his lordship, they had become so ambitious of extending their territories, that they had involved themselves in a war with almost all India. He then considered the finances of the company. The revenue of Bombay, he said, fell short of the necessary civil and military establishment by 200,000l. a-year, which was annually drawn from Bengal. With regard to that of Madras, it appeared on an average of 12 years, from 1767 to 1779, that there had been eight years of war and only four of peace; and that, during the whole time of war, the revenue had not been able to support the civil and military establishments; though in time of peace, it was able to do nearly one-half more. Bengal, however, was the most lucrative of all the East India settlements; but such had been the expences of the Mahratta war, that the governor-general had been obliged to contract a very large debt, insomuch, that it was doubtful whether the investments for England should be wholly or partially suspended. Mr Hastings, he said, had in many instances proved himself a very meritorious servant: but he wished that every one of their servants would consider himself as bound in the first place to prove a faithful steward to the company; not to fancy that he was an Alexander or Aurengzebe, and prefer frantic military exploits to the improvement of the trade and commerce of his country.—General Smith observed, that by the evidence produced to the committee, it appeared that there had been a variety of great abuses in India. Sir Elijah Impey, his majesty's chief justice in that country, had so far derogated from the character of a judge, as to accept of a place from the company; by which means he was brought under their controul, and consequently allowed himself to be deprived of that independence which he ought to possess as a judge. Justice had been so partially administered, that several worthy and respectable persons had been imprisoned, some had been ruined, and others died in jail. From all which considerations he moved, that the affairs of the company ought to be taken into consideration by a committee of the whole house. Some hints were thrown out by Mr Dundas, that the territorial possessions in the East ought to be taken from the company entirely, and put under the direction of the crown; but this was opposed by Mr Fox, as furnishing ministers with such ample means of corruption and undue influence, as might overthrow the constitution entirely. For this reason, he thought it would be more prudent to leave the appointment of its own servants to the company; but at the same time to keep a watchful eye over them, in order to be able to punish and remove those who should be found delinquent.

The house having resolved itself into a committee, a motion was made by General Smith, "That Warren Hastings, Esq. governor-general of Bengal, and Sir Elijah Impey, the chief justice, appear to have been concerned, the one in giving, the other in receiving, an office not agreeable to the late act for regulating the company's affairs; which unjustifiable transaction was attended with circumstances of evil tendency and example." Resolutions were also passed for ascertaining more distinctly the powers of the governor-general and council of Bengal; and votes of censure against Laurence Sullivan, Esq. chairman of the East India Company, for having neglected to transmit to India an act for explaining and amending the act for regulating the affairs of the company, and for the relief of certain persons imprisoned at Calcutta. Among the number of this gentleman's transgressions, also, was his imposing an oath of secrecy on Mr Wilkes, one of the company's clerks; and especially his restraining him from giving information to a select committee of the house of commons.

Mr Dundas having made several motions tending to criminate Sir Thomas Rumbold, formerly governor of Bengal, a bill was brought in and passed into a law, for restraining him and Peter Perring, Esq. from going out of the kingdom for the space of one year, for discovering their estates, &c. An address was also presented to the king, requesting him to recal Sir Elijah Impey from India, in order to answer for high crimes and misdemeanours. A number of other resolutions were now passed by the house, in consequence of motions by Mr Dundas, and which were founded on the reports of the secret committee. Among these it was resolved, "That the orders of the court of directors of the East India Company, which have conveyed to their servants abroad a prohibitory condemnation of all schemes of conquest and enlargement of dominion, by prescribing certain rules and boundaries for the operation of their military force, were founded no less in wisdom and policy than in justice and moderation. That every transgression of these orders, without evident necessity, by any of the several governments in India, has been highly reprehensible, and tended in a great degree to weaken the force and influence, and to diminish the influence of the company in those parts. That every interference of the company as a party in the domestic or national quarrels of the country powers, and all new engagements with them in offensive alliance, have been wisely and providentially forbidden by the company in their commands to their administrations in India. That every unnecessary deviation from these rules should be severely reproved and punished. That the maintenance of an inviolable character for moderation, good faith, and scrupulous regard to treaty, ought to have been the simple grounds on which the British government should have endeavoured to establish an extensive influence, superior to that of other Europeans; and that the danger and discredit arising from the forfeiture of this pre-eminence, could not be compensated by the temporary success of any plan of violence and injustice. That should any relaxation take place, without sufficient cause, in those principles of good government on the part of the directors themselves, it would bring upon them, in a heavier degree, the resentment of the legislative power of their country. That the conduct of the company, and their servants in India, in various instances specified, was contrary to accounts to the court of proprietors; and at the beginning of every session, a state of their accounts and establishments to both houses of parliament. Their number was limited to seven; but they were to be assisted by a board of nine persons, each of them possessed of 2000l. company's stock; who, as well as the commissioners, were to be appointed in the first instance by parliament, and ever afterwards by the court of proprietors. They were also to be removeable at the pleasure of any five commissioners, and were disqualified from sitting in the house of commons. The whole system of government thus proposed, was to continue for the space of three or five years.

This was accompanied with another bill, the professed design of which was to preclude all arbitrary and despotic proceedings from the administration of the company's territorial possessions. By this the powers of the governor-general and supreme council were ascertained more exactly than had hitherto been done: it deprived the governor-general of all power of acting independent of his council; proscribed the delegation of any trust; and declared every British power in the East incompetent to the acquisition or exchange of any territory in behalf of the company, to the acceding to any treaty of partition, the hiring out of the company's troops, the appointing to office any person removed for misdemeanour, or to the hiring out any property to a civil servant of the company. By this also monopolies were entirely abolished; and illegal presents recoverable by any person for his sole benefit. The principal part of the bill, however, related to the zemindars, or native landholders, who were now to be secured by every possible means in the possession of their respective inheritances, and defended in all cases from oppression. Lastly, a mode was presented for terminating the disputes between the nabob of Arcot and the rajah of Tanjore; disqualifying every person in the service of the company from sitting in the house of commons during his continuance in their service, and for a certain specified time after his demission.

During the course of the debates on this bill, Mr Fox set forth the affairs of the company as in the most desperate situation. They had asked leave, he said, the year before, to borrow 500,000l. upon bonds; had petitioned for 300,000l. in exchequer bills; and for the suspension of a demand of 700,000l. due to government for customs. He took notice also, that, according to an act of parliament still in force, the directors could not, by their own authority, accept bills to the amount of more than 300,000l.; under which circumstances it would no doubt surprise the house to be informed, that bills were now coming over for acceptance to the amount of 2,000,000l. It was evidently, therefore, and indispensably necessary, that government should interfere in the affairs of the company to save them from certain bankruptcy. He stated their actual debt at no less than 11,200,000l. while their stock in hand did not exceed 3,200,000l. There was therefore a deficiency of 8,000,000l.; a most alarming sum when compared with the company's capital. Unless speedily assisted, therefore, they must inevitably be ruined; and the ruin of a company of merchants so extensive in their concerns, and of such importance in the eyes of all Europe, could not but give a very severe blow to the national credit. On the other hand, the requisite assistance was a matter of very extensive consideration. It would be absolutely necessary to permit the acceptance of the bills to the above-mentioned amount; and to do this without regulating their affairs, and reforming the abuses of their government, would only be to throw away the public money.

The conduct of the company's servants, and of the company itself, was now arraigned by Mr Fox in the most severe terms; and their misconducts were pointed out under their following heads:

1. With regard to Mr Hastings.—The chairman of the committee had moved in the house of commons, that it was the duty of the company to recal that gentleman; to which motion the house had agreed. In obedience to this resolution, the directors had agreed that Mr Hastings should be recalled; but supposing this to be a matter rather beyond their jurisdiction, they had submitted their determination to a court of proprietors, who rescinded the resolution of the directors: and after this the whole affair came to be laid before the house of commons. In the mean time every thing was anarchy and confusion in the East, owing to this unsettled conduct with regard to the governor; as the whole continent had been made acquainted with the resolution of the house for recalling him, while that of the proprietors for continuing him in his office was kept a secret. The proprietors had also been guilty of another contradiction in this respect, as they had voted their thanks to Mr Hastings for his conduct in India. Hence Mr Fox was led to comment on the nature of the company's connexions with their servants abroad, as well as on the character of the company themselves. Among the former, he said, there were a few, who, being proprietors themselves, endeavoured to promote the trade of the company, and increase its revenues. The views of the rest were otherwise directed; and from the difference in speculation between the two parties, the former were inclined to support that governor who enabled them to make large dividends; and who, for that reason, after having peculated for his own advantage, was obliged to do the same for the benefit of the proprietors. The latter, therefore, could not better gratify their wishes, than by supporting a governor who had in his power so many opportunities of providing for his friends.

2. The next charge was against the servants of the company, whom he accused of a regular and systematic disobedience to the orders of the proprietors.—The supreme council of Bengal, he said, had resolved, in opposition to Mr Hastings, to send two gentlemen, Mr Fowke and Mr Bristow, the one to reside with the nabob of Oude, the other at Benares. Mr Hastings, however, refused to send them; the directors transmitted the most positive orders to carry the vote of the supreme council into execution; but still Mr Hastings disobeyed; alleging in his defence, that he could not employ persons in whom he had no confidence. Afterwards, however, Mr Hastings seemed to contradict himself in a very curious manner. He granted Mr Fowke a contract, with a commission of 5 per cent.; which, he observed, was a great sum, and might operate as a temptation to prolong the war.

"But

gave. To the former part he must inevitably agree. That the act of 1784 gave to the board of controul complete authority, had always been his opinion. For that reason he had opposed it; but entertaining that opinion, he must justify the present bill, which in his mind was a true declaration of the fact. He could not but equally approve of the restraints that were proposed upon the exercise of patronage. Patronage was inseparable from power. But when he saw the industry with which it was limited, and ministers were tied down from the abuse of it, he could not view the present measure with the same jealousy with which he was accustomed to regard propositions for extending the power of the crown. The bill at length passed.

From this period no material change took place in the constitution of the company till 1813. Their charter being then nearly expired, a bill was brought into parliament by Lord Castlereagh, 22d March, renewing the charter for 20 years. By this bill the company was continued in the possession of all its old territories and new acquisitions, and of the exclusive trade to China. But the trade to the ports within the company's limits, China excepted, was thrown open on certain specified conditions. The directors were bound to grant a license, on application, to ships trading to the settlements of Fort William, Fort St George, Bombay, and Prince of Wales island; those trading to other places require a special license, which the directors might grant or refuse, but under appeal to the board of controul. The act farther provided a church establishment for India, specified the purposes to which the company's revenue was to be applied, and limited the annual dividends to 10 per cent. till a certain fund was exhausted. The change made by this act has not disappointed the expectations formed. The price of Indian commodities has fallen, and the amount of the trade has nearly doubled.

3. *Hudson's Bay Company.* The vast countries which surround Hudson's Bay abound with animals whose furs and skins are excellent, being far superior in quality to those found in less northerly regions. In 1670, a charter was granted to a company, which does not consist of above nine or ten persons, for the exclusive trade to this bay; and they have acted under it ever since with great benefit to themselves. The company employ four ships and 130 seamen. They have several forts, viz. Prince of Wales's fort, Churchill river, Nelson, New Severn, and Albany, which stand on the west side of the bay, and are garrisoned by 186 men. The French, in May 1782, took and destroyed these forts, and the settlements, &c. valued at 500,000l. They export commodities to the value of 16,000l. and bring home returns to the value of 29,340l. which yield to the revenue 3734l. This includes the fishery in Hudson's Bay. This commerce, small as it is, affords immense profits to the company, and even some advantages to Great Britain in general; for the commodities we exchange with the Indians for their skins and furs, are all manufactured in Britain; and as the Indians are not very nice in their choice, such things are sent of which we have the greatest plenty, and which, in the mercantile phrase, are drugs with us. Though the workmanship too happens to be in many respects so deficient that no civilized people would take it off our hands, it may be admired among the Indians: On the other hand, the skins and furs we bring from Hudson's Bay, enter largely into our manufactures, and afford us materials for trading with many nations of Europe to great advantage. These circumstances tend to prove incontestably the immense benefit that would redound to Great Britain, by throwing open the trade to Hudson's Bay, since even in its present restrained state it is so advantageous. This company, it is probable, do not find their trade so advantageous now as it was before we got possession of Canada. The only attempt made to trade with Labrador has been directed towards the fishery, the annual produce of which exceeds 49,000l.

The above are the principal trading companies presently subsisting in Great Britain; but to the number might have been added one of vast importance, the *Scotch Darien Company*, had it not been for the crooked and pusillanimous policy of the English ministry at the time. For an account of which, see the article Darien.

Greenland Company. See Greenland.
Banking Companies. See Bank.

Of establishments similar to the above in other countries, the following belonging to the Dutch and French, may be mentioned as the most important.

I. Dutch Companies. 1. Their East India company had its rise in the midst of the struggle which that people had for their liberty: for the Spaniards having forbidden all commerce with them, and shut up all their ports, necessity inspired some Zealanders to seek a north-east passage to China.

This enterprise proving unsuccessful to three several armaments in 1594, 1595, and 1596, a second company was formed, under the name of the *Company of Remote Parts;* which, in 1597, took the ordinary route of the Portuguese to the Indies, and returned in two years and a half's time with little gain but good hopes.

This company, and a new one just established at Amsterdam, being united, equipped other fleets; and these occasioned other companies at Amsterdam, Rotterdam, in Zealand, &c. insomuch that the states soon began to apprehend they might be prejudicial to each other. Under this concern, they called all the directors of the several companies together, who all consented to an union, the treaty whereof was confirmed by the states in 1602; a very remarkable epocha, as being that of the most solid and celebrated establishment of commerce that ever was in the world.

Its first capital was six million six hundred thousand guilders. It had sixty directors, divided into several chambers; twenty in that of Amsterdam, twelve in that of Zealand, fourteen in that of Delft and Rotterdam, and a like number in those at Sluys and Horn. As each grant expires, the company is obliged to procure a new one, which it has already done five times since the first, paying a considerable sum each time. The last application was in 1773, when the company, after stating that its trade had declined, solicited the states-general to grant a diminution of the sum formerly paid for the renewal of the charter. Upon this representation their high mightinesses, in order to have time to inquire into the matter, prolonged the charter sissipi, he was killed in one of them by a party who mutinied against him; whereupon the colony was dispersed and lost. M. Hiberville afterwards succeeded better. He found the Mississippi, built a fort, and settled a French colony there; but he being poisoned, it is said, by the intrigues of the Spaniards, who feared such a neighbour, in 1712 M. Crozat had the whole property of trading to the French territories called *Louisiana* granted him for 15 years.

4. *Company of the West*. In 1717, the Sieur Crozat surrendered this grant; and in the same year a new company was erected under the title of *Company of the West*: to which, besides every thing granted to the former company, was added the commerce of beaver, enjoyed by the Canada company from the year 1706, but expiring in 1717. In this establishment, an equal view was had to the finances and the commerce of the nation; and, accordingly, part of the conditions of its establishment regarded the settling a colony, a trade, &c.; the other the vending part of the bills, called *bills of state*, which could no longer subsist on their present footing. The former are no more than are usual in such establishments: for the latter, the actions are fixed at 500 livres, each payable in bills of state; the actions to be esteemed as merchandise, and in that quality to be bought, sold, and trafficked. The bills of state, which make the fund of the actions, to be converted into yearly revenue. To put the finishing hand to the company, in 1717, its fund was fixed at an hundred millions of livres; which being filled, the cash was shut up.

5. *India Company*. The junction of the former company with that of Canada was immediately followed by its union with that of Senegal, both in the year 1718, by an arret of council: which at the same time granted the new company the commerce of beavers, and made it mistress of the negro or Guinea trade to the French colonies in America.

Nothing was now wanting to its perfection but an union with the East India company, and with those of China and St Domingo; which was effected, with the two first in 1719, and with the third in 1720. This union of the East India and China company with the company of the West, occasioned an alteration of the name; and it was henceforth called the *India Company*.

The reasons of the union were, the inability of the two former to carry on their commerce; the immense debts they had contracted in the Indies, especially the East Company, complaints whereof had been sent to court by the Indians, which discredited the company so that they durst not appear any longer at Surat; the little care they took to discharge their engagements; and their having transferred their privilege to the private traders of St Malo, in consideration of a tenth in the profits of the returns of their ships.

The ancient actions of the company of the West, which were not at par when this engraftment was projected, before it was completed, were risen to 300 per cent.; which unexpected success gave occasion to conclude the new actions of the united companies would not bear less credit. The concourse of subscribers was so great, that in a month's time there were above fifty millions subscribed for; the first twenty-five million actions which were granted to the India company, beyond the hundred millions of stock allowed the company of the West, being filled as soon as the books were opened; to satisfy the earnestness of the subscribers, the stock was increased by several arrets to three hundred millions. Credit still increasing, the new actions rose to 1200 per cent. and those of the ancient company of the West to 1900 per cent.; an exorbitant price, to which no other company ever rose. Its condition was now so flourishing, that in 1719 it offered the king to take a lease of all his farms for nine years at the rate of three millions five hundred thousand livres per annum more than had been given before; and also to lend his majesty twelve hundred millions of livres to pay the debts of the state. These offers were accepted; and the king, in consideration hereof, granted them all the privileges of the several grants of the companies united to that company to the year 1770; on condition, however, of discharging all the debts of the Old East India Company, without any deduction at all. The loan of twelve hundred millions not being sufficient for the occasion of the state, was augmented, three months afterwards, with three hundred millions more; which, with the former loan, and another of one hundred millions before, made sixteen hundred millions, for which the king was to pay interest at the rate of three per cent.

The duke of Orleans, in February 1720, did the company the honour to preside in their assembly, where he made several proposals to them on the part of the king: the principal of these was, that they should take on them the charge and administration of the royal bank. This was accepted of: and Mr Law, comptroller-general of the finances, was named by the king inspector-general of the India Company and bank united.

This union, which, it was proposed, should have been a mutual help to both those famous establishments, proved the fatal point from whence the fall of both commenced: from this time, both the bank bills and the actions of the company began to fall. In effect, the first perished absolutely, and the other had been drawn along with it but for the prudent precautions taken for its support.

The first precaution was the revoking the office of inspector-general, and the obliging Mr Law to quit the kingdom; the ancient directors were discarded, and new ones substituted; and to find the bottom of the company's affairs, it was ordered they should give an account of what they had received and disbursed, both on the account of the company and of the bank, which they had had the management of near a year. Another precaution to come at the state of the company was, by endeavouring to distinguish the lawful actionaries from the Mississippi extortioners; whose immense riches, as well as their criminal address in realizing their actions either into specie or merchandise, were become so fatal to the state, in order, if possible, to secure the honest adventurers in their stock. To this end, an inquisition was made into their books, &c. by persons appointed by the king; and the new directors, or as they were called, *regisseurs*, began seriously to look about for their commerce abroad. Their affairs, however, declined, and at length sunk into a ruined and bankrupt state about the year 1769. The king

Company. or by night, at the solicitation of the directors, to search for prohibited goods which were to be confiscated to the use of the company. These kinds of visits of the officers of revenue, hitherto unauthorized in France, were represented as peculiarly obnoxious, when they were made for the sole benefit of a privileged monopoly.

Company || Comparison.

COMPANY, in military affairs, a small body of foot, commanded by a captain, who has under him a lieutenant and ensign.

The number of sentinels or private soldiers in a company is from 50 to 100; and a battalion or regiment consists of 9, 10, or 11, such companies, one of which is always grenadiers, and posted on the right; next them stands the colonel's company, and on the left the light infantry company. Companies not incorporated into regiments are called *irregulars*, or *independent companies*.

Artillery COMPANY. See ARTILLERY.

COMPANY *of Ships*, a fleet of merchantmen, who make a charter-party among themselves; the principal conditions whereof usually are, that certain vessels shall be acknowledged admiral, vice-admiral, and rear-admiral; that such and such signals shall be observed; that those which bear no guns shall pay so much per cent. of their cargo; and in case they be attacked, that what damages are sustained shall be reimbursed by the company in general. In the Mediterranean such companies are called *conserves*.

COMPARATIVE ANATOMY, is that branch of anatomy which considers the secondary objects, or the bodies of other animals; serving for the more accurate distinctions of several parts, and supplying the defect of human subjects.

It is otherwise called *the anatomy of beasts*, and sometimes *zootomy;* and stands in contradistinction to human anatomy, or that branch of the art which considers the human body the primary object of anatomy. See ANATOMY.

COMPARATIVE *Degree*, among grammarians, that between the positive and superlative degrees, expressive of any particular quality above or below the level of another.

COMPARISON, in a general sense, the consideration of the relation between two persons or things, when opposed to each other, by which we judge of their agreement or difference.

COMPARISON *of Ideas*, an act of the mind, whereby it compares its ideas one with another, in respect of extent, degree, time, place, or any other circumstances. See IDEA.

COMPARISON, in *Grammar*, the inflection of the comparative degree. See GRAMMAR.

COMPARISON, in *Rhetoric*, is a figure whereby two things are considered with regard to some third, which is common to them both.

Instruction is the principal, but not the only end of comparison. It may be employed with success in putting a subject in a strong point of view. A lively idea is formed of a man's courage by likening it to that of a lion; and eloquence is exalted in our imagination by comparing it to a river overflowing its banks, and involving all in its impetuous course. The same effect is produced by contrast: a man in prosperity becomes more sensible of his happiness, by comparing his condition with that of a person in want of bread. Thus comparison is subservient to poetry as well as to philosophy.

Comparisons serve two purposes: when addressed to the understanding, their purpose is to instruct; when to the heart, their purpose is to please. Various means contribute to the latter: 1st, The suggesting some unusual resemblance or contrast *; 2d, The setting an object in the strongest light; 3d, The associating an object with others that are agreeable; 4th, The elevating an object; and, 5th, The depressing it. And that comparisons may give pleasure by these various means, will be made evident by examples which shall be given, after premising some general observations.

* See the article RESEMBLANCE and Dissimilitude.

Objects of different senses cannot be compared together; for such objects are totally separated from each other, and have no circumstance in common to admit either resemblance or contrast. Objects of hearing may be compared together, as also of taste, of smell, and of touch; but the chief fund of comparison are objects of sight; because in writing or speaking, things can only be compared in idea, and the ideas of sight are more distinct and lively than those of any other sense.

When a nation emerging out of barbarity begins to think of the fine arts, the beauties of language cannot long lie concealed; and when discovered, they are generally, by the force of novelty, carried beyond all bounds of moderation. Thus, in the earliest poems of every nation, we find metaphors and similes founded on the slightest and most distant resemblances, which, losing their grace with their novelty, wear gradually out of repute; and now, by the improvement of taste, no metaphor nor simile is admitted into any polite composition but of the most striking kind. To illustrate this observation, a specimen shall be given afterward of such metaphors as we have been describing: with respect to similes take the following specimen:

> "Behold, thou art fair, my love: thy hair is as "a flock of goats that appear from Mount Gilead: "thy teeth are like a flock of sheep from the washing, every one bearing twins: thy lips are like "a thread of scarlet: thy neck like the tower of "David built for an armoury, whereon hang a "thousand shields of mighty men: thy two breasts "like two young roes that are twins, which feed "among the lilies: thy eyes like the fish-pools in "Hesbon, by the gate of Bath-rabbim: thy nose "like the tower of Lebanon, looking toward Da-"mascus." *Song of Solomon.*

> "Thou art like snow on the heath; thy hair like "the mist of Cromla, when it curls on the rocks "and shines to the beam of the west: thy breasts "are

Compari- son.

"are like two smooth rocks seen from Branno of the "streams: thy arms like two white pillars in the "hall of the mighty Fingal." *Fingal.*

It has no good effect to compare things by way of simile that are of the same kind; nor to contrast things of different kinds. The reason is given in the article above cited on the margin, and shall be here illustrated by examples. The first is a comparison built upon a resemblance so obvious as to make little or no impression. Speaking of the fallen angels searching for mines of gold:

A numerous brigade hasten'd: as when bands
Of pioneers with spade and pickaxe arm'd,
Forerun the royal camp to trench a field
Or cast a rampart. *Milton.*

The next is of things contrasted that are of different kinds.

Queen. What, is my Richard both in shape and mind
Transform'd and weak? Hath Bolingbroke depos'd
Thine intellect? Hath he been in thy heart?
The lion, dying, thrusteth forth his paw,
And wounds the earth, if nothing else, with rage
To be o'erpower'd: and wilt thou, pupil like,
Take thy correction mildly, kiss the rod,
And fawn on rage with base humility?
Richard II. Act v. sc. 1.

This comparison has scarce any force: a man and a lion are of different species, and therefore are proper subjects for a simile; but there is no such resemblance between them in general, as to produce any strong effect by contrasting particular attributes or circumstances.

A third general observation is, That abstract terms can never be the subject of comparison, otherwise than by being personified. Shakespeare compares adversity to a toad, and slander to the bite of a crocodile; but in such comparisons these abstract terms must be imagined sensible beings.

To have a just notion of comparisons, they must be distinguished into two kinds; one common and familiar, as where a man is compared to a lion in courage, or to a horse in speed; the other more distant and refined, where two things that have in themselves no resemblance or opposition, are compared with respect to their effects. There is no resemblance between a flower-pot and a cheerful song; and yet they may be compared with respect to their effects, the emotions they produce in the mind being extremely similar. There is as little resemblance between fraternal concord and precious ointment; and yet observe how successfully they are compared with respect to the impressions they make.

"Behold, how good and how pleasant it is for "brethren to dwell together in unity. It is like the "precious ointment upon the head, that ran down "upon Aaron's beard, and descended to the skirts "of his garment." *Psalm* 133.

For illustrating this sort of comparison, we shall add some more examples:

"Delightful is thy presence, O Fingal! it is like "the sun on Cromla, when the hunter mourns his "absence for a season, and sees him between the "clouds.

"Did not Ossian hear a voice? or is it the sound "of days that are no more? Often, like the evening "sun, comes the memory of former times on my "soul.

"His countenance is settled from war; and is "calm as the evening-beam, that from the cloud of "the west looks on Cona's silent vale." *Fingal.*

We now proceed to illustrate, by particular instances, the different means by which comparisons, whether of the one sort or the other, can afford pleasure; and, in the order above established, we shall begin with such instances as are agreeable, by suggesting some unusual resemblance or contrast.

Sweet are the uses of Adversity,
Which, like the toad, ugly and venomous,
Wears yet a precious jewel in her head.
As you like it, Act ii. sc. 1.

See, how the morning opes her golden gates,
And takes her farewel of the glorious sun;
How well resembles it the prime of youth,
Trimm'd like a yonker prancing to his love.
Second Part Henry VI. Act ii. sc. 1.

Thus they their doubtful consultations dark
Ended, rejoicing in their matchless chief:
As when from mountain tops, the dusky clouds
Ascending, while the North-wind sleeps, o'erspread
Heav'n's cheerful face, the lowering element
Scowls o'er the darken'd landscape, snow, and shower;
If chance the radiant sun with farewel sweet
Extends his ev'ning-beam, the fields revive,
The birds their notes renew, and bleating herds
Attest their joy, that hill and valley rings.
Paradise Lost, Book ii.

None of the foregoing similes tend to illustrate the principal subject, and therefore the chief pleasure they afford must arise from suggesting resemblances that are not obvious; for undoubtedly a beautiful subject introduced to form the simile affords a separate pleasure, which is felt in the similes mentioned, particularly in that cited from Milton.

The next effect of a comparison in the order mentioned, is to place an object in a strong point of view; which effect is remarkable in the following similes.

As when two scales are charg'd with doubtful loads,
From side to side the trembling balance nods,
(While some laborious matron, just and poor,
With nice exactness weighs her woolly store),
Till pois'd aloft, the resting beam suspends
Each equal weight; nor this nor that descends;
So stood the war, till Hector's matchless might,
With fates prevailing, turn'd the scale of fight.
Fierce as a whirlwind up the wall he flies,
And fires his host with loud repeated cries.
Iliad, Book xii. 521.

——— She never told her love;
But let concealment, like a worm i' th' bud,

Feed on her damask cheek: she pin'd in thought;
And with a green and yellow melancholy,
She sat like Patience on a monument,
Smiling at grief. *Twelfth Night*, Act. ii. sc. 6.

"There is a joy in grief when peace dwells with "the sorrowful. But they are wasted with mourn-"ing, O daughter of Toscar, and their days are "few. They fall away like the flower on which "the sun looks in his strength, after the mildew has "passed over it, and its head is heavy with the drops "of night." *Fingal.*

——— Out, out, brief candle!
Life's but a walking shadow, a poor player,
That struts and frets his hour upon the stage,
And then is heard no more.
Macbeth, Act. v. sc. 5.

O thou goodness,
Thou divine nature! how thyself thou blazon'st
In these two princely boys! they are as gentle
As zephyrs blowing below the violet,
Not wagging his sweet head; and yet as rough
(Their royal blood inchaf'd) as the rudest wind,
That by the top doth take the mountain-pine,
And make him stoop to the vale.
Cymbeline, Act iv. sc. 4.

"Why did not I pass away in secret, like the "flower of the rock that lifts its fair head unseen, "and strows its withered leaves on the blast?"
Fingal.

As words convey but a faint and obscure notion of great numbers, a poet, to give a lively notion of the object he describes, with regard to number, does well to compare it to what is familiar and commonly known. Thus Homer compares the Grecian army in point of number to a swarm of bees; in another passage he compares it to that profusion of leaves and flowers which appear in the spring, or of insects in a summer's evening: And Milton,

——— As when the potent rod
Of Amram's son in Egypt's evil day
Wav'd round the coast, up call'd a pitchy cloud
Of locusts, warping on the eastern wind,
That o'er the realm of impious Pharaoh hung
Like night, and darken'd all the land of Nile;
So numberless were those bad angels seen,
Hov'ring on wing under the cope of hell,
'Twixt upper, nether, and surrounding fires.
Paradise Lost, Book i.

Such comparisons have, by some writers, been condemned for the lowness of the images introduced, but surely without reason; for with regard to numbers, they put the principal subject in a strong light.

The foregoing comparisons operate by resemblance; others have the same effect by contrast.

York. I am the last of noble Edward's sons,
Of whom thy father, prince of Wales, was first;
In war, was never lion rag'd more fierce;
In peace, was never gentle lamb more mild,
Than was that young and princely gentleman.
His face thou hast, for even so look'd he,
Accomplish'd with the number of thy hours,
But when he frown'd, it was against the French,
And not against his friends. His noble hand
Did win what he did spend; and spent not that
Which his triumphant father's hand had won.
His hands were guilty of no kindred's blood,
But bloody with the enemies of his kin.
Oh Richard, York is too far gone with grief,
Or else he never would compare between.
Richard II. Act ii. sc. 3.

Milton has a peculiar talent in embellishing the principal subject, by associating it with others that are agreeable; which is the third end of a comparison. Similes of this kind have, beside, a separate effect: they diversify the narration by new images that are not strictly necessary to the comparison; they are short episodes, which, without drawing us from the principal subject, afford great delight by their beauty and variety.

He scarce had ceas'd, when the superior fiend
Was moving toward the shore; his pond'rous shield,
Ethereal temper, massy, large, and round,
Behind him cast: the broad circumference
Hung on his shoulders like the moon, whose orb
Through optic glass the Tuscan artist views
At evening from the top of Fesole.
Or in Valdarno, to descry new lands,
Rivers, or mountains, in her spotty globe.
Milton, Book i.

——— Thus far these beyond
Compare of mortal prowess, yet observ'd
Their dread commander. He, above the rest,
In shape and stature proudly eminent,
Stood like a tow'r; his form had not yet lost
All her original brightness, nor appear'd
Less than archangel ruin'd, and th' excess
Of glory obscur'd: as when the sun new-risen
Looks through the horizontal misty air
Shorn of his beams; or, from behind the moon,
In dim eclipse, disastrous twilight sheds
On half the nations, and with fear of change
Perplexes monarchs. *Milton*, Book i.

As when a vulture on Imaus bred,
Whose snowy ridge the roving Tartar bounds,
Dislodging from a region scarce of prey
To gorge the flesh of lambs, or yeanling kids,
On hills where flocks are fed, flies toward the springs
Of Ganges or Hydaspes, Indian streams,
But in his way lights on the barren plains
Of Sericana, where Chineses drive
With sails and wind their cany waggons light:
So on this windy sea of land, the fiend
Walk'd up and down alone, bent on his prey.
Milton, Book iii.

Next of comparisons that aggrandise or elevate. These affect us more than any other sort; the reason of which will be evident from the following instances:

As when a flame the winding valley fills,
And runs on crackling shrubs between the hills,
Then o'er the stubble up the mountain flies,
Fires the high woods, and blazes to the skies,

This

Comparison.

This way and that, the spreading torrent roars;
So sweeps the hero through the wasted shores.
Around him wide, immense destruction pours,
And earth is delug'd with the sanguine show'rs.
Iliad. xx. 569.

Methinks, King Richard and myself should meet
With no less terror than the elements
Of fire and water, when their thund'ring shock,
At meeting, tears the cloudy cheeks of heaven.
Richard II. Act. iii. sc. 5.

"As rusheth a foamy stream from the dark shady "steep of Cromla, when thunder is rolling above, and "dark brown night rests on the hill; so fierce, so vast, "so terrible, rush forward the sons of Erin. The "chief, like a whale of ocean followed by all its bil-"lows, pours valour forth as a stream, rolling its might "along the shore." *Fingal*, Book i.

"As roll a thousand waves to a rock, so Swaran's "host came on; as meets a rock a thousand waves, so "Inisfail met Swaran." *Ibid.*

The last article mentioned, is that of lessening or depressing a hated or disagreeable object; which is effectually done by resembling it to any thing low or despicable.

Thus Milton, in his description of the rout of the rebel-angels, happily expresses their terror and dismay in the following simile:

——————— As a herd
Of goats or timorous flock together throng'd,
Drove them before him thunder-struck, pursu'd
With terrors and with furies to the bounds
And crystal wall of heav'n, which op'ning wide,
Roll'd inward, and a spacious gap disclos'd
Into the wasteful deep; the monstrous sight
Struck them with horror backward, but far worse
Urg'd them behind; headlong themselves they threw
Down from the verge of heav'n. *Milton*, Book vi.

By this time the different purposes of comparison, and the various impressions it makes on the mind, are sufficiently illustrated by proper examples. This was an easy work. It is more difficult to lay down rules about the propriety or impropriety of comparisons; in what circumstances they may be introduced, and in what circumstances they are out of place. It is evident, that a comparison is not proper upon every occasion: a man in his cool and sedate moments is not disposed to poetical flights, nor to sacrifice truth and reality to the delusive operations of the imagination; far less is he so disposed when oppressed with care, or interested in some important transaction that occupies him totally. On the other hand it is observed, that a man, when elevated or animated by any passion, is disposed to elevate or animate all his subjects; he avoids familiar names, exalts objects by circumlocution and metaphor, and gives even life and voluntary action to inanimate beings. In this warmth of mind, the highest poetical flights are indulged, and the boldest similes and metaphors relished. But without soaring so high, the mind is frequently in a tone to relish chaste and moderate ornament; such as comparisons that set the principal object in a strong point of view, or that embellish and diversify the narration. In general, when by any animating passion, whether pleasant or painful, an impulse is given to the imagination; we are in that condition disposed to every sort of figurative expression, and in particular to comparisons. This in a great measure is evident from the comparisons already mentioned; and shall be further illustrated by other instances. Love, for example, in its infancy, rousing the imagination, prompts the heart to display itself in figurative language, and in similes:

Troilus. Tell me, Apollo, for thy Daphne's love,
What Cressida is, what Pandar, and what we?
Her bed is India, there she lies a pearl:
Between our Ilium and where she resides,
Let it be call'd the wild and wand'ring flood;
Ourself the merchant, and this sailing Pandar
Our doubtful hope, our convoy, and our bark.
Troilus and Cressida, Act i. sc. 1.

Again:

Come, gentle night; come, loving black-brow'd night!
Give me my Romeo: and when he shall die,
Take him and cut him out in little stars,
And he will make the face of heav'n so fine,
That all the world shall be in love with night,
And pay no worship to the garish sun.
Romeo and Juliet, Act iii. sc. 4.

But it will be a better illustration of the present head, to give examples where comparisons are improperly introduced. Similes are not the language of a man in his ordinary state of mind, dispatching his daily and usual work: for that reason the following speech of a gardener to his servant is extremely improper:

Go, bind thou up yon dangling apricots,
Which, like unruly children make their sire
Stoop with oppression of their prodigal weight:
Give some supportances to the bending twigs.
Go thou, and, like an executioner,
Cut off the heads of two fast growing sprays,
That look too lofty in our commonwealth:
All must be even in our government.
Richard II. Act iii. sc. 7.

The fertility of Shakespeare's vein betrays him frequently into this error.

Rooted grief, deep anguish, terror, remorse, despair, and all the severe dispiriting passions, are declared enemies, perhaps not to figurative language in general, but undoubtedly to the pomp and solemnity of comparison. Upon this account, the simile pronounced by young Rutland, under terror of death from an inveterate enemy, and praying mercy, is unnatural:

So looks the pent-up lion o'er the wretch
That trembles under his devouring paws;
And so he walks insulting o'er his prey,
And so he comes to rend his limbs asunder.
Ah, gentle Clifford, kill me with thy sword,
And not with such a cruel threat'ning look.
Third Part Henry VI. Act i. sc. 5.

A man spent and dispirited after losing a battle is not disposed to heighten or illustrate his discourse by similes.

York. With this we charg'd again: but out! alas,
We bodg'd again; as I have seen a swan
With bootless labour swim against the tide,
And spend her strength with over-matching waves.
Ah! hark, the fatal followers do pursue,
And I am faint and cannot fly their fury.
The sands are number'd that make up my life;
Here must I stay, and here my life must end.
Third Part Henry VI. Act. i. sc. 6.

Similes thus unseasonably introduced are finely ridiculed in the Rehearsal.

"*Bayes.* Now here she must make a simile.
"*Smith.* Where's the necessity of that, Mr Bayes?
"*Bayes.* Because she's surprised; that's a general "rule; you must ever make a simile when you are sur-"prised; 'tis a new way of writing."

A comparison is not always faultless, even where it is properly introduced. A comparison, like other human productions, may fall short of its end; of which defect instances are not rare even among good writers: and to complete the present subject, it will be necessary to make some observations upon such faulty comparisons. Nothing can be more erroneous than to institute a comparison too faint: a distant resemblance or contrast fatigues the mind with its obscurity, instead of amusing it; and tends not to fulfil any one end of a comparison. The following similes seem to labour under this defect.

K. Rich. Give me the crown.—Here, cousin, seize the crown,
Here on this side, my hand; on that side, thine.
Now is this golden crown like a deep well,
That owes two buckets, filling one another;
The emptier ever dancing in the air,
The other down, unseen, and full of water;
That bucket down, and full of tears, am I,
Drinking my griefs, whilst you mount up on high.
Richard II. Act iv. sc. 3.

K. John. Oh! cousin, thou art come to set mine eye;
The tackle of my heart is crack'd and burnt;
And all the shrouds wherewith my life should sail,
Are turned to one thread, one little hair:
My heart hath one poor string to stay it by,
Which holds but till thy news be uttered.
K. John, Act iv. sc. 10.

York. My uncles both are slain in rescuing me:
And all my followers to the eager foe
Turn back, and fly like ships before the wind,
Or lambs pursu'd by hunger-starved wolves.
Third Part Henry VI. Act i. sc. 6.

The latter of the two similes is good: the former, because of the faintness of the resemblance, produces no good effect, and crowds the narration with an useless image.

In an epic poem, or in any elevated subject, a writer ought to avoid raising a simile upon a low image, which never fails to bring down the principal subject. In general, it is a rule, that a grand object ought never to be resembled to one that is diminutive, however delicate the resemblance may be: for it is the peculiar character of a grand object to fix the attention, and swell the mind; in which state, it is disagreeable to contract the mind to a minute object, however elegant. The resembling an object to one that is greater, has, on the contrary, a good effect, by raising or swelling the mind; for one passes with satisfaction from a small to a great object; but cannot be drawn down, without reluctance, from great to small. Hence the following similes are faulty.

Meanwhile the troops beneath Patroclus' care,
Invade the Trojans, and commence the war.
As wasps, provok'd by children in their play,
Pour from their mansions by the broad highway,
In swarms the guiltless traveller engage,
Whet all their stings, and call forth all their rage;
All rise in arms, and with a general cry
Assert their waxen domes and buzzing progeny:
Thus from their tents the fervent legion swarms,
So loud their clamours, and so keen their arms.
Iliad, xvi. 312.

So burns the vengeful hornet (soul all o'er)
Repuls'd in vain, and thirsty still of gore;
(Bold son of air and heat) on angry wings
Untam'd, untir'd, he turns, attacks, and stings.
Fir'd with like ardour, fierce Atrides flew,
And sent his soul with every lance he threw.
Iliad, xvii. 642.

An error opposite to the former, is the introducing a resembling image, so elevated or great as to bear no proportion to the principal subject. Their remarkable disparity, being the most striking circumstance, seizes the mind, and never fails to depress the principal subject by contrast, instead of raising it by resemblance: and if the disparity be exceeding great, the simile takes on an air of burlesque: nothing being more ridiculous than to force an object out of its proper rank in nature, by equalling it with one greatly superior or greatly inferior. This will be evident from the following comparison.

Loud as a bull makes hill and valley ring,
So roar'd the lock when it releas'd the spring.
Odyssey, xxi. 51.

Such a simile upon the simplest of all actions, that of opening a lock, is pure burlesque.

A writer of delicacy will avoid drawing his comparisons from any image that is nauseous, ugly, or remarkably disagreeable; for however strong the resemblance may be, more will be lost than gained by such comparison. Therefore we cannot help condemning, though with some reluctancy, the following simile, or rather metaphor.

O thou fond many! with what loud applause
Didst thou beat heaven with blessing Bolingbroke
Before he was what thou would'st have him be?
And now being trimm'd up in thine own desires,
Thou, beastly feeder, are so full of him,
That thou provok'st thyself to cast him up.
And so, thou common dog, didst thou disgorge
Thy glutton bosom of the royal Richard,
And now thou wouldst eat thy dead vomit up,
And howl'st to find it.
Second Part Henry IV. Act. 1. sc. 6.

The

The strongest objection that can lie against a comparison is, that it consists in words only, not in sense. Such false coin, or bastard-wit, does extremely well in burlesque; but it is far below the dignity of the epic, or of any serious composition.

> The noble sister of Poplicola,
> The moon of Rome; chaste as the icicle
> That's curdl'd by the frost from purest swon,
> And hangs on Dian's temple.
>
> *Coriolanus*, Act v. sc. 3.

There is evidently no resemblance between an icicle and a woman, chaste or unchaste: but chastity is cold in a metaphorical sense; and an icicle is cold in a proper sense; and this verbal resemblance, in the hurry and glow of composing, has been thought a sufficient foundation for the simile. Such phantom similes are mere witticisms, which ought to have no quarter, except where purposely introduced to provoke laughter. Lucian, in his dissertation upon history, talking of a certain author, makes the following comparison, which is verbal merely.

> "This author's descriptions are so cold, that they "surpass the Caspian snow, and all the ice of the "north."

> ——— But for their spirits and souls
> This word *rebellion* had froze them up
> As fish are in a pond.
>
> *Second Part Henry IV.* Act i. sc. 3.

Pope has several similes of the same stamp.

> And hence one master passion in the breast,
> Like Aaron's serpent, swallows up the rest.
>
> *Epist.* ii. 131.

And again talking of this same ruling or master passion;

> Nature its mother, habit is its nurse:
> Wit, spirit, faculties, but make it worse;
> Reason itself but gives it edge and pow'r;
> As heaven's blest beam turns vinegar more sour.
>
> *Ibid.* 145.

Where the subject is burlesque or ludicrous, such similes are far from being improper. Horace says pleasantly,

> *Quanquam tu levior cortice.* Lib. iii. od. 9.

And Shakespeare.

> In breaking oaths he's stronger than Hercules.

And this leads to observe, that besides the foregoing comparisons, which are all serious, there is a species, the end and purpose of which is to excite gaiety or mirth. Take the following examples.

Falstaff speaking to his page:

> "I do here walk before thee, like a sow that hath "overwhelmed all her litter but one."
>
> *Second Part Henry IV.* Act i. sc. 10.

> "I think he is not a pick-purse, nor a horse-"stealer; but for his verity in love, I do think him "as concave as a covered goblet, or a worm-eaten "nut." *As you like it*, Act iii. sc. 10.

> This sword a dagger had his page,
> That was but little for his age;
> And therefore waited on him so,
> As dwarfs upon knight-errants do.
>
> *Hudibras*, canto 1.

> "Books, like men, their authors, have but one way "of coming into the world; but there are ten thou-"sand to go out of it, and return no more."
>
> *Tale of a Tub.*

> "The most accomplished way of using books at pre-"sent is, to serve them as some do lords, learn their "*titles*, and then brag of their acquaintance."
>
> *Ibid.*

> "He does not consider, that sincerity in love is as "much out of fashion as sweet snuff; nobody takes it "now." *Careless Husband.*

COMPARTITION, in *Architecture*, denotes the useful and graceful disposition of the whole ground-plot of an edifice, into rooms of office, and of reception or entertainment.

COMPARTMENT, in general, is a design composed of several different figures, disposed with symmetry, to adorn a parterre, a ceiling, &c.

A compartment of tiles or bricks, is an arrangement of them, of different colours, and varnished, for the decoration of a building. Compartments in gardening, are an assemblage of beds, plots, borders, walks, &c. disposed in the most advantageous manner that the ground will admit of. Compartments in heraldry, are otherwise called *partitions*.

COMPASS, or *Mariners Steering Compass*, is an instrument used at sea by pilots to direct and ascertain the course of their ships. It consists of a circular brass box, which contains a paper card with the 32 points of the compass, fixed on a magnetic needle that always turns to the north, excepting a small declination variable at different places. See VARIATION.

The needle with the card turns on an upright pin fixed in the centre of the box. In the centre of the needle is fixed a brass conical socket or cap, whereby the card hanging on the pin turns freely round the centre.

The top of the box is covered with a glass that the card's motion may not be disturbed by the wind. The whole is enclosed in another box of wood, where it is suspended by brass hoops or gimbals, to preserve the card horizontal. The compass-box is to be so placed in the ship, that the middle section of the box, parallel to its sides, may be parallel to the middle section of the ship along its keel.

The compass being of the utmost consequence to navigation, it is reasonable to expect that the greatest attention should be paid to its construction, and every attempt to improve it carefully examined, and if proper, adopted. But so careless are the generality of commanders of this most useful instrument, that almost all the compasses used on board merchant ships have their needles formed of two pieces of steel wire, each of which is bent in the middle, so as to form an obtuse angle; and their ends being applied together, make an acute one; so that the whole represents the form of a lozenge; in the centre of which, and of the cards, is placed the brass cap. Now, if we examine

mine a number of these cards, we shall rarely, if ever, find them all in the same direction, but they will all vary more or less, not only with regard to the true direction, but from one another.

These irregularities are owing to the structure of the needle; for the wires of which it is composed are only hardened at the ends; now if these ends are not equally hard, or if one end be hardened up higher than the other, when they come to be put together, in fixing them to the card, that end which is hardest will destroy much of the virtue of the other; by which means the hardest end will have the most power in directing the card, and consequently make it vary towards its own direction: and, as the wires are disposed in the form of a lozenge, these cards can have but little force, so that they will often, when drawn aside, stand at the distance of several degrees on either side the point from whence they are drawn: for all magnetical bodies receive an additional strength by being placed in the direction of the earth's magnetism, and act proportionally less vigorously when turned out of it; wherefore, when these kind of needles are drawn aside from their true point, two of the parallel sides of the lozenge will conspire, more directly than before, with the earth's magnetism; and the other two will be less in that direction; by which means the two sides will very much impede its return; and the two latter will have that impediment to overcome, as well as the friction, by their own force alone.

To remove these inconveniences, some needles are made of one piece of steel of a spring temper, and broad towards the ends, but tapering towards the middle, where a hole is made to receive the cap. At the ends they terminate in an angle, greater or less according to the skill or fancy of the workman. These needles, though infinitely preferable to the other, are, however, far from being perfect; for every needle of this form hath six poles instead of two, one at each end, two where it becomes tapering, and two at the hole in the middle: this is owing to their shape: for the middle part being very slender, it has not substance enough to conduct the magnetic stream quite through from one end to the other: all these poles appear very distinctly, when examined with a glass that is sprinkled over with magnetic sand. This circumstance, however, does not hinder the needle from pointing true; but as it has less force to move the card than when the magnetic stream moves in large curves from one end to the other, it is certainly an imperfection.

These inconveniencies induced the ingenious Dr Knight to contrive a new sea-compas, which came into use on board all the ships of war. The needle in this instrument is quite straight, and square at the ends; and consequently has only two poles, though about the hole in the middle the curves are a little confused. Needles of this construction, after vibrating a long time, will always point exactly in the same direction; and if drawn ever so little on one side, will return to it again, without any sensible difference. We may therefore conclude, that a regular parallelopiped is the best form for a needle, as well as the simplest, the holes for the cap being as small as possible.

And as the weight should be removed to the greatest distance from the centre of motion, a circle of brass, of the same diameter of the card, may be added, which will serve also to support the card, which may then be made of thin paper, without any thing to stiffen it. This ring being fixed below the card, and the needle above it, the centre of gravity is placed low enough to admit of the cap being put under the needle, whereby the hole in the needle becomes unnecessary.

The above observations will be easily understood from viewing the several parts of the instrument as represented on Plate CL. where fig. 6. is the card with the needle KL, and its cap M, fixed upon it, being one-third of the diameter of the real card. Fig. 8. is a perspective view of the backside of the card, where AB represents the turning down of the brass edge, C the under part of the cap, D and E two sliding weights to balance the card, and F, G, two screws that fix the brass edge, &c. to the needle. Fig. 7. is the pedestal that supports the card, containing a screwing needle, fixed in two small grooves to receive it, by means of the collet C, in the manner of a port-crayon. D, the stem, is filed into an octagon, that it may be the more easily unscrewed. For its further illustration and application to use, see NAVIGATION.

The invention of the compass is usually ascribed to Flavio da Melfi, or Flavio Gioia, a Neapolitan, about the year 1302; and hence it is, that the territory of Principato, which makes part of the kingdom of Naples, where he was born, has a compass for its arms. Others say that Marcus Paulus, a Venetian, making a journey to China, brought back the invention with him in 1260. What confirms this conjecture is, that at first they used the compass in the same manner as the Chinese still do; i. e. they let it float on a little piece of cork, instead of suspending it on a pivot. It is added, that their emperor Chiningus, a celebrated astrologer, had a knowledge of it 1120 years before Christ. The Chinese only divide their compass into 24 points. Fauchette relates some verses of Guoyot de Provence, who lived in France about the year 1200, which seem to make mention of the compass under the name of *marinette* or *mariner's stone;* which shew it to have been used in France near 100 years before either the Melfite or Venetian. The French even lay claim to the invention, from the *fleur de lys* wherewith all nations still distinguish the north point of the card. With as much reason Dr Wallis ascribes it to the English, from its name *compass*, by which name most nations call it, and which he observes is used in many parts of England to signify a circle.

Though the mariner's compass has been long in use, the best construction of it was attended with many inconveniences, till the improvements which it received from the invention and experiments of Dr Knight, and the farther emendation of Mr Smeaton.

The compass is sometimes observed to be disturbed by the electricity of its glass cover; and this from so slight an application of the finger as was barely necessary to wipe off a little dust. The same glass, rubbed a little more with the finger, a bit of muslin, or paper, would attract either end of the needle so as to hold it to the glass for several minutes, far out of

Compass. of the due direction, according to that part of the glass which was most excited. And when the needle, after adhering to the glass, has dropped loose, and made vibrations, those would not be bisected as usual by that point where the needle should rest, but would either be made all on one side, or be very unequally divided, by means of some remains of electrical virtue in that part of the glass which had attracted the needle, until at length, after 15 minutes or more, all the electricity being discharged, the magnetical power took place. The remedy for this inconvenience is to moisten the surface of the glass; a wet finger will do it immediately and effectually. The mariner's compass with a chart is much less dangerously moved than the common compass with a bare needle; and the deeper, or farther distant, the needle hangs below the glass, the less disturbance it is likely to receive.

Improved sea-compasses have lately been constructed by Mr M'Culloch of London, for which he obtained a patent. The particulars are as follows.

Plate CLI. fig. 1. Fig. 1. is a section of the steering compass. *a a a a a*, The common wooden box, with its lid. *b b*, The brass compass-box. *c c*, The glass cover to ditto. *d d*, The hollow conical bottom. *e*, The prop upon which the compass is supported instead of gimbals; the spherical top of which is finely polished, and the apex of the hollow cone is fitted in a peculiar manner to receive it. *f f*, A quantity of lead run round the bottom and cone of the compass-box, to balance and keep it steadily horizontal. *g g*, The card and the magnetical needle, bent in such a manner that the point of the conical pivot on which it moves and is supported, may be brought very near to the centre of gravity, as well as to the centre of motion. *h h*, Two guards, which by means of two pins *i i*, affixed to the compass-box, prevent it from turning round and deceiving the steersman.

Fig. 2. Fig. 2. a perspective view of the steering compass, with the lid off and the front laid open. *h h*, The guards. *b*, The compass-box. *e*, The prop, &c. as in fig. 1.

Fig. 3. Fig. 3. a view of the azimuth compass. *b*, The compass-box. *h*, One of the guards. *e*, The prop, as in fig. 1. and 2, with this difference, that in an azimuth compass, instead of being screwed to the bottom of the wood-box, it stands in a brass socket, and may be turned round at pleasure. 1. A brass bar upon which the sight-vanes are fixed. 2. A dark glass, which moves up and down on 3, the sight-vane. 4. A magnifying glass, which is also moveable on the other vane. 5. The nonius or vernier. 6. A slide for moving the vernier so as to stop the card in taking the azimuth. 7. A double convex-glass, by which the division on the vernier may be read with accuracy.

Fig. 4. Fig. 4. is a section representing another application of the magnetic needle and card, constructed by Mr M'Culloch. *a a a a*, The common wood-box. *b b*, The brass compass-box. *c c*, The brass support for the circle and pendulum. *d*, The pendulum. *e*, The agate. *f f*, The magnetic needle and card. *g g*, The brass circle. *h h*, The glass cover and brass ring. *i*, The lead weight. *N. B.* All the centres of motion are in the same plane.

"In one particular this patent compass is considered as an improvement on the common compasses, in as far as the needle is both longer and broader; hence its magnetism must be stronger, and of course the line of its magnetic direction correspondent with the card. In another particular, in order to prevent the motions of the vessel from affecting the needle, which is the most desirable object, the patent compass-box, instead of swinging in gimbals at right angles to each other, is supported in its very centre upon a prop; and whatever motion the other parts of the box may have, this centre being in the vertex of the hollow cone, may be considered as relatively at rest; and therefore gives little or no disturbance to the needle. Again, the pivot or centre upon which the needle turns, is so contrived as to stand always perpendicular over the centre of the compass-box, or apex of the hollow cone, as upon a fixed point; and is therefore still less affected by the motions of the vessel. Thus the centres of motion, gravity, and of magnetism, are brought almost all to the same point; the advantages of which will be readily perceived by any person acquainted with mechanical principles." *M'Culloch's Account.*

The following is a description of Dr Knight's azimuth compass, with the improvements of Mr Smeaton. Plate CLI. fig. 6. is a perspective view of the compass, when in order for observation; the point of view being the centre of the card, and the distance of the eye two feet. AB is the wooden box. C and D are two milled nuts; by means whereof the axes of the inner box and ring are taken from their edges on which they move, and the friction increased, when necessary. EF is the ring that supports the inner box. GH is the inner box; and I is one of its axes, by which it is suspended on the ring EF. The magnet or needle appears passing through the centre together with a small brace of ivory, that confines the cap to its place. The card is a single varnished paper, reaching as far as the outer circle of figures, which is a circle of thin brass; the edge whereof is turned down at right angles to the plane of the card, to make it grow stiff. O is a catgut line, drawn down the inside of the box, for determining the degree upon a brass edge. PQRS is the index bar, with its two stiles and catgut threads; which being taken off from the top of the box, is placed in two pieces, T and V, notched properly to receive it. W is a place cut out in the wood, serving as a handle.

The use of the azimuth compass is for finding the sun's magnetical azimuth, or amplitude; and thence the variation of the compass. If the observation be for an amplitude at sun-rising, or for an azimuth before noon, apply the centre of the index on the west point of the card, within the box; so that the four lines on the edge of the card, and those on the inside of the box, may meet. If the observation be for the sun's amplitude setting, or an azimuth in the afternoon, turn the centre of the index right against the east point of the card, and make the lines within the box concur with those on the card: the instrument thus fitted for observation, turn the index *b c* towards the sun, till the shadow of the thread *a e* fall directly on the slit of the sight, and on the line that is along the middle of the index: then will the inner edge of the index cut the degree and minute of the sun's magnetical azimuth from the north or south. But note, that if, when the compass is thus placed, the azimuth is less than 54° from

from the south, and the index turned towards the sun, it will pass off the divisions of the limb: the instrument therefore in this case must be turned just a quarter of the compass, i. e. the centre of the index must be placed on the north or south point of the card, according as the sun is from you; and then the edge will cut the degree of the magnetic azimuth, or the sun's azimuth, from the north as before.

The sun's magnetical amplitude thus found, the variation of the needle is thus determined. Being out at sea the 15th of May, 1717 in 45° north latitude, the tables gave me the sun's latitude 19° north, and his east amplitude 27° 25′ north; by the azimuth compass, I find the sun's magnetical amplitude at his rising and setting; and find he rises, *e. gr.* between the 62d and 63d degree, reckoning from the north towards the east point of the compass, i. e. between the 27th and 28th degree, reckoning from the east. The magnetical amplitude, therefore, being here equal to the true one, the needle has no variation; but if the sun at his rising should have appeared between the 52d and 53d degree from the north towards the east, his magnetical amplitude would then have been between 37 and 38 degrees, i. e. about ten degrees greater than the true amplitude: therefore the needle would vary about 10 degrees north-easterly. If the magnetical east amplitude found by the instrument should be less than the true amplitude, their difference would show the variation of the needle easterly. If the true east amplitude be southward, as also the magnetical amplitude, and this last be the greater; the variation of the needle will be north-west; and *vice versa.*

What has been said of north-east amplitudes holds also of south-west; and what of south-east amplitudes holds of north-west. Lastly, if amplitudes be found of different denominations, *e. gr.* if the true amplitude be six degrees north, and the magnetical amplitude be six degrees south; the variation, which in this case is north-west, will be equal to the sum of the magnetical and true amplitudes; understand the same for west amplitudes.

The variation may likewise be found from the azimuth: but in that case the sun's declination, latitude of the place, and his altitude, must be given, that his true azimuth may be found.

This instrument is also useful for settling the ship's wake, in order to find the leeway; and also to find the bearings of headlands and other objects.

Experience evinces, that the needle of a compass, like every other magnet, whether natural or artificial, continually loses something of its magnetic powers, which frequently produces a difference of more than a point; and we may venture to assert, that the great errors in ships reckonings more commonly originate from the incorrectness of the compass than from any other cause.

Steel cannot be too highly tempered for the needle of a sea-compass, as the more it is hardened, the more permanent is the magnetism it receives; but to preserve the magnetism, and of course the polarity of the needle, it should be cased with thin, well-polished, soft iron. It has been found by repeated experiments, that the cased needle preserves its magnetism in a more perfect degree than a needle not cased; and perhaps the magnetic power of the cased needle may increase, while that of the uncased needle loses of its polarity.

This is not an opinion hastily adopted, but the result of a fair and judicious trial, as the gentleman from whom the above observations were in substance taken, placed a cased and uncased needle in a room for three months, having at first exactly the same direction, and about the same degree of force. At the end of this period it was found that the cased needle had not in the least changed its direction, while the uncased had varied two degrees, and its magnetic power was considerably diminished.

These remarks have the air of novelty, and may perhaps contribute to the improvement of the compass. But the defects of this instrument are not confined to the needle. The heaviest brass compasses are not to be implicitly trusted in a hollow or high sea, as they have the box hanging in two brass rings, thus allowing it to have only two motions, both vertical and at right angles with each other; by which confinement of the box, upon any succussion, particularly sudden ones, the card is always too much agitated, and before it can recover itself, another jerk prevents it from pointing to the pole. It is even not uncommon to see the card unshipped by the violence of the ship's pitching.

All these defects are abundantly supplied by giving the box a vertical motion at every degree and minute of the circle, and combining these motions with a horizontal one of the box as well as of the card. By this disposition of the box, the effects of the jerks on the card are avoided, and it will always with steadiness point to the pole. Mr Bernard Romans found by experience, that the card not only is not in the smallest degree affected by the hollow sea, but that, in all the violent shocks and whirlings which it is possible for the box to receive, the card lies as still as in a room unaffected by the least motion.

A compass was recently invented and made in Holland having all these motions. It is about the size of the brass compass commonly used. The bottom of the brass box, instead of being shaped like a bowl, must be a hollow cone resembling the bottom of a common glass bottle; the vertex of it must be raised so high as to leave only one inch between the card and the glass; the box must be of the usual depth, and a quantity of lead must be poured in the bottom of the box, round the base of the cone, which secures it on the stile whereon it traverses.

This stile is firmly fixed in the centre of a square wooden box, like the common compass, but with a thicker bottom. The stile is made of brass about six inches long, round, and one-third of an inch thick, having its head blunt like that of a sewing thimble, and of a fine polish, and placed perpendicular. The inner vertex of the cone must likewise be well polished. The vertical part of the cone ought to be sufficiently thick to allow a well-polished cavity for holding a short stile, proceeding from the centre of the card on which it traverses. "The compass I saw, (says Mr Romans), was so constructed; but I see no reason why the style might not proceed from the centre of the vertex of the cone, and so be received by the card the common way. The needle must be a magnetic

Fig. 1.

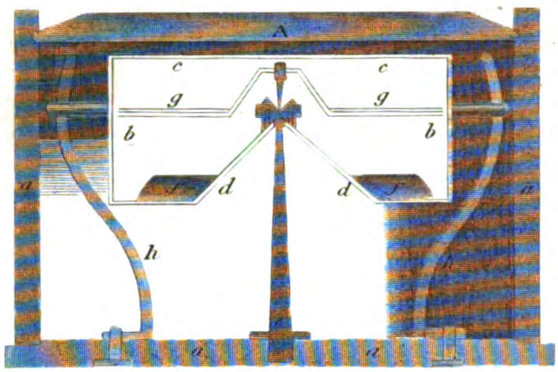


Fig. 2.

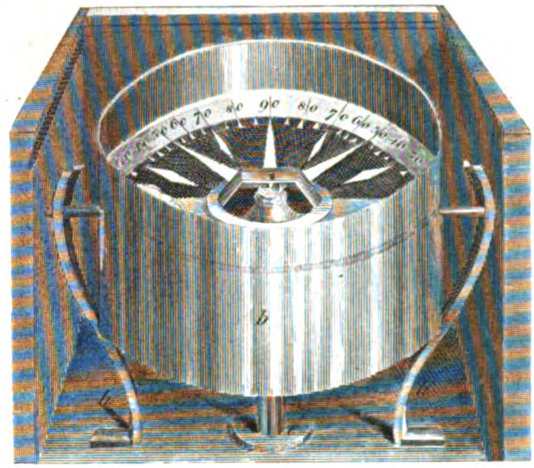


Fig. 3.

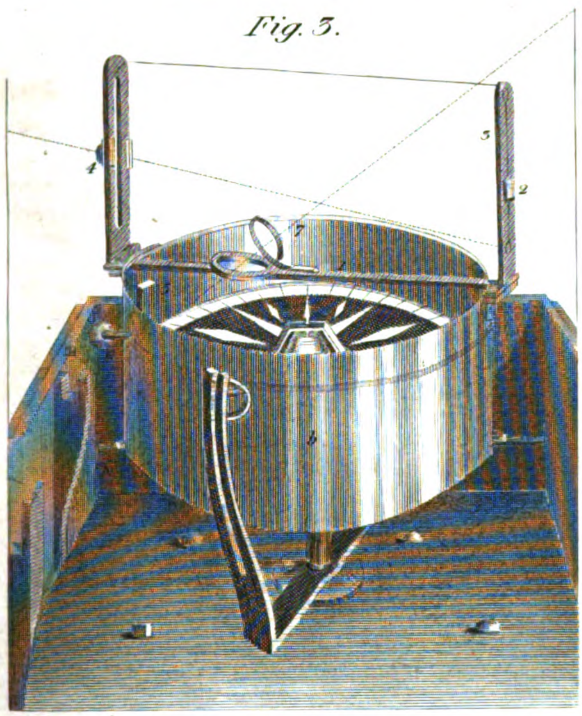


Fig. 4.

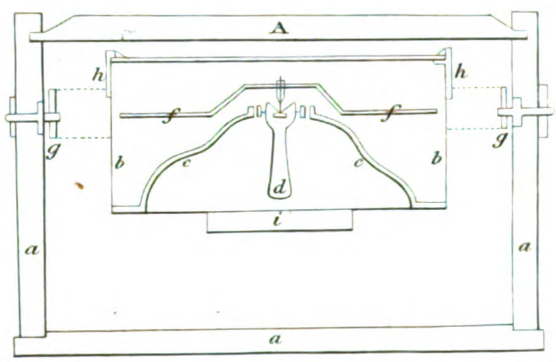


Fig. 5.

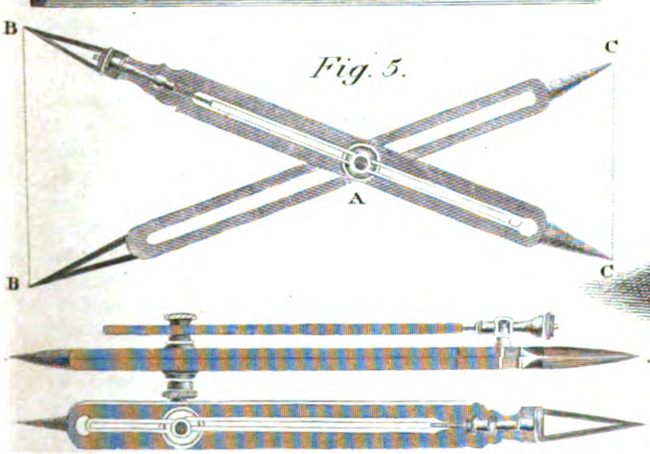
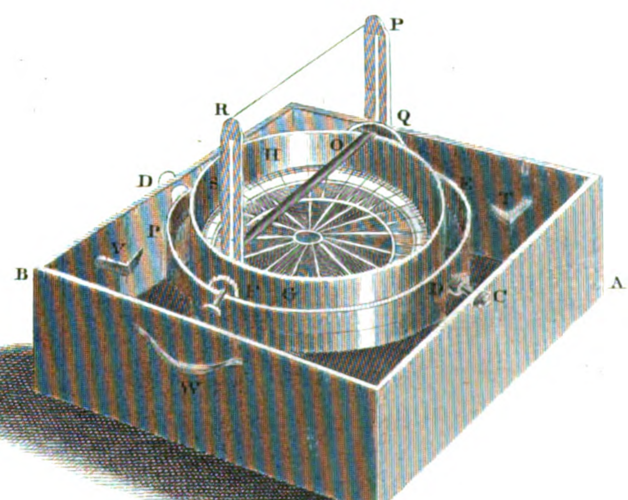


Fig. 6.



against 3, and the compasses opened; the distance between the points will be as 3 to 1, and so a line is divided into 3 equal parts; and so you proceed for any other number of parts under 10.

The numbers of the line of planes answer to the squares of those in the line of lines; for because superfices or planes are to each other as the squares of their like sides; therefore, if the index be placed against 2 in the line of planes, the distance between the small point will be the side of a plane whose area is one; but the distance of the larger points will be the like side of a plane whose area is two; or twice as large. If the index be placed at 3, and the compasses opened, the distances between the points at each end will be the like side of planes whose areas are as 1 to 3; and so of others.

The numbers of the line of solids answer to the cubes of those of the line of lines; because all solids are to each other as the cubes of their sides or diameters; therefore, if the index be placed to number 2, 3, 4, &c. in the line of solids, the distance between the lesser and larger points will be the like sides of solids, which are to each other as 1 to 2, 1 to 3, 1 to 4, &c. For example; If the index be placed at 10, and the compasses be opened so that the small points may take the diameter of a bullet whose weight is one ounce, the distance between the large points will be the diameter of a bullet or globe of 10 ounces, or which is 10 times as large.

Lastly, The numbers in the line of circles are the sides of polygons to be inscribed in a given circle, or by which a circle may be divided into the equal parts, from 6 to 20. Thus, if the index be placed at 6, the points of the compasses at either end, when opened to the radius of a given circle, will contain the side of a hexagon, or divide the circle into six equal parts. If the index be placed against 7, and the compasses opened so that the larger points may take in the radius of the circle, then the shorter points will divide the circle into seven equal parts for inscribing a heptagon. Again, placing the index to 8, and opening the compasses, the larger points will contain the radius, and the lesser points divide the circle into eight equal parts for inscribing an octagon or square. And thus you may proceed for others.

Proportional COMPASSES *with the sector lines.* The structure of these is so like that of the common proportional compasses, only a little nicer, that it needs no particular description. The lines on the first face are the line of lines, marked *lines;* it is divided into 100 equal parts, every tenth numbered; and the line of chords, which goes to 60°, is marked *chords.* On the other face are a line of sines to 90°, and a line of tangents to 45°. On one side are the tangents from 45° to 71° 34′; on the other, secants from 0° to 70° 30′.

For the use of these compasses: 1. To divide a line into any number of equal parts less than 100: divide 100 by the number of parts required; slip the cursor till the line on the sliding dove-tail be against the quotient on the line of lines: then, the whole line being taken between the points of the compasses most remote from the centre, the aperture of the other will show the division required. 2. A right line given, supposed to be divided into 100 parts, to take any number of those parts; slip the line on the sliding dove-tail to the number of parts required: the whole line being taken between the points farthest from the centre, the aperture of the other two will include the number of divisions required. 3. The radius being given, to find the chord of any other under 60°; slip the line on the sliding dove-tail to the degrees required on the line of chords: the radius being taken between the points farthest from the centre of the cursor; the aperture of the other line will be the chord required, provided the number of degrees be greater than 29: if it be less, the aperture taken from the radius will leave the chord required. 4. If the chord of an arch under 60° be given, and the radius required; slip the line on the dove-tail to the degrees given on the line of chords: the given chord being taken between the two points next the cursor, the aperture of the other will be the radius required. 5. The radius being given, to find the sine of any number of degrees; slip the line on the dove-tail to the degree on the line of sines whose sine is required: the radius taken between the points furthest from the cursor, the aperture of the other will give the sine of the angle required. But if the sine sought be less than 30°, the difference of the apertures of the opposite points will be the sine required. 6. The radius being given, to find the tangent of any number of degrees under 71; if the tangent required be under 26° 30′, then slip the line on the dove-tail to the degree proposed on the tangent line; the radius taken between the points farthest from the cursor, the aperture of the others will be the tangent of the degrees required; if the tangent required be above 26° 30′, but under 45°, the line on the cursor must be slipped to the degrees given on the tangent line; then the radius being taken between the points furthest from the cursor, the aperture of the others will be the tangent. If the tangent required be greater than 45°, but less than 56° 20′, slip the notch on the tangent side of the turned-cheek to the degree 0 in the tangent line on the side of the compass; the radius taken between the points furthest from the cursor; the difference between the aperture of the other and these, added together, will be the tangent required. Thus, for the tangents of the degrees under 71. After the like manner may the secant of any number of degrees under 71 be found.

Mr Heath, a mathematical instrument-maker in London, constructed a pair of proportional compasses, in 1746, with a curious and useful contrivance for preventing the shorter legs from changing their position, when these compasses were used. It consisted of a small beam soldered to a screw, and running parallel to the leg of the compasses nearly of the length of the groove; in this beam a slit was made, which admitted of a sliding-nut, the other end of which fell into a hole in the bottom of the screw, belonging to the great nut of the compasses. The screw-pin of the beam passed through an adjuster, by means of which the mark on the slider might be brought exactly to any division. But the proportional compasses have been much out of use since the invention of the sector.

Spring COMPASSES, or dividers; those with an arched head, which by its spring opens the legs; the opening being directed by a circular screw fastened to one of the legs and let through the other, worked with

with a nut. These compasses are made of hardened steel.

Trisecting COMPASSES consist of two central rules, and an arch of circles of 120 degrees, immoveable, with its radius, which is fastened with one of the central rules like the two legs of a sector that the central rule may be carried through all the points of the circumference or the arch. The radius and rule should be as thin as possible: and the rule fastened to the radius should be hammered cold, to attain the greater elasticity; and the breadth of the central rule should be triple that of the radius; there must also be a groove in this rule, with a dove-tail fastened on it for its motion, and a hole in the centre of each rule. The use of this instrument is to facilitate the trisection of angles geometrically; and it is said to have been invented by M. Targen for that purpose.

*Turn-up-*COMPASSES. The body of this instrument is like the common compasses; but towards the bottom of the legs, without-side, are added two other points besides the usual ones; the one whereof carries a drawing pen point, and the other a port-crayon, both adjusted so as to turn round, and be in the way of use, or out of it, as occasion requires. These compasses have been contrived to save the trouble of changing the points.

COMPASSION, or COMMISERATION, in *Ethics*, a mixed passion compounded of love and sorrow, and excited by the sight or recital of distress. Hobbes makes this a merely selfish passion, and defines it as being fear for ourselves; Hutcheson resolves it into instinct; but Dr Butler, much more properly, considers compassion as an original, distinct, particular affection in human nature.

COMPATIBLE, something that may suit or consist with another. See INCOMPATIBLE.

COMPEIGNE, a handsome town of France, in the department of Oise, with a palace or castle, where the king often resided. The maid of Orleans was taken prisoner here in 1430. It is seated on the river Oise, near a large forest. E. Long. 2. 55. N. Lat. 49. 25. It stands about 45 miles north-east of Paris.

COMPENDIUM, in matters of literature, denotes much the same as epitome or abridgement. See ABRIDGEMENT.

COMPENSATION, in a general sense, an action whereby any thing is admitted as an equivalent to another.

COMPENSATION, in *Law*. When the same person is debtor and creditor to another, the mutual obligations, if they are for equal sums, are extinguished by compensation; if for unequal, the lesser obligation is extinguished, and the greater diminished, as far as the concourse of debt and credit goes.

COMPETENCE, or COMPETENCY, in a general sense, such a quantity of any thing as is sufficient.

COMPETENCY, in *Law*, the right or authority of a judge, whereby he takes cognizance of any thing.

COMPETENTES, an order of catechumens, in the primitive Christian church, being the immediate candidates for baptism. See CATECHUMEN.

COMPETITION, in a general sense, is the same with rivalship, or when two or more persons contend for the same thing.

COMPETITION, in *Scots Law*. In escheats, see LAW, Part III. N° clxvi. 17, &c. In confirmations by the superior, in resignations, and in personal rights of lands, *ibid.* clxviii. 5—9. In inhibitions, in adjudication, amongst assignees, arresters, and poinders, *ibid.* clxxi. 6. clxxii. 3. clxxvii. 2. clxxviii. 8, 9, 10. Amongst creditors of a defunct, clxxxi. 19.

COMPETALIA, or COMPETALITA, feasts held among the ancients in honour of the *lares*. The word comes from the Latin, *compitum*, a cross-way; because the feast was held in the meeting of several roads. The *competalia* are more ancient than the building of Rome. Dionysius Halicarnasseus, and Pliny, indeed say, they were instituted by Servius Tullius; but this only signifies that they were then introduced into Rome. The feast being moveable, the day whereon it was to be observed was proclaimed every year. It was ordinarily held on the 4th of the nones of February, i. e. on the second of that month. Macrobius observes, that they were held not only in honour of the *lares*, but also of *mania*, madness. The priests who officiated at them were slaves and liberti, and the sacrifice a sow. They were re-established, after a long neglect, by Tarquin the Proud, on occasion of an answer of the oracle, *that they should sacrifice heads for heads*; i. e. that for the health and prosperity of each family, children were to be sacrificed: but Brutus, after expelling the kings, in lieu of those barbarous victims substituted the heads of garlic and poppy; thus satisfying the oracle which had enjoined *capita*, heads. During the celebration of this feast, each family placed at the door of their house the statue of the goddess *Mania*: they also hung up at their doors figures of wool, representing men and women; accompanying them with supplications that the lares and mania would be contented with those figures, and spare the people of the house.

COMPLEMENT, in *Geometry*, is what remains of the quadrant of a circle, or 90°, after any certain arch has been taken away from it. Thus, if the arch taken away be 40°, its complement is 50; because $50+40=90$. The sine of the complement of an arch is called the *cosine*, and that of the tangent the *cotangent*, &c.

COMPLETUS FLOS, in *Botany*. A flower is said to be complete, which is provided with both the covers, viz. the calyx or flower-cup, and the petals. The term was invented by Vaillant, and is synonymous with *calyculatus flos* in Linnæus. Berkenhout erroneously confounds it with the *auctus* and *calyculatus calyx* of the same author.

COMPLEX, in a more general sense, a term synonymous with compound; though in strictness of speech there is some difference.

COMPLEX is properly applied where a thing contains many others, or consists of different parts not really distinct from each other, but only imaginarily, or in our conceptions. In this sense the soul may be said to be complex, in respect of the understanding and will, which are two things that our reason alone distinguishes in it.

COMPLEX *Term*, or *Idea*, is a term compounded of several simple or incomplex ones. Thus, in the proposition, *a just God cannot leave crimes unpunished*; the subject of this proposition, viz. *a just God*, is a complex

Complexion.

degree, and makes the summers considerably hotter than those which are found to exist in the same latitude where the soil is different. To this proximity of what may be termed *burning sands*, and to the sulphureous and metallic particles which are continually exhaling from the bowels of the earth, is ascribed the different degrees of blackness by which some African nations are distinguished from each other, though under the same parallels. To these observations we may add, that though the inhabitants of the same parallel are not exactly of the same hue, yet they differ only by shades of the same colour; or, to speak with more precision, that there are no two people, in such a situation, one of whom is white and the other black. To sum up the whole——Suppose we were to take a common globe; to begin at the equator; to paint every country along the meridian line in succession from thence to the poles; and to paint them with the same colour which prevails in the respective inhabitants of each, we should see the black, with which we had been obliged to begin, insensibly changing to an olive, and the olive, through as many intermediate colours, to a white; and if, on the other hand, we should complete any one of the parallels according to the same plan, we should see a difference perhaps in the appearance of some of the countries through which it ran, though the difference would consist wholly in shades of the same colour.

The argument, therefore, which is brought against the hypothesis, is so far from being an objection, that it may be considered as one of the first arguments in its favour; for if the climate has really an influence on the mucous substance of the body, it is evident that we must not only expect to see a gradation of colour in the inhabitants from the equator to the poles, but also different shades of the same colour in the inhabitants of the same parallel.

To this argument may be added one that is incontrovertible, which is, that when the black inhabitants of Africa are transplanted to colder, or the white inhabitants of Europe to hotter climates, their children, born there, are of a different colour from themselves; that is, lighter in the first, and darker in the second instance.

As a proof of the first, we shall give the words of the Abbé Raynal, in his admired publication. "The children," says he, "which they (the Africans) procreate in America, are not so black as their parents were. After each generation the difference becomes more palpable. It is possible, that after a numerous succession of generations, the men come from Africa would not be distinguished from those of the country into which they may have been transplanted."

This circumstance we have had the pleasure of hearing confirmed by a variety of persons who have been witnesses of the fact; but particularly by many intelligent Africans, who have been parents themselves in America, and who have declared, that the difference is so palpable in the northern provinces, that not only they themselves have constantly observed it, but that they have heard it observed by others.

Neither is this variation in the children from the colour of the parents improbable. The children of the blackest Africans are born white. In this state they continue for about a month, when they change to a pale yellow. In process of time they become brown. Their skin still continues to increase in darkness with their age, till it becomes of a dirty sallow black; and at length, after a certain period of years, glossy and shining. Now, if climate has any influence on the mucous substance of the body, this variation in the children from the colour of their parents is an event which must be reasonably expected; for being born white, and not having equally powerful causes to act upon them in colder, as their parents had in the hotter climes which they left, it must necessarily follow, that the same effect cannot possibly be produced.

Hence also, if the hypothesis be admitted, may be deduced the reason why even those children who have been brought from their country at an early age into colder regions, have been observed to be of a lighter colour than those who have remained at home till they arrived at a state of manhood. For having undergone some of the changes which we mentioned to have attended their countrymen from infancy to a certain age, and have been taken away before the rest could be completed, these farther changes, which would have taken place had they remained at home, seem either to have been checked in their progress, or weakened in their degree, by a colder climate.

We come now to the second and opposite case; for a proof of which we shall appeal to the words of Dr Mitchell in the Philosophical Transactions, N° 476. sect. 4. "The Spaniards who have inhabited America under the torrid zone for any time, are become as dark coloured as our native Indians of Virginia, of which I myself have been a witness; and were they not to intermarry with the Europeans, but lead the same rude and barbarous lives with the Indians, it is very probable, that, in a succession of many generations, they would become as dark in complexion."

To this instance we shall add one, which is mentioned by a late writer, who, describing the African coast and the European settlements there, has the following passage. "There are several other small Portuguese settlements, and one of some note at Mitomba, a river in Sierra Leone. The people here called *Portuguese* are principally persons bred from a mixture of the first Portuguese discoverers with the natives, and now become, in their complexion and woolly quality of their hair, perfect negroes, retaining, however, a smattering of the Portuguese language."

These facts with respect to the colonists of the Europeans are of the highest importance in the present case, and deserve a serious attention. For when we know to a certainty from whom they are descended; when we know that they were, at the time of their transplantation, of the same colour as those from whom they severally sprung; and when, on the other hand, we are credibly informed that they changed it for the native colour of the place which they now inhabit: the evidence in support of these facts is as great as if a person, on the removal of two or three families into another climate, had determined to ascertain the circumstance; as if he had gone with them and watched their children; as if he had communicated his observations at his death to a successor; as if his successor had

Complexion. prosecuted the plan; and thus an uninterrupted chain of evidence had been kept up from their first removal to any determined period of succeeding time.

But though these facts seem sufficient of themselves to confirm our opinion, they are not the only facts which can be adduced in its support. It can be shown, that the members of the very same family, when divided from each other, and removed into different countries, have not only changed their family complexion, but that they have changed it to as many different colours as they have gone into different regions of the world. We cannot have, perhaps, a more striking instance of this than in the Jews. These people are scattered over the face of the whole earth. They have preserved themselves distinct from the rest of the world by their religion; and as they never intermarry with any but those of their own sect, so they have no mixture of blood in their veins that they should differ from each other; and yet nothing is more true, than that the English Jew is white, the Portuguese swarthy, the Armenian olive, and the Arabian copper; in short, that there appear to be as many different species of Jews as there are countries in which they reside.

To these facts we shall add the following observation, that if we can give credit to the ancient historians in general, a change from the darkest black to the purest white must have actually been accomplished. One instance, perhaps, may be thought sufficient. Herodotus relates, that the Colchi were black, and that they had crisped hair. These people were a detachment of the Æthiopian army under Sesostris, who followed him in his expedition, and settled in that part of the world where Colchis is usually represented to have been situated. Had not the same author informed us of this circumstance, we should have thought it strange that a people of this description should have been found in such a latitude. Now, as they were undoubtedly settled there, and as they were neither so totally destroyed, nor made any such rapid conquests, as that history should notice the event, there is great reason to presume that their descendants continued in the same, or settled in the adjacent country; from whence it will follow, that they must have changed their complexion to that which is observed in the inhabitants of this particular region at the present day; or, in other words, that the black inhabitants of Colchis must have been changed into the fair Circassian. Suppose, without the knowledge of any historian, they had made such considerable conquests as to have settled themselves at the distance of 1000 miles in any one direction from Colchis, still they must have changed their colour: For had they gone in an eastern or western direction, they must have been of the same colour as the Circassians; if to the north whiter; if to the south, of a copper-colour. There are no people within that distance of Colchis who are black.

From the whole of the preceding observations on the subject, we may conclude, that as all the inhabitants of the earth cannot be otherwise than the children of the same parents, and as the difference of their appearance must have of course proceeded from incidental causes, these causes are a combination of those qualities which we call *climate;* that the blackness of the Africans is so far engrafted in their constitution, in the course of many generations, that their children wholly inherit it, if brought up in the same spot; but that it is not so wholly interwoven in their nature, that it cannot be removed if they are born and settled in another. Complexion.

The same principles with the above we find adopted and further illustrated by Professor Zimmerman of Brunswick, in his celebrated work, The Geographical History of Man, &c. He there proves in the most satisfactory manner, That the complexion of the human species is uniformly correspondent with the degree of heat or cold to which they are habitually exposed. In maintaining this position, he makes a very proper distinction with regard to climate. By *climates* we are to understand, not simply or solely those distinguished by the geographical divisions of the globe, to the exclusion of what he terms *physical* climate, or that which depends on the changes produced in any given latitude by such adventitious circumstances as the lower or more elevated situations of a country, its being encompassed by water or large tracts of land, overspread or surrounded with forests, placed in an extensive plain, or environed by lofty mountains. Peculiarities of the like kind, as has been already noticed, frequently prevent the *physical* climate from corresponding entirely with the *geographical*, as a country influenced by them is often much warmer or colder than other regions placed under the same degree of latitude. The influence of these secondary or modifying circumstances has been already adverted to, and need not be further enlarged upon: we shall here only observe, that the erroneous reasoning of Lord Kames on this subject seems to have been owing to this inattention to the difference above mentioned. At Senegal, and in the adjacent lands, the thermometer is often at 112 or 117 degrees in the shade; and here we find the inhabitants jet black, with woolly hair. The heat is equally great in Congo and Loango, and these countries are inhabited by negroes only; whereas in Morocco, to the north of these regions, and at the Cape of Good Hope, to the south, the heat is not so intense, nor are the inhabitants of so deep a hue. Lord Kames asks, Wherefore are not the Abyssinians and the inhabitants of Zaara of as dark a complexion as the Moors on the coast of Guinea? M. Zimmerman answers, that "these countries are much cooler. The desert is not only farther from the equator, but the winds blowing over the Atlas mountains, which like the Alps are covered with snow, and the westerly wind coming from the sea, must considerably mitigate the heat. Nor is Abyssinia so warm as either Monomotapa or Guinea. The north-east winds from the side of Persia and Arabia are cooled by their passage over the Red sea: the northern winds from Egypt lose much of their heat on the chain of mountains that is extended between the countries; the winds from the south and the west are sea winds. Thus, the only quarter from which they can derive excessive heat is from the east, as the air on this side must pass over tracts of heated lands." For a similar reason it is that negroes are not found either in Asia or South America under the equator. The situations of these countries, our author observes, expose them to sea-breezes and cooling winds from the continent. He confirms this hypothesis by observing, that the mountaineers of warm climates, as in Barbary and Ceylon, are much fairer than the inhabitants of the valleys: that voices of their people. The one, however, is not incompatible with the other. An hour of relaxation in a winter evening might serve for the accomplishment of this pious purpose; and one should imagine that, independent of religious considerations, the spirit of the craft might dictate such a measure, as calculated to produce popular entertainment and gain popular affection.

In composition, the author either confines himself, as a subject, to the mere mechanical modulations and arrangements of sound, and, as his end, to the pleasure of the ear alone; or otherwise he soars a nobler height; he aspires to imitative music; he endeavours to render the hearts and souls of his auditors ductile by his art, and thus to produce the noblest emotions and most salutary effects. In the first view, it is only necessary that he should look for beautiful sounds and agreeable chords; but in the second he ought to consider music in its conformity with the accents of the human voice, and in the expressive powers of notes harmonically combined to signify or paint such objects as are susceptible of imitation. In Rousseau's article *opera*, some ideas may be found by which the art may be ennobled and elevated, by forming music into a language more powerful and pathetic than eloquence itself. See OPERA.

COMPOSITION, in literature, the art of forming and arranging sentiments, and clothing them with language suitable to the nature of the subject or discourse. See the articles LANGUAGE, ORATORY, POETRY, DIALOGUE, EPISTLE, and HISTORY.

COMPOSITION, in *Chemistry*, is the union and combination of two more substances of different natures, from which a compound body results. From this union of bodies of different natures, a body is formed, of a different nature, which Becker and Stahl have called a *mixture*, and which may be called a *combination*, or *chemical composition*, to avoid the equivocal sense of the word *mixture*. By this last, we understand only a mere apposition of parts; and which would therefore give a very false idea of chemical composition, in which a mutual adhesion takes place between the combined substances. See *Affinity* under CHEMISTRY.

COMPOSITION, in *Painting*, includes the invention as well as disposition of the figures, the choice of attitudes, &c.

Composition, therefore, consists of two parts; one of which finds out, by means of history, proper objects for a picture; and the other disposes them to advantage. See PAINTING.

COMPOSITION, in *Pharmacy*, the art or act of mixing divers ingredients together into a medicine, so as they may assist each other's virtues, supply each other's defects, or correct any ill qualities thereof. See PHARMACY.

COMPOSITION, in *Commerce*, a contract between an insolvent debtor and his creditors, whereby the latter accept of a part of the debt in composition for the whole, and give a general acquittance accordingly.

COMPOSITION, in *Printing*, commonly termed *composing*, the arranging of several types or letters in the composing-stick, in order to form a line; and of several lines arranged in order, in the galley, to make a page; and of several pages to make a form. See PRINTING.

COMPOSITÆ, in *Botany*, the name of a class in Hermannus and Royen; as likewise of an order in Linnæus's fragments of a natural method, consisting in general of the plants which have the characters enumerated in the following article. A particular description of this order is given under the article SYNGENESIA, which includes all the compound flowers.

COMPOSITUS FLOS, in *Botany*, an aggregate flower, composed of many *flosculi sessiles*, on a common entire receptaculum, with a common perianthium, and whose antheræ being five in number unite in the form of a cylinder; the flosculi are monopetalous, and under each of them is a monospermous germen. Compound flowers are either *ligulati*, *tubulosi*, or *radiati*.

COMPOST, in *Agriculture*, denotes a certain kind of mixture designed to assist the soil in the way of vegetation, instead of dung. The requisites for a compost are, 1. That it ought to be cheaper than the quantity of dung required for an equal extent of soil. 2. It ought to be less bulky; and, 3. It ought to produce equal effects.

Under the article AGRICULTURE we have endeavoured to show, that the true vegetable food consists in reality of the putrid effluvia proceeding from decayed animal and vegetable substances. If this theory is admitted, the hope of making composts as a succedaneum for dung is but very small, unless they are made of putrified animal and vegetable substances; in which case, unless in very singular circumstances, they will prove much dearer than dung itself. Several attempts, however, have been made by those who had other views concerning the nature of the true vegetable food. An oil compost is recommended in the Georgical Essays, upon a supposition that the food of vegetables is of an oily nature. It is made as follows: "Take of North American potash 12 lb. Break the salt into small pieces, and put it into a convenient vessel with four gallons of water. Let the mixture stand 48 hours: then add coarse train oil 14 gallons. In a few days the salt will be dissolved, and the mixture, upon stirring, will become nearly uniform. Take 14 bushels of sand, or 20 of dry mould: upon these pour the above liquid ingredients. Turn this composition frequently over, and in six months it will be fit for use. When the liquid ingredients are put to one or two hogsheads of water, a liquid compost will be formed, which must be used with a water-cart."

This compost, however, the inventor himself owns to be inferior to rotten dung, as indeed may very naturally be supposed; yet in some cases it seems capable of doing service, as will appear from some of the following experiments which we extract from the essays above mentioned.

Exp. I. By the author of the essays. "I took four pots, N° 1, 2, 3, 4. N° 1. contained 12 lb. of barren sand, with 1 oz. of the sand oil-compost. N° 2. contained 12 lb. of sand without any mixture. N° 3. had 12 lb. of sand with half an ounce of slaked lime. N° 4. had 12 lb. of sand with 4 oz. of the sand oil-compost. In the month of March I put six grains of wheat into each pot, and during the summer I occasionally watered

watered the plants with filtrated water. All the time the plants were consuming the farina, I could observe very little difference in their appearance. But after one month's growth, I remarked that N° 1. was the best; N° 2. the next; N° 3. the next; and N° 4. much the worst." The same differences were observed in August, when N° 1. the best, had five small ears, which contained a few poor grains of wheat."

Exp. II. By the same. "In the month of June, I selected four lands of equal goodness in a field intended for turnips. The soil was a light sand with a tolerable quantity of vegetable earth amongst it. It was ploughed out of sward in November, and had not borne a crop for many years. I shall distinguish my experimental lands by N° 1, 2, 3. 4. N° 1. was manured with rotten dung; N° 2. with oil compost; N° 3. with lime; N° 4. was left without any dressing. On the 20th of June they were all sown with turnip-seed broadcast, and during the course of the season were twice hoed. In November I viewed the field, and made the following remarks. N° 1. the best; N° 2. the next; N° 3. the worst; N° 4. better than N° 3." Here the oil-compost appears in a favourable light; but other trials, made with equal accuracy, seem rather to prove, that it is not proper for turnips, barley, or quick-growing vegetables. It requires being meliorated by the atmosphere, and therefore is better adapted for winter crops."

Exp. III. By the same. "In the month of May, I planted 12 alleys that lay between my asparagus beds with cauliflower plants. Each alley took up about 30 plants. One of the alleys I set apart for an experiment with the oil-compost, prepared according to the directions already given. About a handful of the compost was put to the root of each cauliflower plant. In all other respects the alley was managed like the rest. The plants in general flowered very well; but those to which I applied the compost sprung up hastily with small stalks, and produced very poor flowers. I imputed this unfavourable appearance to the freshness of the compost, which was only a few weeks old. In the September following this unsuccessful experiment, I planted the same alleys with early cabbages. The necessity of meliorating the compost was in this trial fully confirmed: For the cabbages that grew upon the alley, which in May had received the compost, were larger and in all respects finer than the others."

Exp. IV. by James Stovin, Esq. of Doncaster. "In the year 1769, I made the following trial with the oil-compost, prepared as above directed. One acre sown with barley, and manured with oil-compost at 18s. produced five quarters five bushels. An acre adjoining sown with barley, and manured with 12 loads of rotten dung at 3l. produced four quarters three bushels and two pecks. The compost barley was bolder and better corn than the other. In the year 1770, the dunged acre produced of rye, three quarters. The compost acre of ditto, two quarters six bushels. In the year 1771, the same lands were sown with oats, and the produce was greatly in favour of the dunged acre. These experimental lands were in a common field that had been long under the plough."

Exp. V. by Richard Townley, Esq. of Belfield. "In the spring 1770, I prepared a piece of ground for onions. It was laid out into six beds of the same size, and which were all sown at the same time. Over two of them, the oil-compost was scattered in a very moderate quantity. Over other two, pigeon's dung: and over the remaining two, some of my *weed-compost* (formed of putrified vegetables), which I esteem one of the best manures, for most vegetables, that can be made. The onions came up very well in all the beds; but in about six weeks, those that were fed with the oil compost, plainly discovered the advantage they had over the rest by their luxuriancy and colour, and at the end of the summer perfected the finest crop I had ever seen, being greatly superior to the others both in quantity and size. The same spring I made an experiment upon four rows of cabbages, set at the distance of four feet every way. Two were manured with oil-compost, and two with my own. All the plants were unluckily damaged, just before they began to form, by some turkeys getting into the field and plucking off the greatest part of the leaves. However, they so far recovered, in the September following, as to weigh from 22 to 28lb. a-piece. The rows proved so equal in goodness, that I could not determine which had the advantage. The same year, one part of a field of wheat exposed to the north-east winds, which that spring continued to blow for a month or five weeks, appeared very poor and languid at the time of tillering. Over it I ordered some of the oil-compost to be sown with the hand; which not only recovered, but also pushed forwards the wheat plants in that part of the field, so as to make them little inferior, if any, to the rest. The same spring, I made a comparative experiment, upon four contiguous lands of oats, between the oil-compost and my own weed-compost. The latter had manifestly the advantage, though the other produced a very large and fine crop. I also tried the oil-compost upon carrots, and it answered exceedingly well. I did the same this year (1771) both upon them and my onions, and have the finest crops of these vegetables I ever saw anywhere upon the same compass of ground."

Exp. VI. by Mr J. Broadbent of Berwick, in Elmet near Leeds.——"On the first of October 1771, I sowed two acres of a light channelly soil with wheat, and harrowed in the compost with the grain. Being at a considerable distance from a large town, we find it very difficult and expensive to procure rotten dung in sufficient quantity for our tillage lands, for which reason we have recourse to land dressings both for our winter and spring corn. Rape-dust and soot are principally used; but the present price of both these articles is a heavy tax upon the farmer. To obviate that inconvenience, I resolved to make trial of the oil-compost; and from what I have observed in this one experiment, I am encouraged to make a more extensive use of it the next year. Being well acquainted with the nature and efficacy of soot, I am satisfied, that the above two acres produced as good a crop of wheat as if they had been dressed with that excellent manure."

On the supposition that vegetables are supported by matters of a saline nature, composts formed of different sorts of salts have been contrived, but with less success than the one above treated of. A famous composition

Compost. position of this kind was lately sold by patent, under the name of *Baron Van Haak's Compost*. The following experiment is mentioned in the Georgical Essays, as made with a view to determine the virtues of it compared with the oil-compost and soot mixed with ashes.—"In the beginning of April 1773, an acre of land was sown with early oats. I pitched upon one land in the middle of the piece, which I esteemed better than any of the rest, and upon this I scattered Baron Van Haak's compost, in the quantity directed in his instructions. On one side I manured a land with the oil-compost, but rather with a less quantity than directed; and, on the other side, I manured two lands with dry coal-ashes sifted fine, and an equal quantity of soot. The lands upon which this experiment was made, were much worn out with a long succession of crops. The lands which had the benefit of the ashes and soot produced an exceeding fine crop; the oil-compost produced a tolerable good one; but that which had only the assistance of the baron's compost, produced a very poor one. It could not have been worse had it been left destitute of every assistance."

Composts, made with putrified animal substances will no doubt answer much better, in most cases, than any other kind of manure, but they are difficult to be procured. The following is recommended by Dr Hunter of York.—"Take a sufficient quantity of saw-dust, incorporate it with the blood and offal of a slaughter-house, putting a layer of one and a layer of the other till the whole becomes a moist and fetid composition. Two loads of this compost, mixed with three loads of earth, will be sufficient for an acre of wheat or spring-corn. Being a kind of top-dressing, it should be put on at the time of sowing, and harrowed in with the grain. The present year I have a field of wheat manured in this manner, and have the pleasure to say, that it is extremely clean, and has all the appearance of turning out an excellent crop. As this kind of compost lies in a small compass, it seems well adapted for the use of such farmers as are obliged to bring their manures from a distance. It is besides extremely rich, and will probably continue in the land much longer than fold-yard or stable-dung. I apprehend that it is capable of restoring worn-out land to its original freshness; and I am induced to be of that opinion, from the appearance of the above crop, which is now growing upon land much impoverished by bad management."

Another compost, prepared from whales flesh, is recommended by Mr Charles Chaloner.—"I have a particular pleasure (says he) in describing and making public the best method of forming a compost from whales flesh, as recommended to me by Dr Hunter. Having marked out the length and breadth of your intended dung-hill, make the first layer of earth about a foot in thickness. Moor-earth, or such as is taken from ant-hills, is the best for this purpose. Over the earth lay one layer of long litter, from the fold-yard or stable, above 12 inches in thickness, then a layer of whale-flesh, and over that another layer of dung. Repeat the operations till the head be raised about six feet, then give it a thick covering of earth, and coat the heap with sods. In this manner each layer of flesh will be placed between two layers of dung. In about a month turn the whole in the usual manner, which will occasion a strong degree of heat and fermentation. When turned, coat with earth as before, with a view to confine the putrid steam which would otherwise escape. In a month or two the heap will be found to be considerably fallen, when it should have a second turning as before. The operation of turning must be repeated at proper intervals, till the whole becomes an uniformly putrid mass. The whale-flesh is of different degrees of firmness, some of it being almost liquid; and, in proportion to its firmness, the heap will become sooner or later fit for use. In general, the compost should not be used till 12 months old; but that depends upon circumstances. Guard the heap from dogs, pigs, badgers, and vermin, as these animals are remarkably fond of whale-flesh. This animal compost may with great advantage be applied to all purposes where good rotten dung is required. I have used it with great success for cabbages, and find it an excellent dressing for meadow-ground. According to the best computation, one hogshead of whale refuse, will make eight loads of dung; which when we consider the great facility with which this basis of our dung-hill may be carried, is a momentous concern to such farmers as lie remote from a large town." See *Manure*, under AGRICULTURE, where the method of preparing it from peat earth, is particularly detailed. We may here recommend a most ingenious thermometer, invented by Mrs Lovi of Edinburgh, for regulating the temperature of compost dunghills, which the farmer will find of great use in managing the process.

Compost ‖ Compound.

COMPOST, in *Gardening*, is a mixture of several earthy substances and dungs, either for the improvement of the general soil of a garden, or for that of particular plants. Almost every plant delights in some peculiar mixture of soils or compost, in which it will thrive better than in others.

COMPOSTELLA, a celebrated town of Spain, and capital of Galicia, with an archbishop's see, and an university. The public squares, and the churches, particularly the metropolitan church, are very magnificent. It has a great number of monasteries, for both sexes, and about 12,000 inhabitants. It is pretended that the body of St James was buried here, which draws a great number of pilgrims from most parts of Christendom. They walk in procession to the church, and visit his wooden image, which stands on the great altar, and is illuminated with 40 or 50 wax candles. They kiss it three times with a very respectful devotion, and then put their hats on its head. In the church there are 30 silver lamps always lighted, and six chandeliers of silver five feet high. The poor pilgrims are received into an hospital, built for that purpose, which stands near the church; and round it are galleries of free-stone, supported by large pillars. The archbishop is one of the richest prelates in Spain, having 70,000 crowns a-year. From this town the military order of St Jago, or St James, had its origin. It is seated in a peninsula, formed by the rivers Tambra and Ulla, in a pleasant plain, 265 miles north-west of Madrid. W. Long. 8. 17. N. Lat. 42. 52.

New COMPOSTELLA, a town of North America, in New Spain, and province of Xalisco, built in 1531. It is situated near the South sea. W. Long. 104. 42. N. Lat. 21. 20.

COMPOUND, in a general sense, an appellation given

given to whatever is composed or made up of different things; thus we say, a compound word, compound sound, compound taste, &c.—*Compound* differs from *complex*, and stands opposed to *simple*. See COMPLEX and SIMPLE.

COMPOUND Flower. See *COMPOSITUS Flos*.

COMPOUND Interest, called also *interest upon interest*, is that which is reckoned not only upon the principal, but upon the interest itself forborne; which hereby becomes a sort of secondary principal. See INTEREST.

COMPOUND Motion, that motion which is effected by several conspiring powers. Powers are said to conspire if the direction of the one be not quite opposite to that of the other, as when the radius of a circle is conceived to revolve about a centre, and at the same time a point to move straight along it.

COMPOUND Numbers, those which may be divided by some other number besides unity, without leaving any remainder; such as 18, 20, &c. the first being measured by the numbers 2, 6, 9; and the second by the numbers 2, 4, 5, 10.

COMPOUND Quantities. See ALGEBRA.

COMPOUND Ratio, is that which the product of the antecedents of two or more ratios has to the product of their consequents. Thus, 6 to 72 is in a ratio compounded of 2 to 6, and of 3 to 12.

COMPOUND (substantive), the result or effect of a composition of different things; or a mass formed by the union of many ingredients.

COMPREHENSION, in English church-history, denotes a scheme proposed by Sir Orlando Bridgman in 1667-8, for relaxing the terms of conformity in behalf of Protestant dissenters, and admitting them into the communion of the church. A bill for this purpose was drawn up by Lord Chief-Baron Hale, but disallowed. The attempt was renewed by Tillotson and Stillingfleet in 1674, and the terms were settled to the satisfaction of the nonconformists; but the bishops refused their assent. This scheme was likewise revived again immediately after the Revolution; the king and queen expressing their desire of an union: however, the design failed after two attempts; and the act of toleration was obtained.

COMPREHENSION, in *Metaphysics*, is that act of the mind whereby it apprehends or knows any object that is presented to it, on all the sides whereon it is capable of being apprehended or known. To comprehend a thing is defined by the schoolmen, *rem aliquam totam et totaliter cognoscere*.

COMPREHENSION, in *Rhetoric*, a trope or figure whereby the name of a whole is put for a part; or that of a part for a whole; or a definite number of any thing for an indefinite.

COMPRESS, in *Surgery*, a bolster of soft linen cloth, folded in several doubles, frequently applied to cover a plaster, in order not only to preserve the part from the external air, but also the better to retain the dressings or medicines.

COMPRESSION, the act of pressing or squeezing some matter together, so as to set its parts nearer to each other, and make it possess less space. *Compression* properly differs from *condensation*, in that the latter is performed by the action of cold, the former by some external violence.

COMPROMISE, a treaty or contract, whereby two contending parties establish one or more arbitrators to judge of and terminate their difference in an amicable manner.

COMPTON, HENRY, bishop of London, was the youngest son of Spencer earl of Northampton, and born in 1632. After the restoration of Charles II. he became cornet of a regiment of horse; but soon after quitting the army for the church, he was made bishop of Oxford in 1674; and about a year after translated to the see of London. He was entrusted with the education of the two princesses Mary and Anne, whom he also afterwards married to the princes of Orange and Denmark; and their firmness in the Protestant religion was in a great measure owing to their tutor, to whom, when Popery began to prevail at court, it was imputed as an unpardonable crime. He was suspended from his ecclesiastical function by James II. but was restored by him again on the prince of Orange's invasion. He and the bishop of Bristol made the majority for filling the vacant throne with a king: he performed the ceremony of the coronation; was appointed one of the commissioners for revising the liturgy; and laboured with much zeal to reconcile dissenters to the church. His spirit of moderation made him unpopular with the clergy, and in all probability checked his further promotion. He died in 1713; but living in busy times, did not leave many writings behind him.

COMPTROLLER. See CONTROLLER.

COMPULSOR, an officer under the Roman emperors, dispatched from court into the provinces, to compel the payment of taxes, &c. not paid within the time prescribed. The word is formed of the verb *compellere*, "to oblige, constrain." These were charged with so many exactions, under colour of their office, that Honorius cashiered them by a law in 412.

The laws of the Visigoths mention military compulsers; which were officers among the Goths, whose business was to oblige the tardy soldiers to go into the fight, or to run to an attack, &c.

Cassian mentions a kind of monastic compulsors, whose business was to declare the hours of canonical office, and to take care the monks went to church at these hours.

COMPUNCTION, in *Theology*, an inward grief in the mind for having offended God. The word comes from *compungere*, of *pungere*, "to prick."—The Romanists own their confession insignificant unless attended with compunction or pricking of heart.

Among spiritualists, compunction bears a more extensive signification; and implies not only a grief for having offended God, but also a pious sensation of grief, sorrow, and displeasure, on other motives.—Thus, the miseries of life, the danger of being lost in the world, the blindness of the wicked, &c. are to pious people motives of compunction.

COMPURGATOR, one that, by oath, justifies another person's innocence. Compurgators were introduced as evidences in the jurisprudence of the middle ages. Their number varied according to the importance of the subject in dispute, or the nature of the crime with which a person was charged.

COMPUTATION, in a general sense, the manner

ner of estimating time, weights, measure, moneys, or quantities of any kind.—The word is sometimes also used among mathematicians in the like sense as calculation.

COMUM, in *Ancient Geography*, a town of the Orobii, of an ancient standing, and formerly powerful, daring to dispute with the Romans: *Comenses*, the people; *Comensis Ager*, the epithet. It became afterwards no inconsiderable municipium, to which Julius Cæsar added 5000 new colonists (Strabo); whence it was generally called *Novocomum*, and the people *Novocomenses*. But in time it recovered its ancient name, *Comum*; Pliny the younger, a native of that place, calling it by no other name. Now *Como*, in the duchy of Milan, at the south end of the lake of that name. E. Long. 9. 37. N. Lat. 46. It is about 80 miles N. E. of Turin.

COMUS, in *Mythology*, the god of jollity or festivity. There is great reason to believe he was the Chamos of the Moabites; Beel-Phegor, Baal-Peor, Priapus, and Bacchus. He is represented under the appearance of a young man, with an inflamed red countenance, his head inclined, and crowned with flowers; his air drowsy; leaning on a huntsman's spear in his left hand, and holding an inverted torch in his right. His statue was placed at the chamber doors of new married persons; his pedestal crowned with flowers.

CON, or Cond. See Cond.

CONANT, Dr John, a learned English divine, born in 1608. He took his degrees at Exeter college Oxford; was, by the parliament, constituted one of the assembly of divines, though he seldom, if ever, sat with them; and in 1657 was admitted vice-chancellor of the university. On the restoration he was one of the commissioners, and assisted at the conferences in the Savoy; but was deprived by the act of uniformity; after eight years he was confirmed, and was made archdeacon of Norwich, and prebendary of Worcester. In 1686 he lost his sight; and died in 1693; leaving a number of admired sermons, afterwards published in six volumes.

CONARION, or Conoides, a name for the pineal gland. See Anatomy *Index*.

CONATUS, a term frequently used in philosophy and mathematics, defined by some to be a quantity of motion, not capable of being expressed by any time or length; as the *conatus recedendi ab axe motus*, is the endeavour which a body, moved circularly, makes to recede, or fly off, from the centre or axis of its motion.

CONCA, Sebastian, called *Cavalier*, a celebrated history and portrait painter, was born at Gaeta in 1679, and placed as a disciple with Francesco Solimena, an incomparable master. Under his direction Conca exerted his utmost industry to obtain a proper knowledge of the true principles of the art of painting; nor did he permit any kind of amusement to withdraw his attention from his studies. Solimena soon perceived in his disciple such talents, and such a disposition, as would qualify him to make a very great progress; and on that account he conceived so strong an affection for him, that he not only afforded him the best instructions, but often employed him to sketch after his own designs; took him along with him to Monte Cassino, where he was to paint a chapel in fresco; and there made Conca acquainted with every thing relative to that manner of painting. At his return to Naples with Solimena, he was, if possible, still more assiduous to improve himself to the utmost; and entered on a project that might at once advance his income, and add to his expertness in his profession. That project was, to paint portraits in a small size and at a low rate; by which scheme all ranks of persons crowded to him; and beside the pecuniary advantages resulting from it, he acquired an extraordinary freedom of hand in penciling and colouring; a good habit of imitating nature with an elegant choice; and likewise great diversity of airs of heads, which were of extraordinary use to him in his future beautiful compositions. As he had a great desire to see Rome, he obtained permission from Solimena to indulge his inclination; and although he was near thirty years of age when he visited that city, yet he spent eight years in constant study after the antiques, after Buonaroti, Raphael, and the Carracci, and perfected himself in every part of his profession. The fame of his works soon spread throughout Rome, and procured him the patronage of Cardinal Ottobuoni, who was a princely encourager of artists; and Conca having shown an elegant proof of his abilities in a composition representing Herod inquiring of the wise men the place of the birth of the Messiah, the figures being as large as life, the Cardinal thought it so excellent a performance, that he rewarded him in a munificent manner, entertained him in his own palace, and introduced him to Pope Clement XI. who appointed Conca to paint the picture of the prophet Jeremiah in the church of St John Lateran; which he executed with universal applause. On that occasion the pope was desirous of giving him some particular mark of his esteem; and therefore, in a general assembly of the academicians of St Luke, he conferred on him the order of knighthood, and the cardinal presented him with a rich diamond cross, which Conca, out of respect to his patron, always wore at his bosom. From that time he was incessantly employed, and his works were solicited by most of the princes of Europe. The churches and chapels of every part of Italy are enriched with some of his compositions; of which he painted an incredible number, as he lived to a very advanced age, and never discontinued his labours. He was earnestly invited by Philip V. of Spain to visit his court, but he could not be prevailed on to leave Rome. He painted two admirable pieces for the king of Poland, with figures as large as life; in one was represented Alexander presenting Bucephalus to Philip, after he had managed him; a grand composition, with a multitude of figures, correctly designed, and charmingly grouped and disposed; the whole being adorned with most elegant architecture, in true and beautiful perspective. The other was the marriage of Alexander with Roxana, the daughter of Darius, which was in every respect equal to the former. He was at last so strongly pressed to go to Naples, that he undertook the journey; and was received in that kingdom with all the respect and honour due to his merit; and there he finished several noble designs, as also at Gaeta his native city. While he continued at Naples, he received in the royal presence a snuff-box of very great value, presented

presented to him in the king's name by the marquis of Tanucci, at that time prime minister; and in the year 1757, the king was pleased to ennoble him and all his descendants. At that time he was 78, and it is confidently said, that he died in 1761, aged 82, which is very probable, though not positively certain. He understood perspective and architecture thoroughly, and added to it a fine understanding of the chiaro scuro. His style of composition is grand and elegant; his design very correct; his disposition ingenious; his attitudes and expression full of truth, nature, and variety; and his colouring is excellent. The history of Diana and Actæon, by Conca, is in the possession of the earl of Pembroke at Wilton.

CONCALE BAY, is on the coast of France in Brittany, where the British forces landed in June 1758, in order to go to St Maloes; which they did, and burnt all the ships in that harbour, which were above 100, of all sorts. Concale is the town which gives name to the bay, and is famous for oysters. It is 18 miles east of St Maloes, and 197 west of Paris. W. Long. 1. 47. N. Lat. 48. 41.

CONCARNEAU, a town of France, in the department of Finisterre, with a harbour and a castle, and 2200 inhabitants. E. Long. 4. 2. N. Lat. 47. 46.

CONCATENATION, a term chiefly used in speaking of the mutual dependence of second causes upon each other.

CONCAVE, an appellation used in speaking of the inner surface of hollow bodies, but more especially of spherical ones.

Concave Glasses, such as are ground hollow, and are usually of a spherical figure, though they may be of any other, as parabolical, &c. All objects seen through concave glasses appear erect and diminished.

CONCENTRATION, in general, signifies the bringing things nearer a centre. Hence the particles of salt, in sea-water, are said to be concentrated; that is, brought nearer each other, by evaporating the watery part.

CONCENTRIC, in *Mathematics*, something that has the same common centre with another: it stands in opposition to *excentric*.

CONCEPTION, in *Logic*, the simple apprehension or perception which we have of any thing, without proceeding to affirm or deny any thing about it. Some writers, as Lord Kames, distinguish between conception and perception; making the latter to denote the consciousness of an object when present, or to include the reality of its object; whereas conception expresses the forming an idea of an object whether present or absent, or without any conviction of its reality.

CONCEPTION, in *Medicine*, denotes the first formation of the embryo, or fœtus in the womb.

Conception is no other than such a concourse and commixture of the prolific seed of the male with that of the female, in the cavity of the uterus, as immediately produces an embryo.

The symptoms of conception or pregnancy are when, in a few days after the conjugal act, a small pain is perceived about the navel, and is attended with some gentle commotions in the bottom of the abdomen; and within one, two, three, or even four months, the menses cease to flow, or prove in less quantity than usual. Upon the first failure of this kind, the woman begins to count the series of her weeks, without taking any notice of the time before elapsed; after this, or between the second or third months, but generally about the third, the motions of the embryo become perceivable to the mother; who hereupon becomes troubled with a nausea, vomiting, loathing, longing, &c. About this time the breasts begin to swell, grow hard and painful, and contain a little milk; the nipples also become larger, firmer, and darker coloured, a livid circle appearing round them; the eyes seem sunk and hollow. During the two first months of pregnancy, the woman grows thinner and slenderer; the abdomen being also depressed; though it afterwards distends, and grows gradually larger.

The manner wherein conception is effected is thus laid down by the modern writers: In the superfices of the ovaries of women, there are found little pellucid spherules, consisting of two concentric membranes filled with a lymphatic humour, and connected to the surface of the ovaria underneath the tegument, by a thick calyx, contiguous to the extremities of the minute ramifications of the Fallopian tubes.

These spherules, by the use of venery, grow, swell, raise and dilate the membrane of the ovary into the form of papillæ; till, the head propending from the stalk, it is at length separated from it; leaving behind it a hollow cicatrix in the broken membrane of the ovary; which, however, soon grows up again.

Now, in these spherules, while still adhering to the ovary, fœtuses have been frequently found; whence it appears, that these are a kind of ova, or eggs, deriving their structure from the vessels of the ovary, and their liquor from the humours prepared therein.

Hence also it appears, that the Fallopian tubes being swelled and stiffened by the act of venery, with their muscular fimbriæ, like fingers, may embrace the ovaries, compress them, and by that compression expand their own mouths: and thus the eggs, now mature, and detached as before, may be forced into their cavities, and thence conveyed into the cavity of the uterus; where they may either be cherished and retained, as when they meet with the male seed; or, if they want that, again expelled.

Hence the phenomena of false conceptions, abortions, fœtuses found in the cavity of the abdomen, the Fallopian tubes, &c. For in coition, the male seed, abounding with living animalcules, agitated with a great force, a brisk heat, and probably with a great quantity of animal spirits, is violently impelled through the mouth of the uterus, which on this occasion is opener, and through the valves of the neck of the uterus, which on this occasion are laxer than ordinary, into the uterus itself; which now, in like manner, becomes more active, turgid, hot, inflamed, and moistened with the flux of its lymph and spirits, by means of the titillation excited in the nervous papillæ by the attrition against the rugæ of the vagina.

The semen thus disposed in the uterus, is retained, heated, and agitated, by the convulsive constriction of the uterus itself; till meeting with the ova, the finest and most animated part enters through the dilated pores of the membranula of the ovum, now become glandulous; is there retained, nourished, and dilated; grows to its umbilicus, or navel; stifles the other less lively animalcules; and thus is conception effected.

Hence

Hence it appears, that conception may happen in any part where the semen meets with an ovum: thus whether it be carried through the Fallopian tube to the ovary, and there cast upon the ovum; or whether it meet with it in some recess of the tube itself; or, lastly, whether it join it in the cavity of the uterus, it may still have the same effect, as it appears from observation actually to have had. But it is probable, that conception is then most perfect when the two, viz. the semen and ovum, are carried at the same time into the uterus, and there mixed, &c.

According to other physiologists the male seed is taken up, before it arrives in the uterus, by the veins which open into the vagina, &c. and thus mixed with the blood; by which, in the course of circulation, it is carried, duly prepared, into the ovary, to impregnate the eggs.

It has been advanced by several writers, that women may possibly conceive in their sleep, and be with child without any knowledge of the occasion of it. As ridiculous and absurd as this doctrine may appear to the generality of the world, no less an author than Gensili has thought it worthy a particular dissertation.

Conception, Immaculate, of the Holy Virgin, is a feast established in honour of the holy virgin, particularly with regard to her having been conceived and born *immaculate*, i. e. without original sin, held in the Romish church on the 8th of December. The immaculate conception is the great head of controversy between the Scotists and Thomists; the former maintaining, and the latter impugning it. In the three Spanish military orders, of St James of the sword, Calatrava, and Alcantara, the knights take a vow at their admission to defend the immaculate conception. This resolution was first taken in 1652. Peter d'Alva has published 48 huge volumes in folio on the mysteries of the conception.

Conception, an episcopal town of Chili in South America. It is situated in W. Long. 73. 50. S. Lat. 36. 40; and is the oldest European settlement in Chili, and the second in point of dignity. On their first settlement here, the Spaniards were repeatedly driven off by the Indians, so that they were obliged to take up their residence at St Jago. Since that time both the cities of Conception and St Jago have been frequently destroyed by earthquakes. In the year 1751 both of them were laid in ruins by a dreadful shock, the first concussions of which were attended with an unusual swelling of the sea, that overturned the few houses which had escaped the ravages of the earthquake. The harbour is good, and pretty much frequented; on which account the city is regarded as a place of consequence. The king allowed annually 350,000 pieces of eight for the support of a garrison of 3500 men; a corps that was seldom complete. None of the fortifications are considerable; but those towards the land are wretched. The Spaniards now live in tolerable security with respect to the Indians, and have no notion of any attack on that side. This town, with the rest of the province, fell into the hands of the Independents in 1817.

Conception, a town of North America, in New Spain, and in the audience of Guatimala. It is seated near the sea coast, 100 miles west of Porto-bello, and a small river that runs into the sea. W. Long. 81. 45. N. Lat 10. 0.

Conception del Pao, a town of South America, in the province of Caraccas, containing 2300 inhabitants, who live chiefly by their cattle. It is 84 miles south-east of Caraccas. W. Long. 65. 10. N. Lat. 8. 42.

CONCERT, or Concerto, in *Music*, a number or company of musicians, playing or singing the same piece of music or song at the same time.

CONCERTATO intimates the piece of music to be composed in such a manner, as that all the parts may have their recitativos, be it for two, three, four, or more voices or instruments.

CONCERTO grossi, the grand chorus of a concert, or those places where all the several parts perform or play together.

CONCESSION, in general, signifies either the act of granting or yielding any thing, or the thing itself which is so granted or yielded.

Concession, in *Rhetoric*, a figure whereby something is freely allowed, that yet might bear dispute, to obtain something that one would have granted to him, and which he thinks cannot fairly be denied, as in the following concession of Dido, in Virgil:

"The nuptials he disclaims, I urge no more;
"Let him pursue the promis'd Latian shore.
"A short delay is all I ask him now;
"A pause of grief, an interval from wo."

CONCHA, in *Zoology*, a synonyme of the Mytilus, Solen, and other shell-fish.

CONCHES, a town of Normandy, in the department of Eure, which carries on a considerable trade. It is seated on the top of a mountain, in the territory of Ouche, 45 miles north-west of Paris. E. Long. 0. 51. N. Lat. 48. 58.

CONCHITES marmor, a name given by the ancients to a species of marble dug near Megara, and remarkable for containing a great number of sea-shells, and other marine bodies immersed in it.

CONCHOID, in *Geometry*, the name of a curve, given to it by its inventor Nicomedes. See Fluxions.

CONCHOLOGY,

1 Introduction.

IS that department of natural history which treats of testaceous animals. In the Linnæan arrangement it constitutes the third order of the class of Vermes. This is the order *testacea*, of which we propose to lay before our readers a pretty full view in the present treatise. The peculiarity and extent of this order of animals have induced us to consider it in a separate treatise, by which means we shall avoid swelling out to an an inconvenient magnitude, the class of Vermes, which will be treated of in its proper place in the course of the work.

2 Importance of conchology.

The fine polish, splendid colours, and elegant form of shells, have been long admired, and have procured for them a conspicuous place in the cabinets of the curious. Indeed in this respect, mankind have discovered no small degree of folly and extravagance, in the high price which has been given for rare and beautiful shells, and often only on account of their rarity. But the study of conchology acquires a higher degree of importance and utility in another view. In many parts of the world, different kinds of testaceous animals are employed as an excellent and nutritious food; and some tribes supply the table with a delicate luxury. Different shells furnish employment to ingenuity and art, in the manufacture of mother-of-pearl for various purposes; and the pearl itself, so much sought after as an ornament of dress, and often the rival of the richest gems, in the estimation of mankind, is the production of testaceous animals. Its nature and mode of formation, therefore, cannot fail to be objects of curious investigation. But testaceous animals and their productions, are not only beneficial and ornamental; some are found to be highly pernicious. The snail ravages the garden and the field, and marks its progress with the destruction of some of the fairest of the vegetable tribes; while the ship-worm is justly the dread of the mariner; secure, as it were, in its insignificance, it humbles the glory and pride of man; and labouring in secret, demolishes the noblest efforts of ingenuity. In these views, then, the economy and habits of testaceous animals, which at first sight might appear a barren and useless pursuit, become an important and beneficial subject of investigation. The following chapters, therefore, shall be occupied in the classification and natural history of this tribe of animals.

CHAP. I. HISTORY OF CONCHOLOGY.

3 Cultivated by the ancients.

THE few scattered fragments concerning the natural history of shells, or testaceous animals, which are to be found in the writings of the ancients, when compared with the more extended and systematic labours of the moderns, are so unimportant and inaccurate, that it would be altogether superfluous to trouble our readers with an account of the information which they contain. It appears, however, from the works of Aristotle and Pliny, the great naturalists of Greece and Rome, that the study of conchology was not entirely neglected in their time. It appears too, that admirers and collectors of shells were not then wanting. Scipio and Lælius, we are informed, found a relaxation from the toils and cares of war and government, by indulging in this elegant amusement (A).

4 By the moderns.

Nor will it be attended with much advantage to give a particular account of the works of the earlier writers on this subject, among the moderns. These are Gesner, Johnston, Rondeletius, Aldrovandus, Bellonius, Wormius, and some other authors, who cultivated this department of natural history, and accompanied their descriptions with figures, illustrative of the objects which they described.

The first author who attempted a systematic division of shells, according to their external form and character, was John Daniel Major, professor of medicine in the university of Kiel in Holstein. His method is published at the end of his curious and interesting remarks on the treatise concerning the *purpura* of Fabius Columna, printed at Kiel in 1675. The system of the German naturalist was followed by that of our countryman Dr Lister, on a more extended and improved plan, which was published ten years after. Succeeding naturalists turned their attention to the study of conchology, and to the improvement of the classification of the numerous objects of this department of natural history. Such were Buonanni, Rumfius, Langius, Breynius, Tournefort, Gualtieri, D'Argenville, Klein, Linnæus, Adanson, Geoffroy, and Muller.

We shall here exhibit some of the most celebrated systems of conchology which have been proposed by writers on this subject. This, we trust, will not be unacceptable to our readers, and particularly as the works of these authors are in few hands, and therefore become less accessible.

5 System of Lister.

I. The first general arrangement of shells is that published by Dr Lister in a work with the following title. *Martini Lister, M. D. Historiæ sive Synopsis methodicæ Conchyliorum libri quatuor, continentes 1057 figuras ære nitidissime insculptas, a Susanna et Anna Lister depictas.* Londini, 1685—1688, folio. A second edition of the same work was published at Oxford in 1770, with additional figures.

SYSTEM OF LISTER.

Lib. I. *De Cochleis Terrestribus.*

Pars I. De Buccinis et Turbinibus terrestribus.

Sect. 1. De Buccinis terrestribus a sinistra dextrorsum tortilibus, lævibus, edentulis.

Sect. 2. De Buccinis terrestribus a sinistra dextrorsum tortilibus, edentulis, striatis.

Sect. 3. De Buccinis terrestribus a sinistra dextrorsum tortilibus, apertura dentata.

Sect. 4. De Buccinis terrestribus a dextra sinistrorsum tortilibus, apertura plana.

Sect. 5. De Buccinis terrestribus a dextra sinistrorsum tortilibus, apertura dentata.

Sect. 6. De Turbinibus terrestribus cochleæformibus, id est compactiore figura.

Sect.

(A) Lælium et Scipionem conchas et umbilicos ad Cajetam et ad Laurentum legere consuesse, et ad omnem animi remissionem ludumque descendere. *Cic. de Orat.* lib. ii.

History.

Sect. 7. Trochilus.

Sect. 8. De Turbinibus terrestribus, compressis edentulis, ipso ambitu acuto.

Sect. 9. De Turbinibus compressis, ambitu obtusiore, apertura edentula.

Sect. 10. De Turbinibus terrestribus compressis, a sinistra dextrorsum tortilibus, apertura dentata.

Sect. 11. De Turbinibus terrestribus compressis, apertura dentata, a dextra sinistrorsum tortilibus, apice inverso ex ipsa aperturæ parte.

Pars II. Cochleæ nudæ terrestres, limaces quibusdam dictæ.

Lib. II. *De Turbinibus et Bivalvibus aquæ dulcis.*

Pars I. De Turbinibus.

Sect. 1. De Buccinis fluviatilibus.
Sect. 2. De Cochleis fluviatilibus.
Sect. 3. De Cochleis fluviatilibus compressis.

Pars II. De Testaceis bivalvibus fluviatilibus.

Sect. 1. De Musculis fluviatilibus, cardine dentato.
Sect. 2. De Musculis fluviatilibus, cardine lævi.
Sect. 3. De Pectunculis fluviatilibus.

Lib. III. *De Testaceis bivalvibus marinis.*

Pars I. De Testaceis bivalvibus, imparibus testis.

Sect. 1. Cap. 1. De Pectinibus ex utraque parte æqualiter auritis, striatis. Cap. 2. De Pectinibus æqualiter auritis, lævibus. Cap. 3. De Pectinibus inæqualiter auritis, non dentatis. Cap. 4. De Pectinibus inæqualiter auritis dentatis.

Sect. 2. Cap. 1. De Ostreis apophysi plana longa recurva, angulo acuto desinente. Cap. 2. De Ostreis apophysi brevi, subter et quasi in occulto posita.

Sect. 3. De Spondylis.

Pars II. De Testaceis bivalvibus, paribus testis.

Sect. 1. Cap. 1. De Pectinibus margaritiferis. Cap. 2. De Pectinibus, binis apophysibus longis conjunctis. Cap. 3. De Pectinibus margaritiferis polyginglymis.

Sect. 2. Cap. 1. De Pectunculis polyleptoginglymis, margine ex altera parte productiore. Cap. 2. De Pectunculis polyleptoginglymis, margine rotunda, striatis. Cap. 3. De Pectunculis polyleptoginglymis, margine rotunda, lævibus.

Sect. 3. Cap. 1. De Pectunculis lævibus, triquetris fere, cervice angustiore. Cap. 2. De Pectunculis lævibus, triquetris, cervice latiore. Cap. 3. De Pectunculis lævibus, rostro recurvo.

Sect. 4. Cap. 1. De Pectunculis fasciatis, lunula notatis, margine striata. Cap. 2. De Pectunculis fasciatis, lunula quadam notatis, margine lævi. Cap. 3. De Pectunculis fasciatis, ad rostrum integris.

Sect. 5. Cap. 1. De Pectunculis striatis productioribus, striis a rostro ad medium usque dorsum concurrentibus. Cap. 2. De Pectunculis striatis diversimode exaratus, sive dissimilibus. Cap. 3. De Pectunculis striatis, striis similibus, dorso ad alterum latus paululum eminente. Cap. 4. De Pectunculis striatis, dorso in aciem compresso. Cap. 5. De Pectunculis striatis, muricatis asperisve. Cap. 6. De Pectunculis striatis, striis a rostro tantum deductis lævibus. Cap. 7. De Pectunculis cancellatis. Cap. 8. De Pectunculis striatis, ex latere multo magis diffusis, latioribus. Cap. 9. De Pectunculis striatis, ex latere diffusis angustioribus. Cap. 10. De Pectunculis striatis imbricatis.

Sect. 6. Cap. 1. De Musculis marinis, cardine lævi minimeque dentato. Cap. 2. De Musculis marinis polyleptoginglymis.

Sect. 7. Cap. 1. De Pinnis, margine velut præcisa obtusave. Cap. 2. De Pinnis, margine producta et auctiore.

Sect. 8. Cap. 1. De Tellinis, id est conchis fere cuneiformibus, ambitu serrata. Cap. 2. De Tellinis quibus ambitus ex interna parte lævis est.

Sect. 9. De Solenis, id est conchis tenuibus longissimisque ab utraque parte naturaliter hiantibus.

Sect. 10. Cap. 1. De Chamis, ab altero tantum latere fere naturaliter hiantibus. Cap. 2. De Chamis pholadibus.

Pars II. De Testaceis multivalvibus.

Sect. 1. Cap. 1. De Pholadibus triumve testarum conchis, cardinibus loculis quibusdam quasi perforatis. Cap. 1. De Pholadibus, cardine integro.

Sect. 2. De Conchis quinque testarum anatiferis plerisque dictis.

Sect. 3. De Balanis, id est, duodecim testarum conchis præter operculum mitratum.

Sect. 4. Sive appendix ad librum tertium de conchitis iisve lapidibus, qui quandum similitudinem cum conchis marinis habeant.

Lib. IV. *De Buccinis marinis, quibus etiam vermiculi dentalia et patellæ, numerantur.*

Sect. 1. Cap. 1. De Patellis, vertice perforato. Cap. 2. De Patellis, vertice integro, lævibus. Cap. 3. De Patellis, vertice integro, striatis, margine quasi radiata. Cap. 4. De Patellis, vertice adunco margine æquali. Cap. 5. De Patellis, vertice adunco, margine obliqua. Cap. 6. De Patellis, vertice adunco, quibus ex interna parte cavitas quædam quasi arcuata, longis compressis. Cap. 7. De Patellis, vertice acuto, stilo quodam interno donatis.

Sect. 2. De Dentalibus.

Sect. 3. De Vermiculis.

Sect. 4. Cap. De Nautilis caudatis, sive e plurimis tabulatis confectis. Cap. 2. De Nautilis vacuis, sive non tabulatis.

Sect. 5. Cap. 1. De Cochleis marinis, apice brevi, umbilicatis, sinu aurito. Cap. 2. De Cochleis marinis, apice brevi, umbilico simplici. Cap. 3. De Cochleis marinis, apice brevi, centro minime sinuato. Cap. 4. De Cochleis marinis, basi brevi, apice ad oris initium parum elato. Cap. 5. De Cochleis marinis, apice mediocriter producto, ore dentato. Cap. 6. De Cochleis marinis, apice mediocriter producto, ore edentulo, lævibus. Cap. 7. De Cochleis marinis, apice mediocriter producto, striatis. Cap. 8. De Cochleis marinis, clavicula tenui et longissima, striatis. Cap. 9. De Cochleis marinis, clavicula tenui et longissima, lævibus.

Sect. 6. Cap. 1. De Neritis dentatis, clavicula paululum prominente. Cap. 2. De Neritis dentatis, clavicula compressa, striatis. Cap. 3. De Neritis dentatis, clavicula compressa, lævibus. Cap. 4. De Neritis ad columellam dentatis, labio productiore edentulo.

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edentulo. Cap. 5. De Neritis edentulis lævibus. Cap. 6. De Neritis edentulis muricatis.

Sect. 7. De Auribus marinis.

Sect. 8. Cap. 1. De Trochis pyramidalibus, apertura sive basi leviter tumida. Cap. 2. De Trochis pyramidalibus, basi paululum cava sive sinuata. Cap. 3. De Trochis, apertura sive basi plana. Cap. 4. De Trochis brevioribus, umbilicatis, dentatis. Cap. 5. De Trochis cochleæformibus, umbilicatis, edentulis. Cap. 6. De Trochis clavicula breviore, columella paulo erectiore integra. Cap. 7. De Trochis, basi media leviter tumida, quasi altera clavicula. Cap. 8. De Trochis, unico dente ad columellam acuto.

Sect. 9. Cap. 1. De Conchis venereis unicoloribus. Cap. 2. De Conchis venereis, lineis nigris secundum longitudinem depictis. Cap. 3. De Conchis undatim depictis. Cap. 4. De Conchis venereis fasciatis, immaculatis; et de conchis venereis fasciatis et maculatis, aut alias cum fasciis variegatis. Cap. 5. De Conchis venereis, punctis nigris distinctis. Cap. 6. De Conchis venereis, maculis albis nigrisve interspersis insignitis; et de conchis venereis maculis albis quasi reticulatim depictis. Cap. 7. De Conchis venereis, striis eminentibus conspicuis. Cap. 8. De Conchis venereis, punctis elatis exasperatis, nodisve inæqualibus. Cap. 9. De Conchis venereis, apertura non dentata, basi integra. Cap. 10. De Conchis venereis, basi umbilicata cochleata.

Sect. 10. Cap. 1. De Rhombis cylindraceis columella dentata, crassis, unius coloris. Cap. 2. De Rhombis cylindraceis dentatis, maculosis. Cap. 3. De Rhombis cylindraceis dentatis, fasciatis. Cap. 4. De Rhombis cylindraceis dentatis, undatis. Cap. 5. De Rhombis cylindraceis dentatis, dorso gibboso. Cap. 6. De Rhombis cylindraceis edentulis, ore strictiore. Cap. 7. De Rhombis edentulis tenuibus, ore patulo, clavicula paululum exserta. Cap. 8. De Rhombis edentulis, ore patulo, clavicula compressa.

Pars II. Cap. 1. De Rhombis cylindrico-pyramidalibus, unius coloris. Cap. 2. De Rhombis cylindrico-pyramidalibus, quibus lineæ maculatæ circum injiciuntur. Cap. 3. De Rhombis cylindrico-pyramidalibus, striatis. Cap. 4. De Rhombis cylindrico-pyramidalibus, undatis. Cap. 5. De Rhombis cylindrico-pyramidalibus, fasciatis. Cap. 6. De Rhombis cylindrico-pyramidalibus, reticulatis. Cap. 7. De Rhombis cylindrico-pyramidalibus, dentatis.

Sect. 11. Cap. 1. De Buccinis persicis dictis. Cap. 2. De Buccinis musicis dictis. Cap. 3. De Buccinis columella dentata, clavicula longissima et tenuissima.

Sect. 12. Cap. 1. De Buccinis bilinguibus, lævibus. Cap. 2. De Buccinis bilinguibus, striatis. Cap. 3. De Buccinis bilinguibus, aspersis et muricatis. Cap. 4. De Buccinis bilinguibus, digitatis.

Sect. 13. Cap. 1. De Buccinis ampullaceis lævibus, aut certe minus asperis. Cap. 2. De Buccinis ampullaceis, muricatis. Cap. 3. De Buccinis ampullaceis, ad sinistram convolutis.

Sect. 14. Cap. 1. De Buccinis utrinque productioribus, lævibus. Cap. 2. De Buccinis utrinque productioribus, striis densis et tenuioribus exasperatis. Cap. 3. De Buccinis utrinque productioribus, striis paucioribus donatis, labro simplici. Cap. 4. De Buccinis utrinque productioribus, striis paucioribus, labro duplicato donatis. Cap. 5. De Buccinis utrinque productioribus, muricatis.

Sect. 15. Cap. 1. De Buccinis brevirostris, nodosis. Cap. 2. De Buccinis brevirostris, striatis. Cap. 3. De Buccinis brevirostris, lævibus, fere clavicula productiore. Cap. 4. De Buccinis brevirostris, labro repando, tenuibus. Cap. 5. De Buccinis brevirostris, labro repando, crassis. Cap. 6. De Buccinis brevirostris, compressis. Cap. 7. De Buccinis auritis, sive rostro recurvo donatis, ventriculosis. Cap. 8. De Buccinis brevirostris, sinu reflexo, lævibus. Cap. 9. De Buccinis brevirostris, rostro reflexo, clavicula productiore.

Sect. 16. Seu appendix de buccinitis, iisve lapidibus que buccina omnigena valde referant.

II. In 1722, Langius presented to the world the following work on conchology. *Caroli Nicolai Langii Lucernen. Helvet. Phil. et Med. &c. Methodus nova et facilis, testacea marina plæraque, quæ huc usque nobis nota sint, in suas debitas et distinctas classes, genera, et species, distribuendi, nominibusque suis propriis, structuræ potissimum accommodatis nuncupandi, &c. Lucernæ*, 1722, 4to, p. 102. 6 Of Langius.

SYSTEM of LANGIUS.

Pars Prima. *Testacea marina univalvia non turbinata.*

Classis Prima. Testacea marina univalvia non turbinata, et in se non contorta.

Sect 1. Testacea marina univalvia non turbinata, et in se non contorta nullo modo, vel solummodo in summo apice tantillum incurvata. Gen. 1. Patellæ. Gen. 2. Balani.

Sect. 2. Tubuli marini, seu testacea marina univalvia, non turbinata, et in se non contorta, elongata tubuli instar concava. Gen. 1. Penicilla. Gen. 2. Dentales. Gen. 3. Tubuli radiciformes. Gen. 4. Tubuli vermiculares.

Classis Secunda. Testacea marina univalvia, non turbinata, sed ita in se contorta, ut eorum spiræ non promineant.

Sect. 1. Testacea marina univalvia ita in se transversim, vel oblique secundum longitudinem contorta, ut eorum circumvolutiones vix appareant. Gen. 1. Nautili. Gen. 2. Nuces marinæ.

Sect. 2. Porcellanæ, seu testacea marina univalvia non turbinata. Gen. 1. Porcellanæ vulgares. Gen. 2. Porcellanæ fimbriatæ. Gen. 3. Porcellanæ spirales. Gen. 4. Porcellanæ thoracicæ. Gen. 5. Porcellanæ minores integræ.

Sect. 3. Divis. 1. Cornua ammonis, quæ sunt testacea marina univalvia non turbinata, et serpentum in modum in se contorta, ut eorum circumvolutiones nulla ex parte promineant, et tamen ex utroque latere omnes appareant. Gen. 1. Cornua ammonis unita. Gen. 2. Cornua ammonis anomala. Divis. 2. Gen. 1. Cornua ammonis simpliciter divisa. Gen. 2. Cornua ammonis integra divisa.

Pars.

Pars Secunda. *Cochleæ marinæ, seu testacea marina univalvia turbinata, quæ unica tantum constant valva et figura sua cochlearum in modum intorta sunt, ita ut intima eorum spira aliquo saltem modo promineat et producatur.*

Classis Prima. Cochleæ marinæ longæ, seu cochleæ marinæ ore admodum elongato et superius aperto.

Sect. I. Cochleæ marinæ longæ ore labiis rectis. Gen. 1. Cochleæ pyramidales. Gen. 3. Cochleæ cylindroideæ.

Sect. 2. Cochleæ longæ pyriformes, seu cochleæ marinæ longæ ore labiis leviter incurvatis, ideoque etiam leviter ventricosis. Divis. 1. Cochleæ longæ pyriformes minores. Gen. 1. Cochleæ longæ pyriformes minores, vulgares. Gen. 2. Cochleæ longæ pyriformes minores intortæ integræ. Gen. 3. Cochleæ longæ pyriformes minores intortæ et insulcatæ. Divis. 2. Cochleæ longæ pyriformes majores. Gen. 1. Cochleæ longæ pyriformes majores vulgares. Gen. 2. Cochleæ longæ pyriformes majores, intortæ integræ. Gen. 3. Cochleæ longæ pyriformes majores intortæ cylindroideæ.

Classis Secunda. Cochleæ canaliculatæ, seu cochleæ marinæ ore elongato et superius in canaliculum abeunte.

Sect. 1. Cochleæ marinæ canalicula recta. Gen. 1. Cochleæ canaliculatæ rectæ tenuiores. Gen. 2. Cochleæ canaliculatæ rectæ crassiores. Gen. 3. Purpuræ rectirostræ.

Sect. 2. Cochleæ marinæ canaliculatæ incurvatæ. Gen. 1. Cochleæ canaliculatæ introrsum incurvatæ. Gen. 2. Cochleæ canaliculatæ extrorsum incurvatæ. Gen. 3. Murices. Gen. 4. Cochleæ muriciformes insigniter incrispatæ. Gen. 5. Purpuræ curvirostræ. Gen. 6. Cochleæ cassidiformes umbilicatæ. Gen. 7. Cassidæ.

Classis Tertia. Buccina sunt cochleæ marinæ ore et mucrone simul elongatis, primaque spira notabiliter ventricosa.

Sect. 2. Buccina parva mucrone mediocriter elongato et tenuiter acuminato. Gen. 1. Buccina parva pruniformia acuminata. Gen. 2. Buccina parva pruniformia canaliculata. Gen. 3. Buccina parva curvirostra. Gen. 4. Buccina parva sulcata. Gen. 5. Buccina parva sulcata et canaliculata. Gen. 6. Buccina parva integra ore perpendiculari. Gen. 7. Buccina parva integra ore obliquo.

Sect. 2. Buccina majora, quæ sunt Buccina mucrone admodum elongato et acuminato. Gen. 1. Buccina majora canaliculata rostrata ore simplici. Gen. 2. Buccina majora canaliculata, ore labioso. Gen. 3. Buccina majora canaliculata rostrata, ore labioso, fimbriata. Gen. 4. Buccina majora canaliculata et sulcata.

Classis Quarta. Strombi, qui sunt cochleæ marinæ ore et mucrone simul insigniter elongatis, et prima spira notabiliter angustiore quam in Buccinis.

Sect. 1. Strombi ore superius aperto. Gen. 1. Strombi canaliculati acuminati. Gen. 2. Strombi canaliculati rostrati, ore simplici. Gen. 3. Strombi canaliculati rostrati, ore anguloso. Gen. 4. Strombi canaliculati rostrati, ore labioso. Gen. 5. Strombi sulcati vulgares. Gen. 6. Strombi sulcati, ore labioso.

Sect. 2. Strombi integri, ore superius clauso, seu integro. Gen. 1. Strombi integri vulgares, ore simplici. Gen. 2. Strombi integri, ore labioso. Gen. 3. Strombi integri, ore fimbriato et dentato.

Classis Quinta. Cochleæ marinæ, ore admodum brevi seu parvo, mucrone vero insigniter elongato.

Sect. 1. Turbines aperti, seu cochleæ marinæ, ore admodum brevi seu parvo superius aperto, mucrone longissimo. Gen. 1. Turbines aperti lati. Gen. 2. Turbines aperti acuminati. Gen. 3. Turbines aperti canaliculati recte rostri. Gen. 4. Turbines aperti canaliculati oblique incurvati. Gen. 5. Turbines aperti sulcati.

Sect. 2. Turbines integri, ore superius clauso seu integro. Gen. 1. Turbines integri vulgares. Gen. 2. Turbines integri acuminati. Gen. 3. Turbines integri fimbriati.

Sect. 3. Trochi seu cochleæ marinæ ore admodum brevi, seu parvo e basi lata et quasi plana in mucronem quasi rectilineam conoideum insigniter elongatum abeuntes. Gen. 1. Trochi ore angusto et horisontaliter compresso. Gen. 2. Trochi ore ampliore et subrotundo.

Classis Sexta. Cochleæ marinæ breviores, seu cochleæ marinæ ore et mucrone breviores, magisque contracto.

Sect. 1. Cochleæ breviores proportionatæ. Gen. 1. Cochleæ trochiformes breviores proportionatæ et mucronatæ. Gen. 2. Cochleæ marinæ terrestriformes breviore proportionatæ. Gen. 3. Cochleæ depressæ.

Sect. 2. Cochleæ marinæ breviores perpendiculariter anomalæ. Gen. 1. Neritæ. Gen. 2. Cochleæ umbilicatæ foramine spirarum semicirculari. Gen. 3. Cochleæ umbilicatæ foramine spirarum rotundo.

Sect. 3. Cochleæ marinæ breviores horisontaliter anomalæ. Gen. 1. Cochleæ planæ. Gen. 2. Aures marinæ.

Sect. 4. Varia hucusque enarratarum cochlearum opercula quæ aut propter usum aut propter singularem structuram, magis nota sunt. Gen. 1. Opercula cochlearum marinarum subrotunda. Gen. 2. Ungues marini, seu opercula cochlearum marinarum oblonga.

Pars Tertia. *Conchæ marinæ, id est testacea marina bivalvia quæ duabus constant valvis in cardine, articulatione quadam inter se conjunctis, ut commode claudi et aperiri queant.*

Sect. 1. Conchæ marinæ notabiliter umbonatæ et rectæ incurvatæ. Gen. 1. Conchæ marinæ valvis æqualibus æquilateræ. Gen. 2. Conchæ cordiformes umbone cardinum deducto. Gen. 3. Conchæ marinæ cordiformes æquilateræ, umbone cardinum unito.

Sect. 2. Conchæ marinæ valvis æqualibus æquilateræ leviter umbonatæ. Gen. 1. Conchæ crassæ. Gen. 2. Pectines

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Pectines tenues. Gen. 3. Pectunculi. Gen. 4. Conchæ pectiniformes æquilateræ subrotundæ. Gen. 5. Conchæ pectiniformes æquilateræ.

Sect. 3. Conchæ marinæ valvis æqualibus æquilateræ, notabiliter umbonatæ et oblique incurvatæ. Gen. 1. Conchæ marinæ incurvatæ subrotundæ vulgares. Gen. 2. Chamæ æquilateræ.

Sect. 4. Conchæ marinæ, valvis æqualibus æquilateræ, leviter umbonatæ et oblique incurvatæ. Gen. 1. Conchæ marinæ valvis æqualibus subrotundæ. Gen. 2. Tellinæ æquilateræ.

Sect. 5. Pinnæ, seu conchæ marinæ valvis æqualibus æquilateræ, cardine umbone destituta. Gen. 1. Pinnæ rectæ. Gen. 2. Pinnæ incurvatæ.

Classis Secunda. Conchæ inæquilateræ, seu conchæ marinæ valvis æqualibus ex utroque cardinis latere inæqualiter effusæ.

Sect. 1. Conchæ marinæ valvis æqualibus inæquilateræ notabiliter umbonatæ, et rectæ incurvatæ. Gen. 1. Conchæ marinæ valvis æqualibus inæquilateræ subrotundæ. Gen. 2. Conchæ marinæ cordiformes inæquilateræ, umbone cardine deducto. Gen. 3. Conchæ marinæ cordiformes inæquilateræ, umbone cardinum unito.

Sect. 2. Conchæ marinæ valvis æqualibus inæquilateræ, leviter umbonatæ et rectæ incurvatæ. Gen. 1. Conchæ marinæ leviter umbonatæ et rectæ incurvatæ subrotundæ.

Sect. 3. Conchæ marinæ valvis æqualibus inequilateræ, notabiliter umbonatæ et oblique incurvatæ, subrotundæ vulgares. Gen. 1. Chamæ inæquilateræ. Gen. 2. Conchæ rhomboidales.

Sect. 4. Conchæ marinæ valvis æqualibus inæquilateræ, leviter umbonatæ et oblique incurvatæ. Gen. 1. Conchæ marinæ, &c. subrotundæ. Gen. 2. Conchæ pectiniformes inæquilateræ triangulares. Gen. 3. Tellinæ inæquilateræ. Gen. 4. Conchæ tellinæformes. Gen. 5. Musculi. Gen. 6. Conchæ longærugosæ. Gen. 7. Conchæ soleniformes. Gen. 8. Mytili.

Sect. 5. Conchæ marinæ valvis æqualibus inæquilateræ, leviter umbonatæ et oblique incurvatæ, structura et striis peculiaribus. Gen. 1. Conchæ imbricatæ. Gen. 2. Pholades. Gen. 3. Dactyli. Gen. 4. Hysteroconchæ. Gen. 5. Conchæ alæformes. Gen. 6. Conchæ quadratæ.

Sect. 6. Conchæ inæquilateræ non umbonatæ, seu conchæ marinæ valvis æqualibus inæquilateræ, cardine umbone destituto. Gen. 1. Solenes. Gen. 2. Conchæ marinæ, &c. structura peculiari.

Classis Tertia. Conchæ anomalæ, seu conchæ marinæ valvis inæqualibus.

Sect. 1. Conchæ marinæ anomalæ umbonatæ et auritæ. Gen. 2. Pectines anomali. Gen. 1. Spondyli.

Sect. 2. Ostreæ, seu conchæ marinæ anomalæ omnino, non vel irregulariter tantum umbonatæ rugosæ. Gen. 1. Ostrea vulgaris. Gen. 2. Ostrea denticulata. Gen. 3. Ostrea rostrata. Gen. 4. Ostrea peculiaris.

Of Breynius.

III. A different system was proposed for the classification of testaceous animals by Breynius, in the following work, which was published in the year 1732. *Joannis Philippi Breynii dissertatio physica de polythalamiis, nova testaceorum classe, cui quædam præmittuntur de methodo testacea in classes et genera distribuendi: huic adjicitur commentatiuncula de belemnitis prussicis, tandemque schediasma de Echinis methodice disponendis; Gedani*, 1732, 4to.

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SYSTEM of BREYNIUS.

In this system the author has divided shells into the eight following classes, viz. 1. Tubulus. 2. Cochlidium. 3. Polythalamium. 4. Lepas. 5. Concha. 6. Conchoides. 7. Balanus. 8. Echinus.

1. *Tubulus*, est testa tubulosa monothalamia, vel in lineam rectam extensa, vel incurva, vel contorta, vel aliquando ad spiram, sed irregulariter, accedens. Huic pertinent dentalia, entalia, solenes univalvi, &c.

2. *Cochlidium*, est testa tubulosa, monothalamia, conica, inspirans constanter regularem, convoluta aliquando opercula prædita, sepius vero eo destituta. Ad hanc classem spectant nautili tenues sive vacui vulgo dicti; aures marinæ, neritæ, cochleæ, buccina, murices, cassides, cylindri, volutæ, porcellanæ, et omnes testæ turbinatæ, exceptis nautilo et anomia, ad classem tertiam referendis.

3. *Polythalamium*, est testa tubulosa polythalamia, conica, recta, vel in spiram regularem convoluta, cum syphunculo thalamos transeunte: huic reducendi nautili anomia, litui, et orthocerata.

4. *Lepas*, est testa vasculosa simplex, referens vasculum magis minusve cavum, orificio multum patenta, ut patellæ similesque.

5. *Concha*, est testa vasculosa composita bivalvis, id est quæ ex duabus componitur valvis, sive vasculis magis minusve concavis in cardine articulatione quadam inter se junctis ut aperiri et claudi queant; ut chamæ, mytili, tellinæ, pinnæ, ostreæ, pectines anomiæ.

6. *Conchoides*, est testa vasculosa composita bivalvis, sed quæ præterea et aliquot minoribus portiunculis testaceis componitur, ut pholades anatiferæ.

7. *Balanus*, est testa vasculosa composita, que præter unicam testam majorem alias portiones minores habet ex quibus componitur, ut balanus vulgo dictus.

8. *Echinus*, est testa vasculosa composita, undique clausa; magis minusve concava, duobus tantum foraminibus seu aperturis pro ore et ano perforata, externe aculeis vel claviculis mobilibus testaceis armata.

8 Of Tournefort.

IV. The system of Tournefort appeared for the first time, and was published from the author's manuscript, in the treatise on conchology by Gualtieri. In this system shells are divided into three classes, viz. Monotoma, Ditoma, and Polytoma.

SYSTEM of TOURNEFORT.

Testacea dicuntur quorundam animalium integumenta, quæ testæ seu lateris duritiem habent, et in quibus tantum, in testa animalia vivant.

Testacea autem omnia quæ hucusque in musæis curiosorum adversari et congeri solent, ad tres classes facile revocari possunt. Hæc enim vel monotoma sunt, vel ditoma, vel polytoma.

Monotoma testacea appellantur ea quorum testa indivisa est; ditoma quæ geminis constant testis ad cardinem

History. dinem connixis; polytoma vero quæ ex pluribus simul adnexis compinguntur.

CLASSIS PRIMA. Quæ testacea monotoma complectitur. Testacea monotoma quorum testa indivisa est, in tres familias abeant: alia enim univalvia sunt, alia spiralia, alia fistulosa.

Familia I. *Testaceorum univalvium.* Monotoma univalvia dicimus quorum testa simplex est, in os amplius effusa. Gen. 1. Lepas. Gen. 2. Eruca.

Familia II. *Testaceorum spiralium.* Monotoma spiralia dicimus testacea quorum pars inferior in spiram contorquetur: horum autem spiræ seu helices exterius patent, et simpliciter spiralia dicuntur, vel eorum spira intus reconditur, et convoluta dicuntur.

Divis. 1. Testacea monotoma simpliciter spiralia, seu quorum spira exterior est. Gen. 1. Murex. Gen. 2. Murex alatus. Gen. 3. Murex aporrhais. Gen. 4. Murex venereus. Gen. 5. Murex pyramidalis. Gen. 6. Buccinum. Gen. 7. Buccino-murex. Gen. 8. Purpura. Gen. 9. Buccino-purpura. Gen. 10. Peribolus. Gen. 11. Turbo. Gen. 12. Verticillus. Gen. 13. Cochlea. Gen. 14. Cochlea terrestris. Gen. 15. Ceratites. Gen. 16. Cochlea marina. Gen. 17. Nerita. Gen. 18. Auris marina.

Divis. 2. Testacea monotoma spiralia convoluta, quæ cochleam interiorem habent vix foris conspicuam. Gen. 1. Concha venerea. Gen. 2. Concha persica. Gen. 3. Nautilus. Gen. 4. Conchilium.

Familia III. *Testaceorum fistulosorum.* Testacea monotoma fistulosa seu tubulosa, ut ex nomine patet, fistulæ in modum tenuantur. Gen. 1. Dentale. Gen. 2. Entale. Gen. 3. Tubuli marini.

CLASSIS SECUNDA, quæ testacea ditoma continet. Testacea ditoma semper ex duabus testis ad cardinem articulatis compinguntur, et vel arcte undique clauduntur, vel utrinque hiant; unde in duas familias dividi possunt.

Familia I. Testaceorum ditomorum quæ arcte clauduntur. Gen. 1. Concha. Gen. 2. Conchula. Gen. 3. Ostreum. Gen. 4. Mytilus. Gen. 5. Pinna. Gen. 6. Perna. Gen. 7. Pholas. Gen. 8. Pecten. Gen. 9. Pectunculus.

Familia II. Testaceorum ditomorum quæ semper hiant. Gen. 1. Chamæ. Gen. 2. Solen.

CLASSIS TERTIA, quæ testacea polytoma continet. Polytoma testacea dicuntur quorum testæ ex pluribus partibus vel articulatis, vel per cartilaginem connexis compinguntur; unde in duas familias abeunt.

Familia I. Eorum quorum partes articulantur. Gen. 1. Echinus.

Familia II. Eorum quorum partes per cartilaginem connectuntur. Gen. 1. Balanus.

9 Of D'Argenville. V. M. D'Argenville, in 1742, published at Paris a treatise on Conchology with 33 plates. A second edition of the same work appeared at Paris in 1757. In this edition the number of the plates was increased to 41. A more splendid edition was published after the death of the author, by M. M. de Favanne de Montcerville father and son. This edition is extended to 3 volumes, two of which consist of letter press, and the 3d contains the engravings, which are 80 in number, and are executed with great accuracy and elegance. But the descriptions of the genera and species only reach the 19th plate; so that the work which was published in 1780 is still unfinished.

SYSTEM OF D'ARGENVILLE.

In this system shells are divided into four parts. I. Sea-shells. II. Fresh-water shells. III. Land-shells. IV. Fossil-shells.

PART I. Sea-shells are divided into 3 Classes. 1. Univalves. 2. Bivalves. 3. Multivalves.

Class I. contains 15 families, viz. 1. Lepas. 2. Oreilles de mer. 3. Tuyaux et Vermisseaux de mer. 4. Nautiles. 5. Limaçons à bouche ronde. 6. Limaçons à bouche demi-ronde. 7. Limaçons à bouche aplatie. 8. Cornets ou Volutes. 9. Olives ou Cylindres. 10. Rochers ou Murex. 11. Tonnes. 12. Porcelaines. 13. Buccins. 14. Pourpres. 15. Vis.

Class II. contains 7 families, viz. 1. Huitres. 2. Cames. 3. Tellines. 4. Moules. 5. Cœurs. 6. Peignes. 7. Manches de couteaux.

Class III. consists of 7 families, viz. 1. Oscabrions, ou lepas à huit pieces. 2. Oursins. 3. Glands de mer. 4. Pousse-pieds. 5. Conques anatiferes. 6. Pholades. 7. Tuyaux de mer multivalves.

PART II. Fresh-water shells are divided into 2 Classes. 1. Univalves. 2. Bivales.

Class I. contains 8 families, viz. 1. Lepas. 2. Nautiles ou cornes d'ammon. 3. Limaçons à bouche ronde. 4. Limaçons à bouche demi-ronde. 5. Limaçons a bouche triangulaire. 6. Tonnes. 7. Buccins. 8. Vis.

Class II. is composed of two families. 1. Cames. 2. Tellines.

PART III. Land shells, constituting a single class, viz. Univalves, which contains 6 families; viz. 1. Lepas. 2. Limaçons à bouche ronde. 3. Limaçons à bouche demi-ronde. 4. Limaçons a bouche aplatie. 5. Buccins. 6. Vis.

PART IV. Fossil shells, which consist of 3 classes. 1. Univalves. 2. Bivalves. 3. Multivalves.

Class I. is composed of 15 families having the same names as the first class of sea-shells.

Class II. contains 7 families similar to the 2d class of sea-shells.

Class III. consists of 5 families, viz. 1. Oursins. 2. Glands de mer. 3. Pousse-pieds. 4. Pholades. 5. Tuyaux multivalves.

VI. A system of Conchology was published by Klein in 1753, and illustrated with engravings. In the same work the author enters into an investigation concerning the formation, increase, and colours of shells. The following is an abridged view of this arrangement. 10 Of Klein.

SYSTEM

History.

SYSTEM of KLEIN.

In this system, shells are divided into 6 parts.

PART I. which is entitled Cochlis, is divided into 2 sections, viz. Cochlis simplex, and Cochlis composita.

Sect. I. consists of 8 classes, viz. 1. Cochlis plana, containing 4 genera. 2. Cochlis convexa, 6 genera. 3. Cochlis fornicata, 5 genera. 4. Cochlis elliptica, 6 genera. 5. Cona-cochlis, 16 genera. 6. Cochlea, 8 genera. 7. Buccinum, 5 genera. 8. Turbo, 14 genera.

Sect. II. Consists of five classes, viz. 1. Cochlis rostrata, 7 genera. 2. Voluta longa, 15 genera. 3. Voluta ovata, 8 genera. 4. Alata, 6 genera. 5. Murex, 2 genera.

PART II. Concha, is also divided into 2 sections, viz. Monoconchæ and Diconchæ æquales.

Sect. I. contains 2 classes, viz. 1. Patella, 2 genera. 2. Ansata, 4 genera.

Sect. II. consists of three subdivisions, viz. 1. Diconchæ conniventes. 2. Diconchæ interruptæ. 3. Diconchæ inæquales.

Subdiv. 1. is composed of 6 classes, viz. 1. Diconchæ figuratæ, 4 genera. 2. Ostreum, 6 genera. 3. Musculus, 3 genera. 4. Cyclas. 5. Diconcha aurita, 9 genera. 6. Diconchæ cordiformes, 3 genera.

Subdiv. 2. consists of 5 classes, viz. 1. Diconcha sulcata. 2. Diconchæ umbilicatæ, 3 genera. 3. Diconchæ sinu profundo, seu chamæ, 3 genera. 4. Diconchæ sinu prominulo, seu tellinæ, 6 genera. 5. Pyloris, 9 genera.

Subdiv. 3. Diconchæ inæquales, 7 genera.

PART III. Polyconchæ, consists only of one genus.

PART IV. Niduli Testacei, comprehends one class, viz. Balanus, which includes 4 genera.

PART V. Echinus marinus, seu echinodermata, is divided into 3 sections, viz. 1. Anocysti. 2. Catocysti. 3. Pleurocysti.

Sect. I. contains 2 classes, viz. 1. Cidaris, 9 genera. 2. Clipeus, 1 genus.

Sect. II. is composed of four classes, viz. 1. Fibula, 2 genera. 2. Classis, 2 genera. 3. Scutum, 2 genera. 4. Placenta, 3 genera.

Sect. III. consists of 3 classes, viz. 1. Arachnoides, 1 genus. 2. Cor marinum, 2 genera. 3. Ovum marinum, 2 genera.

PART VI. Tubulus marinus is composed of 11 genera.

In the systems of Conchology which we have now exhibited, the characters are taken from the shells. In the three following, the marks of discrimination are derived from the animal as well as from the shell. The first by M. Adanson was published in 1757.

11 Of Adanson.

SYSTEM of ADANSON.

This system consists of 3 classes, viz. 1. Limaçons. 2. Les conques. 3. Les conques multivalves.

CLASS I. Limaçons. Sect. I. Limaçons univalves. Sect. II. Limaçons operculés.

Sect. I. Famille 1. Les limaçons univalves qui n'ont ni yeux ni cornes. Gen. 1. La gondole, *cymbium*. Famille 2. Les limaçons univalves qui ont deux cornes, et les yeux places à leur racine et sur leur côte interne. Gen. 2. Le bulin, *bulinus*. Gen. 3. Le coret, *coretus*. Gen. 4. Le pietin, *pedipes*. Famille 3. Les limaçons univalves qui ont quatres cornes, dont les deux exterieures portent les yeux sur leur sommet. Gen. 5. Le limaçon, *cochlea*. Gen. 6. L'ormier, *haliotis*. Famille 4. Les limaçons univalves qui ont deux cornes, et les yeux placés à leurs racines, et sur le côte externe, ou par derrière. Gen. 7. Le lepas, *lepas*. Gen. 8. L'yet, *yetus*. Gen. 9. La vis, *terebra*. Famille 5. Les limaçons univalves qui ont deux cornes et les yeux posés un peu au-dessus de leur racine, et sur leur côte externe. Gen. 10. La porcellaine, *porcellana*. Gen. 11. Le pucelage, *cypræa*. Gen. 12. Le mantelet, *peribolus*.

Sect. II. Famille 1. Limaçons operculés qui ont deux cornes, avec un renflement, et qui portent les yeux ordinairement au-dessus de leur racine, et à leur côté externe. Gen. 1. Le rouleau, *strombus*. Gen. 2. La pourpre, *purpura*. Gen. 3. Le buccin, *buccinum*. Gen. 4. Le cerite, *cerithium*. Famille 2. Limaçons opercules, qui ont deux cornes sans renflement, et les yeux places à leur racine, et sur leur côte externe. Gen. 5. Le vermet, *vermetus*. Gen. 6. La toupie, *trochus*. Gen. 7. La natice, *natica*. Famille 3. Les limaçons operculés, qui ont quatre cornes, dont les deux exterieures portent les yeux sur leur sommet. Gen. 8. Le sabot, *turbo*. Gen. 9. La nerite, *nerita*.

CLASS II. Les conques. Sect. I. Les conques bivalves. Famille 1. Les conques bivalves, qui ont les deux lobes du manteau separés, dans tout leur contour. Gen. 1. L'huitre, *ostreum*. Famille 2. Les conques bivalves dont les deux lobes du manteau forment trois ouvertures sans aucun tuyau. Gen. 2. Le jataron, *jataronus*. Gen. 3. Le jambonneau, *perna*. Famille 3. Les conques bivalves dont les deux lobes du manteau forment trois ouvertures dont deux prennent la figure d'un tuyau assez long. Gen. 4. La came, *chama*. Gen. 5. La telline, *tellina*. Gen. 6. Le pectoncle, *pectunculus*. Gen. 7. Le solen, *solen*.

CLASS III. Les conques multivalves. Famille 1. Les conques multivalves, dont aucune des pieces de la coquille ne prend la forme d'un tuyau. Gen. 1. La pholade, *pholas*. Famille 2. Les conques multivalves, dont une des pièces de la coquille prend la forme d'un tuyau qui enveloppe entierement toutes les autres. Gen. 2. Le taret, *teredo*.

12 Of Geoffroy.

VIII. The method of Geoffroy, formed on similar principles with the last, was published at Paris in 1767, in a work entitled " A Summary Treatise on the Testaceous Animals found in the vicinity of Paris." The following is a view of this method.

SYSTEM of GEOFFROY.

SECT. I. Coquilles univalves.

Gen.. 1. Le limax, *cochlea*. Quatre tentacules, dont deux plus grands portent des yeux à leur extremité. Coquille univalve en spirale.

Gen.

History.

Gen. 2. Le buccin, *buccinum.* Deux tentacules plats en formes d'oreilles. Les yeux placés à la base des tentacules du côté interieur. Coquille univalve en spirale et conique.

Gen. 3. Planorbe, *planorbis.* Deux tentacules filiformes. Les yeux placés à la base des tentacules du côté interieur. Coquille univalve en spirale, et ordinairement applatie.

Gen. 4. La nerite, *nerita.* Deux tentacules. Les yeux placés à la base des tentacules du côté exterieur. Opercule à la coquille. Coquille univalve en spirale et presque conique.

Gen. 5. Ancile, *ancylus.* Deux tentacules. Les yeux placés à la base des tentacules du côté inferieur. Coquille univalve concave et unie.

SECT. II. Coquilles univalves.

Gen. 1. La câme, *chama.* Deux siphons simples et alongées. Charniere de la coquille dentelle. Coquille arrondée.

Gen. 2. La moule, *mytilus.* Deux siphons courts et frangés. Charniere de la coquille membraneuse et sans dents. Coquille alongée.

13 Of Muller. IX. The system of Muller first published in 1773, and afterwards extended in a different work which appeared in 1776, arranges testaceous animals into three families. The following is a view of this arrangement taken from the latter work on the zoology of Denmark and Norway.

SYSTEM OF MULLER.

FAMILIA I. *Testacea Univalvia.*

SECT. I. Testacea univalvia, testa pervia.

Gen. 1. *Echinus.* Testa crustacea, ano verticali, tentaculis simplicibus.

Gen. 2. *Spatagus.* Testa crustacea, ano infero, tentaculis penicillatis.

Gen. 3. *Dentalium.* Testa calcarea, testa rudi, tentaculis nulli.

SECT. II. Testacea univalvia, testa patula.

Gen. 4. *Akera.* Apertura effusa, tentaculis nullis.

Gen. 5. *Argonauta.* Apertura profunda, tentaculis binis.

Gen. 6. *Bulla.* Apertura repanda, tentaculis binis setaceis, colliculo extrinsecus oculatis.

Gen. 7. *Buccinum.* Apertura ovata, tentaculis binis triangularibus, angulo intrinseco oculatis.

Gen. 8. *Carychium.* Apertura ovata, tentaculis binis truncatis conspicuis, angulo intrinseco oculatis.

Gen. 9. *Vertigo.* Apertura subquadrata, tentaculis binis sublinearibus, apice oculatis.

Gen. 10. *Turbo.* Apertura orbiculari, tentaculis binis setaceis, conspicuis, angulo extrinseco oculatis.

Gen. 11. *Helix.* Apertura lunari, tentaculis quatuor linearibus, apice oculatis.

Gen. 12. *Planorbis.* Apertura semilunari, tentaculis binis setaceis, angulo intrinseco oculatis.

Gen. 13. *Ancylus.* Apertura totali tentaculis binis truncatis, occultis, angulo extrinseco oculatis.

Gen. 14. *Patella.* Apertura totali, tentaculis binis setaceis, occulto angulo, extrinseco oculatis.

Gen. 15. *Haliotis.* Apertura repanda, poris pertusa.

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SECT. III. Testacea univalvia, testa operculata.

Gen. 16. *Tritonium.* Libera, apertura canaliculata, tentaculis duobus linearibus, angulo extrinseco oculatis.

Gen. 17. *Trochus.* Libera, apertura sub-tetragona, tentaculis duobus setaceis, colliculo extrinseco oculatis.

Gen. 18. *Nerita.* Libera, apertura lunari, tentaculis duobus setaceis, angulo extrinseco oculatis.

Gen. 19. *Valvata.* Libera, apertura circinnata, tentaculis duobus setaceis, angulo postico oculatis.

Gen. 20. *Serpula.* Adnata, apertura orbiculari, tentaculis pinnatis.

FAMILIA II. *Testacea Bivalvia.*

SECT. I. Testacea bivalvia cardine dentata.

Gen. 1. *Mya.* Testa altera extremitate hiante; cardine dente crasso solitario.

Gen. 2. *Solen.* Testa utraque extremitate hiante; cardine dente reflexo, sæpe gemino.

Gen. 3. *Tellina.* Siphone duplici, murico; cardine dentibus utrinque tribus alternis.

Gen. 4. *Cardium.* Siphone duplici, cirrato, pedeque falciformi; cardine dentibus mediis alternis, remotis penetralibus.

Gen. 5. *Venus.* Siphone duplici, cirrata, pedeque laminæformi; cardine dentibus tribus approximatis, lateralibus divergentibus.

Gen. 6. *Mactra.* Cardine dente medio complicato, adjacente foveola.

Gen. 7. *Donax.* Cardine dentibus duobus, lateralique solitario.

Gen. 8. *Arca.* Cardine dentibus numerosis, alternis, penetrantibus.

Gen. 9. *Terebratula.* Branchiis circinnatis; cardine dentibus alterius uncinatis, valvula superiore deorsum perforata.

SECT. II. Testacea bivalvia, cardine edentulo.

Gen. 10. *Anomia.* Branchiis simplicibus; valvula inferiore perforata.

Gen. 11. *Ostrea.* Branchiis simplicibus, pede nullo; cardines fossula cava.

Gen. 12. *Pecten.* Branchiis cirratis, pede juxta auriculam cardine fossula ovata, byssum emittens.

Gen. 13. *Mytilus.* Siphone duplici brevi; fossula lineari, byssum emittens.

FAMILIA III. *Testacea Multivalvia.*

Gen. 1. *Chiton.* Valvulæ dorsales, tentacula nulla.

Gen. 2. *Lepas.* Valvulæ erectæ, tentacula bipartita.

Gen. 3. *Pholas.* Valvulæ ad cardinem minores.

X. To this account of the different methods of arranging shells, we shall only add the system proposed by Da Costa in his Elements of Conchology. In this system the author adopts the usual general division into Univalves, Bivalves, and Multivalves. 14 Da Costa.

I. UNIVALVES are distributed into 16 families, which are divided into four orders.

Order I. Simple; consists of four families. 1. Patella. 2. Haliotis. 3. Vermiculi. 4. Dentalia. Order II. includes only one family. 5. Polythalamia. Order III. Revolved. Fam. 6. Turbinata involuta. Order IV. Turbinated

Animals which inhabit Shells.

binated. Fam. 7. Cymbium. Fam. 8. Auris cochlea. Fam. 9. Cylindri. Fam. 10. Voluta. Fam. 11. Globosa. Fam. 12. Cassides. Fam. 13. Trochi. Fam. 14. Cochleæ. Fam. 15. Buccina. Fam. 16. Murex.

II. Bivalves composed of 3 orders.

Order I. With unequal valves, and shut close. Fam. 1. Pecten. Fam. 2. Spondylus. Fam. 3. Ostreum. Fam. 4. Anomia. Ord. II. With equal valves, and shut close, is divided into three sections. Sect. 1. Multarticulate. Fam. 5. Pectinoides. Fam. 6. Pectunculi. Fam. 7. Arca. Sect. 2. Articulate. Fam. 8. Pectunculus. Fam. 9. Tellina. Fam. 10. Placenta. Sect. 3. Inarticulate. Fam. 11. Margaritifera. Fam. 12. Musculus. Ord. III. With valves that never shut close. Fam. 13. Chama, *Gapers*.

III. Multivalves contain one order. Fam. 14. Pholas. Fam. 15. Anatiferæ. Fam. 16. Balani.

CHAP. II. OF THE ANIMALS WHICH INHABIT SHELLS.

15 Generic characters of testaceous animals.

BEFORE we proceed to the classification of shells, we shall here give a short description of the animals which inhabit them. Of these, however, a minute and accurate anatomical description is not to be expected; for little more is known of the structure of these animals than what has been given by naturalists concerning their external characters.

Some of the animals, which inhabit shells, are also found in the *mollusca* state; that is, without any testaceous covering. Such, for instance, is the *limax*, or snail.

The animals which have been found inhabiting shells are the following; viz. Doris, Triton, Ascidia, Tethys, Limax, Spio, Amphitrite, Terebella, Nereis.

Doris.—The body is creeping, oblong, and flat beneath; the mouth is placed below on the forepart; vent behind on the back, and surrounded by a fringe. Feelers two or four, situated on the upper part of the body in front, and retractile within the proper receptacles.

The animal which inhabits the chiton belongs to this genus.

Triton.—The body is oblong, and the mouth is furnished with an involute spiral proboscis; tentacula or arms 11, six on each side, divided nearly to the base. The hind ones cheliforous.

The triton inhabits different species of lepas.

Ascidia.—The body is fixed, roundish, and apparently issuing from a sheath; apertures two, generally placed near the upper end, one beneath the other. The animals are found in the sea, and adhere by their base to rocks, shells, and other submarine substances: they are more or less gelatinous. The only powers of motion which they possess seem to be that of contracting and dilating themselves alternately; by which means they are enabled to throw out the water which they take in with considerable force.

This animal inhabits the pholas, solen, some species of the mya, mactra, and other bivalves.

Tethys.—The body is detached, rather oblong, fleshy, without peduncles: the mouth is furnished with a terminal cylindrical proboscis, under an expanded membrane or lip: apertures two, on the left side of the neck.

The tethys inhabits a great proportion of bivalve shells, as many species of tellina, cardium, mactra, venus, ostrea, and others

Limax.—The body is oblong, creeping, with a fleshy kind of shield above, and a longitudinal flat disc beneath: aperture placed on the right side within the shield: feelers 4, situated above the mouth, with an eye at the tip of each of the larger ones.

The animals belonging to this genus inhabit the turbinated univalve shells; but it appears that all the animals which inhabit these shells do not exactly correspond with the above generic characters.

Spio.—The body projecting from a tube, jointed and furnished with dorsal fibres; peduncles or feet rough with bristles, and placed towards the back; feelers 2; long, simple; eyes 2; long.

This animal inhabits some species of sabella.

Amphitrite.—Body projecting from a tube, and annulate; peduncles or feet small, numerous, with lateral fasciculi, and branchiæ; feelers 2, approximate, feathered; no eyes.

The amphitrite inhabits some species of sabella and serpula.

Terebella.—Body oblong, creeping, naked, furnished with lateral fasciculi, or tufts, and branchiæ; mouth placed before, furnished with lips, without teeth, and protruding a clavated proboscis; feelers numerous, ciliated, capillary, and placed round the mouth.

This animal is an inhabitant of many species of dentalium, serpula and sabella.

Nereis.—Body long, creeping, with numerous lateral peduncles or feet on each side; feelers simple, rarely none; eyes 2 or 4, rarely none. According to some naturalists, the nereis inhabits some species of sabella.

Sepia.—Body fleshy, receiving the breast in a sheath, with a tubular aperture at its base; arms 8, beset with numerous warts or suckers, and in most species 2 pedunculated tentacula; head short; eyes large; mouth resembling a parrot's beak.

The animal which inhabits the argonauta is considered by naturalists as belonging to this genus.

Clio.—Body oblong, natant, generally sheathed, and furnished with two dilated membranaceous arms or wing-like processes; tentacula 3, besides 2 in the mouth.

According to some naturalists, it is an animal belonging to this genus, which inhabits the argonauta.

CHAP.

Terms employed in describing Shells.

CHAP. III. OF THE TERMS WHICH ARE EMPLOYED IN DESCRIBING SHELLS.

16 Terms explained.

AS it will tend to facilitate our progress in the study of *Conchology*, clearly to understand the terms which are employed in describing shells, and the names by which the different parts have been distinguished by naturalists; we shall here give a few definitions of the principal terms. And that these definitions may be easily consulted, we shall observe the same order as in the classification which is to be adopted. They may be conveniently arranged, therefore, into the three divisions of multivalves, bivalves, and univalves.

1. *Explanation of the Terms of Multivalve Shells.*

17 Multivalves.

MULTIVALVE shells are composed of more than two pieces.

Articulated (testæ articulatæ), when the different pieces of which the shell is composed are so strongly united that they seem to form one shell.

Æquivalve shells (testæ æquivalves), when the valves of the two sides have the same form, size, and position.

A shell is said to *adhere* (testa adherens,) when it is attached to solid bodies by some of the pieces of which it is composed: It is said to be *loose* (testa libera), when it is not attached by any point.

Pedunculated (testa pedunculata), when all the pieces of which it is composed, are supported by a tendinous peduncle which is fixed to solid bodies.

Tubular (testa tubulosa,) when the greatest part of the shell is formed of a cylindrical tube.

Base of the shell (basis testæ), that part on which it is supported.

Ligament (ligamentum), is a membranous or tendinous substance which connects the valves together, and sometimes lines the cavity of the shells. Of this there are several varieties.

——— scaly (ligamentum squamatum,) when the surface is covered with small granular scales.

——— prickly (ligamentum aculeatum), when the surface is furnished with small rough points.

——— smooth (ligamentum læve), when the surface has neither points, scales, nor tubercles.

——— punctated (ligamentum punctatum), when the surface is marked with small cavities.

Lid (operculum), is the name given to four small triangular valves, articulated in the form of a cross, which shut up the superior orifice of some species of multivalve shells.

Peduncle (pedunculus) is the tendinous substance which supports some of the multivalve shells. It is flexible while the animal is alive, and is smooth or scaly.

Rays (radii); these are impressions on the external surface of some shells; they are of a conical form, having the vertex turned towards the base of the shell. They are only distinctly seen in adult shells.

——— filiform (radii filiformes) are long and narrow.

——— smooth (radii leves.)———

——— striated (radii transversim striati.)———

Valves (valvulæ) are the different pieces of which multivalve shells are composed.

2. *Explanation of the Terms applied to Bivalve Shells.*

A BIVALVE shell is said to *adhere* (testa adherens), when it is fixed by any part of one of its valves to a solid body. 18 Bivalves.

It is said to have *ears* (testa aurita), when it forms at its base, one or two compressed angles.

Gaping (testa hians), when the valves do not shut close.

Bearded (testa barbata), covered externally with an epidermis composed of strong hair or bristles.

Compressed (testa compressa), when the valves are flat, forming a small cavity.

Heart-shaped (testa cordata), having the form of a heart; (subcordata) approaching to that form.

Toothless (edentula) without teeth at the hinge.

Equilateral (testa æquilatera), when the anterior and posterior part of the shell is equal in form and figure.

Equivalve (equivalvis), when the two valves are similar in form and convexity.

Irregular (testa irregularis), when the form varies in the individuals of the species.

Lenticular (lenticularis) when the valves are round, and little elevated in the middle, and diminish gradually in thickness towards the edges.

Linear (testa linearis), when the length considerably exceeds the breadth, but without a cylindrical form.

Tongue-shaped (linguæformis), flat and oblong, having the two extremities round and obtuse.

Boat-shaped (navicularis), resembling the figure of a boat.

Pectinated (pectinata), when the valves being furnished with longitudinal ribs, have on their anterior surface ribs nearly transverse, which form by their union with the first acute angles.

Radiated (radiata), when it is marked on the external surface with rays, ribs, or elevated striæ, which proceed from the extremity of the summits, and terminate in the circumference of the valves.

Beaked (rostrata), when one of its surfaces, either anterior or posterior, being contracted and elongated, terminates in form of a beak.

Base (basis). The situation in which Linnæus has described and considered bivalve shells, consists in placing the beaks of the shell turned downwards, in such a way that the ligaments of the valves may be seen, so that the base of the shell is the region of its beaks.

Margin of the shell (margo testæ) signifies the whole circumference of the shell, parallel to the edge of the valves. It is divided into anterior, posterior, and superior.

——— anterior (margo anterior), when the shell is placed on the beak of the valve, commences at the side of the ligament, on the fore-part of the beaks,

Terms employed in describing Shells.

Valves, of bivalve shells, are divided into right and left, equal and unequal, equilateral and inequilateral, superior and inferior.

——— right valve (dextra), is distinguished from the left, by placing the shell on its base, having the cardinal ligament before, and the anus behind. In this position the right valve of the shell corresponds to the left of the observer, and the left valve (sinistra) to the right of the observer.

——— equal (equales), when the right valve corresponds with the left in form, size, and other external characters.

——— superior (valvula superior). In an irregular shell, such as the oyster, one of the valves is attached to solid bodies; the other in this case is superior. This valve is sometimes called by Linnæus, the lid (operculum): in some species it is flat and small, and in others more convex than the inferior valve.

——— keel-shaped (valvulæ carinatæ), when one part of their convexity presents a sharp edge.

——— chambered (concameratæ), when they exhibit in their cavity testaceous plates, detached and raised.

——— spinous (spinosæ), when the whole surface is furnished with spines.

——— banded (fasciatæ), exhibiting large coloured transverse stripes or bands.

——— lamellated (lamellosæ), when the surface is furnished with plates more or less separated.

——— radiated (radiatæ), exhibiting divergent or coloured rays.

——— sinuated (lacunosæ), when one of the valves has a sensible depression at the middle of its margin, and a corresponding elevation of the opposite valve.

——— striated (striatæ) when the surface is marked with striæ.

——— transverse, when the striæ are parallel to the margin of the valves.

——— longitudinal, when they run from the base to the circumference.

Muscular impressions (impressiones), are marks on the interior surface of the valves, where the muscles of the animal are attached.

——— solitary (solitariæ), when the inner surface of each valve has only one.

——— double (duplicatæ), two on the inner surface of each valve.

——— triple or ternate (ternatæ), three in each valve.

Ligament (ligamentum), is a horny substance, of little flexibility, which unites the two valves near their base, and which in almost all bivalve shells is placed at the lower end of their anterior surface. It is divided into

——— gaping (hians), when its upper extremity is divided into two.

——— double (duplex), when under the external ligament there appears a second, in a particular hollow of the hinge, which does not appear externally.

——— internal (internum), when it unites the valves without appearing externally.

——— profound (retractum seu intractum), when it is so deep in the suture as scarcely to be seen when the valves are shut.

——— truncated (truncatum), when shorter than its suture.

Furrows (sulci), are those impressions or interstices between the ribs or rays on the surface of the valves.

——— square (quadrati), when the bottom is flat.

——— lamellated (lamellosi), when the bottom is marked with small transverse scales.

——— punctated (excavato puuctati), when the whole surface is marked with small cavities or dots.

3. *Explanation of Terms applied to Univalve Shells.*

19 Univalves.

The *base*, (basis) is the most elevated part of the shell, opposite to the spire. It is divided into

——— notched (emarginata), when it is accompanied with a deep notch.

——— tubular (tubulosa seu cordata), when it is formed by a tube.

——— simple or entire (simplex aut integra) without notch or tube.

Summit (vertex) signifies the top of some patellæ, and from its position is central, marginal, or submarginal.

The *shell* (testa) is divided with regard to its position into superior and inferior.

The *anterior part* (pars antica), is that which forms the spire of the shell; and it is also the superior part.

The form of shells is

——— bordered (marginata), when the two sides of the opening are broader and thicker than the rest of the diameter.

——— chambered (polythalamia), when it is internally divided by different partitions parallel to the opening.

——— convoluted (convoluta), when the spires turn round a lengthened cone, nearly vertical to each other.

——— rooted (radicata), when it is attached to a solid body by a ligament proceeding from its base.

——— interrupted (interrupta), when the successive additions to the shell are marked with distinct rings.

——— umbilicated (umbilicata), when the axis round which the spire turns, being empty, forms a cavity at the base of the shell, whose diameter is at least a sixth part of that of the shell.

——— imperforated (imperforata seu exumbilicata), when its inferior axis has neither hole nor umbilicus.

——— oval or elliptic (ovalis), the longitudinal diameter exceeding the transverse, and the two extremities equal and a little contracted.

——— egg-shaped (ovata), the longitudinal diameter exceeding the transverse, and the extremities terminated by the segment of a circle.

——— beaked (rostrata), when the two extremities, sometimes tubular, form a projection in form of a beak.

——— imbricated (imbricata), when the surface is covered with parallel scales, so arranged as to cover each other.

——— turbinated (turbinata), when the belly of the shell is large in proportion to the spires, which seem to proceed from its centre.

Opening

Terms employed in describing Shells.

Opening or *mouth* (apertura), is that part of the cavity of the shell which is visible. It is
——— angular (angulata), when its circumference has several angles.
——— gaping (dehiscens), when one of the extremities is wider than the other.
——— bimarginated (bimarginata), when the right lip forms a double margin.
——— compressed (coarctata), when it is distinctly flattened.
——— semicircular (semiorbiculata), when it forms half a circle.
——— linear (linearis), when it is narrow, and the length considerably exceeds the breadth.
——— longitudinal (longitudinalis), when the length is greater than the breadth, and the greatest dimension is parallel to the axis of the shell.
——— orbicular (orbicularis), forming an entire circle.
——— striated (striata), when the cavity is marked with striæ, parallel to the direction of the convolutions.
——— transverse (transversa), when the breadth is greater than the length.
Pillar (columella), is that part of the shell situated within the opening, near its axis, round which the spires turn. It is brought into view by dividing the shell its whole length. It is
——— flattened (plana), when the surface is flat and smooth.
——— caudated (caudata), when it is lengthened beyond the base of the shell.
——— folded (plicata), marked with transverse and distinct folds.
——— spiral (spiralis), proceeding from the base, and forming a small twisted elongation.
——— truncated (truncata), cut transversely at the base.
Convolutions (anfractus), are the turnings of the spire round the pillar, from the opening to the base of the shell. They are
——— bifid (bifidi), when each is divided into two equal parts by a furrow or spiral line.
——— grooved (canaliculati), when the superior edge is marked with a groove.
——— keel-shaped (carinati), when the outer turn of the shell is marked with an angle more or less acute.
——— crowned (coronati), when the upper surface is bordered at a little distance from the sutures, with a single row of tubercles or spinous scales.
——— dextral (dextri), turning from the left to the right.
——— sinistral (sinistri), turning from the right to the left.
——— lettered (scripti), marked with characters.
——— spinous (spinosi), having short spines on the surface.
——— entire (simplices), without furrows or tubercles.
——— banded (fasciati), when the surface is marked with broad coloured stripes.
——— lamellated (lamellati), the surface marked with longitudinal or transverse excrescences, and laminated like membranes.
——— lineated (lineati), marked with coloured lines.
——— radiated (spinoso-radiati), having the circumference bordered with straight spines, separating and divergent.
——— separated (disjuncti), having an interval between each convolution.
——— furrowed (sulcati), having the surface marked with furrows, which are always broader than striæ.
——— decussated (decussati), when the striæ cross each other at right angles.
Spire (spira), signifies all the convolutions taken together. It is
——— pointed (acuta), when the convolutions joined together form an acute angle.
——— flattened (depressa), forming a flat surface.
——— convex (convexa), when it is rounded, and the point of the base has little elevation.
——— convex (convexo-acuta), rounded at the outer edge, but elevated into an acute angle.
——— convex and elevated (convexo-exserta), rounded at the outer edge, and elevated without forming an acute angle.
——— convex and pointed (convexo-mucronata), obtuse and almost rounded at the outer edge, and terminated at the centre with a pointed elevation.
——— crowned (coronata), when the outer edges of each convolution are accompanied with a row of spines or tubercles.
——— capitate (capitata), the convolutions united, forming a swelling resembling a head.
——— obtuse (obtusa), the convolutions united, forming an obtuse angle.
——— plano concave (plano-concava), the convolutions forming no elevation, but are slightly grooved.
——— pyramidal (pyramidata), of a conical form.
Sutures (suturæ), signify the place of junction of the different convolutions, forming a spiral line. They are
——— grooved (canaliculatæ), when they are so deep as to form a small canal.
——— notched (crenulatæ), when the points of contact are marked with notches.
——— double (duplicatæ), accompanied with two striæ, which run parallel.
——— effaced (obsoletæ), when the place of junction is not perceptible.
Siphon (sipho), is a small canal situated in the internal part of the shell of the nautili, which penetrates into the divisions of which it is composed. It is
——— central (centralis), when it is situated in the middle of the divisions.
——— lateral (lateralis), situated at one side.
——— oblique (obliquus), cutting the axis of the divisions obliquely.
Veins (varices), are elevations or ribs, running in the direction of the length of the shell, formed by the junction of the different additions which the shell has received. They cut the convolutions of the spire transversely. They are
——— continued (continuatæ), proceeding from the base of the spire to the convolution at the opening, without interruption.
——— spinous (spinosæ), furnished with strong spines.
——— interrupted (decussatæ), not corresponding with the different convolutions.

CHAP.

CHAP. IV. CLASSIFICATION OF SHELLS.

20 Classification.

SHELLS are divided by Linnæus into multivalve, bivalve, and univalve. In the following classification the same arrangement will be adopted; and we shall first exhibit in one view the characters of each genus, in the original language of Linnæus, with a translation opposite, for the sake of the English reader; so that the genus of any shell may be easily determined. In describing the species, we shall observe the utmost brevity, giving such characters only as are necessary to afford precise marks of distinction. In arranging the species under each genus, the British species will be distinguished with an asterisk; so that, with the advantage of a general classification, this will answer the purpose of a British conchology.

GENERIC CHARACTERS.

I. MULTIVALVE SHELLS.

21 Generic character of multivalves.

1. CHITON. Animal doris. Testæ plures, secundum longitudinem sibi appositæ dorso incumbentes.

2. LEPAS. Animal triton. Testa basi affixa multivalvis: valvis inæqualibus erectis.

3. PHOLAS. Animal ascidia. Testa bivalvis divaricata, cum minoribus accessoriis difformibus: cardo recurvatus cartilagine connexus.

1. C. Animal inhabiting the shell a doris. Shell consisting of several segments or valves disposed down the back.

2. L. Animal a triton. Shell affixed at the base, and consisting of many unequal erect valves.

3. P. Animal an ascidia. Shell bivalve, divaricate, differently shaped; accessory valves: hinges bent back, united by a cartilage: beneath the hinge, internally, is an incurved tooth.

II. BIVALVE SHELLS.

22 Of bivalves.

4. MYA. Animal ascidia. Testa bivalvis hians, ut plurimum, altera extremitate: cardo dente (plerisque uno) solido, crasso, patulo, vacuo; nec inserto testæ appositæ.

5. SOLEN. Animal ascidia. Testa bivalvis oblongata, utreque latere hians. Cardo dens subulatus reflexus, sæpe duplex, non insertus testæ appositæ; margo lateralis magis obsolatus.

6. TELLINA. Animal tethys. Testa bivalvis, anterius hinc ad alterum latus flexa. Cardinis dentes ut plurimum tres: laterales plani alterius testæ.

7. CARDIUM. Animal tethys. Testa bivalvis subæquilatera, æquivalvis, plerumque convexa, longitudinaliter costata, striata aut sulcata, margine dentata. Cardo dentibus mediis binis alternatis: altero ut plurimum incurvo; lateralibus remotis insertis.

8. MACTRA. Animal tethys. Testa bivalvis, inæquilatera, æquivalvis. Cardo dente medio complicato cum adjecta foveola, lateralibus remotis insertis.

9. DONAX. Animal tethys. Testa bivalvis, margine sæpe crenulato antico obtusissimo, Cardo dentibus duobus; marginalique solitario (rarius duplice, triplice, aut nullo) subremoto sub ano.

10. VENUS. Animal tethys. Testa bivalvis; labiis margine antico incumbentibus. Cardo dentibus tribus, omnibus approximatis lateralibus apice divergentibus.

4. M. Animal an ascidia. Shell bivalve, generally gaping at one end. Hinge with broad, thick, strong teeth (seldom more than one), and not inserted into the opposite valve.

5. S. Animal an ascidia. Shell bivalve, oblong, open at both ends. Hinge with a subulate, reflected tooth, often double, and not inserted in the opposite valve; the lateral margin more effaced.

6. T. Animal a tethys. Shell bivalve, generally sloping on one side, in the fore part of one valve a convex, of the other a concave fold. Hinge usually with three teeth: the latter ones in one shell being smooth.

7. C. Animal a tethys. Shell bivalve, nearly equilateral, æquivalve, generally convex, longitudinally ribbed, striated, or grooved, with a toothed margin. Hinge with two teeth near the beak, and a larger remote lateral one on each side, each looking into the opposite.

8. M. Animal a tethys. Shell bivalve, of unequal sides, and æquivalve. Middle tooth of the hinge complicated, with a small hollow on each side, lateral ones remote and inserted into each other.

9. D. Animal a tethys. Shell bivalve, generally with a notched margin: the frontal margin very obtuse. Hinge with two teeth, and a single marginal one placed behind (rarely double, triple or none).

10. V. Animal a tethys. Shell bivalve; the frontal margin flattened with incumbent lips. Hinge with three teeth, all approximate; the lateral ones divergent at the tip.

Classification of Shells.

11. SPONDYLUS. Animal tethys. Testa inæquivalvis rigida. Cardo dentibus duobus recurvis, cum foveola intermedia.

12. CHAMA. Animal tethys. Testa bivalvis crassior, cardo callo gibbo, oblique inserto fossulæ obliquæ.

13. ARCA. Animal tethys? Testa bivalvis æquivalvis. Cardo dentibus numerosis, acutis, alternis insertis.

14. OSTREA. Animal tethys. Testa bivalvis, plurimis inæquivalvis subaurita. Cardo edentulus, fossula cava, ovata, sulcisque (in plurimis) lateralibus transversis.

15. ANOMIA. Animal corpus ligula emarginata ciliata: ciliis valvæ superiori affixis: brachiis duobus linearibus corpora longioribus conniventibus porrectis, valvæ alternis utrinque ciliatis: ciliis affixis valvæ utrique: testa inæquivalvis, valva altera planiuscula, altera basi magis gibba: parum altera basi sæpe perforata. Cardo cicatricula lineari prominente introrsum dente laterali; valvæ vero planioris in ipso margine. Radii duo ossei pro basi animalis.

16. MYTILUS. Animal ascidia? Testa bivalvis, rudis, sæpius affixa bysso, ut plurimum, crassiori. Cardo in plurimis edentulus, distinctus, paucis exceptis, linea subulata, excavata longitudinali.

17. PINNA. Animal limax. Testa sub-bivalvis fragilis, erecta hians, emittens barbam byssinam. Cardo edentulus, coalitis in unam valvis.

11. S. Animal a tethys. Shell hard, solid, with unequal valves. Hinge with two recurved teeth, separated by a small cavity.

12. C. Animal a tethys. Shell bivalve, rather coarse. Hinge with a callous protuberance, obliquely inserted in an oblique hollow.

13. A. Animal a tethys? Shell bivalve equivalve. Hinge with numerous sharp teeth, alternately inserted between each other.

14. O. Animal a tethys. Shell bivalve, generally with unequal valves, and slightly eared. Hinge without teeth, but furnished with an ovate cavity, and in most with lateral, transverse furrows.

15. A. Animal an emarginate, ciliated, strap-shaped body, with bristles attached to the upper valve; arms, two, linear, longer than the body, projecting and approaching together, alternate on the valve, and ciliated on each side, with bristles affixed to each valve. Shell inequivalve, one of the valves flattish, the other protuberant at the base: one of the valves often perforated near the base. Hinge with a linear prominent cicatrix, and a lateral tooth placed within; but on the very margin of the flat valve there are two bony rays for the base of the animal.

16. M. Animal an ascidia? Shell bivalve, rough, generally affixed by a byssus or beard of silky filaments. Hinge mostly without teeth, and in most cases with a subulate, hollow, longitudinal line.

17. P. Animal a limax. Shell bivalve, brittle, gaping at one end, and having a byssus or beard. Hinge without teeth, the valves being united into one.

III. UNIVALVE SHELLS.

23 Univalves.

18. ARGONAUTA. Animal sepia aut clio. Testa univalvis, spiralis, involuta, membranacea, unilocularis.

19. NAUTILUS. Animal? Testa univalvis, isthmis perforatis concamerata, polythalamia.

20. CONUS. Animal limax. Testa univalvis convoluta, turbinata; apertura effusa, longitudinalis, linearis, edentula, basi integra; columella levis.

21. CYPRÆA. Animal limax. Testa univalvis, involuta, sub-ovata, obtusa, lævis. Apertura utrinque effusa, linearis utrinque dentata longitudinalis.

22. BULLA. Animal limax. Testa univalvis convoluta, inermis. Apertura sub-coarctata, oblonga, longitudinalis, basi integerrima. Columella obliqua, lævis.

23. VOLUTA. Animal limax. Testa unilocularis spiralis. Apertura ecaudata, sub-effusa. Columella plicata: labio umbilicove (ut plurimum) nullo.

24. BUCCINUM. Animal limax. Testa univalvis, spiralis, gibbosa. Apertura ovata desinens in canaliculum (retusam lacunam) dextrum, cauda retusa. Labium interius explanatum.

25. STROMBUS. Animal limax. Testa univalvis, spiralis, latere ampliata. Apertura labro sæpius dilatato, desinens in canalem sinistrum.

26. MUREX. Animal limax. Testa univalvis, spiralis, exasperata suturis membranaceis. Apertura desi-

18. A. Animal a sepia or clio. Shell univalve, spiral, involute, membranaceous, one cell.

19. N. Animal? Shell univalve, divided into several chambers communicating with each other.

20. C. Animal a limax. Shell univalve, convolute, turbinate; aperture effuse, longitudinal, linear, without teeth; entire at the base. Pillar smooth.

21. C. Animal a slug. Shell univalve, involute, subovate, smooth, obtuse. Aperture effuse at each end, linear, extending the whole length of the shell, and toothed on each side.

22. B. Animal a limax. Shell univalve, convolute, without teeth. Aperture a little narrowed, oblong, longitudinal, quite entire at the base. Pillar oblique and smooth.

23. V. Animal a limax. Shell one cell, spiral. Aperture without a beak, and somewhat effuse. Pillar twisted or plaited: generally without lips or perforation.

24. B. Animal a limax. Shell univalve, spiral, gibbous. Aperture ovate, ending in a short canal, leaning to the right, with a retuse beak. Internal or pillar lip expanded.

25. S. Animal a limax. Shell univalve, spiral, enlarged at the side. Aperture dilated with the lip expanding, and ending in a groove towards the left.

26. M. Animal a limax. Shell univalve, spiral, rough, with membranaceous sutures. Aperture oval, terminating

nens in canalem integrum rectum sive subascendentem.

27. Trochus. Animal limax. Testa univalvis, spiralis, subconica. Apertura subtetragono-angulata seu rotundata, superius transversè coarctata; columella obliquata.

28. Turbo. Animal limax. Testa univalvis, spiralis, solida. Apertura coarctata, orbiculata, integra.

29. Helix. Animal limax. Testa univalvis, spiralis, subdiaphana, fragilis. Apertura coarctata, intus lunata seu subrotunda; segmento circuli dempto.

30. Nerita. Animal limax. Testa univalvis, spiralis, gibba, subtus planiuscula. Apertura semiorbicularis, vel semilunaris; labio columellæ transverso, truncato, planiusculo.

31. Haliotis. Animal limax. Testa auriformis, patens: spira occultata laterali disco, longitudinaliter poris pertusa.

32. Patella. Animal limax. Testa univalvis subconica, absque spira.

33. Dentalium. Animal terebella. Testa tubulosa, recta, monothalamia, utraque extremitate pervia.

34. Serpula. Animal terebella. Testa univalvis, tubulosa, adherens (sæpe isthmis integris passim intercepta).

35. Teredo. Animal terebella. Valvis duabus calcariis hemisphericis, anterius excisis, et duabus lanceolatis. Testa teres, flexuosa, lignum penetrans.

36. Sabella. Animal nereis. Ore ringente, tentaculis duobus crassioribus pone caput. Testa tubulosa, contexta ex arenulis confertim membranæ vaginali insertis.

terminating in an entire straight, or slightly ascending canal.

27. T. Animal a limax. Shell univalve, spiral, somewhat conic. Aperture somewhat angular, or rounded: the upper side transverse and contracted; pillar placed obliquely.

28. T. Animal a limax. Shell univalve, spiral, solid. Aperture contracted, orbicular, entire.

29. H. Animal a limax. Shell univalve, spiral, subdiaphanous, brittle. Aperture contracted, semilunar or roundish.

30. N. Animal a limax. Shell univalve, spiral, gibbous, flattish at bottom. Aperture semiorbicular or semilunar, pillar lip transversely truncated and flattened.

31. H. Animal a limax. Shell ear-shaped dilated, with a longitudinal row of orifices along the surface; the spire lateral and nearly concealed.

32. P. Animal a limax. Shell subconic, without spire.

33. D. Animal a terebella, Shell tubular, straight, or slightly curved, with one cavity open at both ends.

34. S. Animal a terebella. Shell tubular, generally adhering to other substances (often separated internally by entire divisions.)

35. T. Animal a terebella. With two calcareous, hemispherical valves, anteriorly cut off, and two lanceolate ones. Shell round, flexuous, penetrating wood.

36. S. Animal a nereis. With a ringent mouth, and two thicker tentacula behind the head. Shell tubular, consisting of particles of sand united to a membrane by a glutinous cement.

I. MULTIVALVES.

24 Chiton.

Gen. 1. Chiton.

Gen. Char.—The animal inhabiting this shell is a doris. The shell consists of several segments or valves, arranged along the back.

Species.

*All the Species marked * are British.*

squamosus 1. Eight valves, semistriated; margin covered with minute scales; 2 inches long. America. Wood, t. 1. f. 1.

bistriatus. 2. With eight doubly striated valves, middle valves with curvilinear striæ; margin scaly. Chemnitz. viii. t. 94. f. 788 to 91.

fulvus. 3. With eight valves, and whitish dotted striæ; margin coriaceous; 1 inch long. S. America. Wood, t. 1. f. 2.

piceus. 4. With eight smooth valves; margin coriaceous and spiny; colour pitchy; 2 inches long. Red sea. Wood, t. 1. f. 3.

granulatus. 5. Flat above, with numerous raised dots in rows; border broad, coriaceous, spinous; 2 inches long. W. Indies. Chem. viii. t. 96. f. 806.

aculeatus. 6. Eight-valved, striated; valves prickly; margin with bristles; 2½ inches long. Asia. Chemnitz, v. t. 173. f. 1692.

fasciatus. 7. With eight valves; lower triangular, half of the 6 middlemost granulated; 1½ inch long. W. Indies. Chemnitz, viii, t. 94. f. 792 and 3.

marmoratus. 8. Eight-valved, smooth, varied with white and black; margin tumid and scaly; 1¼ inch long. W. Indies. Chemnitz, viii. t. 95. f. 803 to 5.

maculatus. 9. Eight-valved, smooth, within sea-green; margin covered with gray white scales; 1¼ inch long. India. Chemnitz, viii. t. 95. f. 802.

tunicatus. 10. With eight smooth, white valves; above the membrane roundish; margin coriaceous and reflected; 4 inches long, and 1¾ inch broad. North seas. Wood, t. 2. f. 1.

gigas. 11. Eight-valved, thick, convex, white; first valve notched, last toothed, middle ones emarginate; 4 inches long; margin coriaceous. Cape of Good Hope. Chemnitz, viii. t. 96. t. 819.

amiculatus. 12. Eight-valved, kidney-shaped, fragile; valves imbricated; covered with a broad coriaceous membrane; 6 inches long. Kurile islands. Pallas, t. 7. f. 26.

castaneus. 13. With eight very smooth chesnut-coloured valves, inside rosy; 2 inches long, Wood, t. 2. f. 2.

ruber. 14. With eight valves, with slight curved striæ; margin red; 1 inch long. North seas. Chemnitz, viii. t. 96. f. 813.

punctatus. 15. With eight valves, smooth body; with excavated dots on the margin. Asia, Europe, and America.

indicus. 16. Eight-valved, whitish ash colour, border scaly; middle valves finely punctured; 1 inch long. W. Indies. Chemnitz, viii. t. 96. f. 811.

virides. 17. With eight valves; keel triangular, very rough and slightly toothed; margin scaly; 2 inches long. Chemnitz, x. t. 173. f. 1689.

lineatus. 18. With eight smooth streaked valves; margin broad and coriaceous; $1\frac{1}{4}$ inch long. Wood, t. 2. f. 4 and 5.

fascicularis. * 19. With eight valves, having one lateral tuft of hair at the junction of each valve, and two in the front; from $\frac{1}{8}$ to 1 inch long. Barbary. Wood, t. 2. f. 6.

sulcatus. 20. With eight thick, convex, grooved valves; margin broad and scaly; 4 inches long. South seas. Wood, t. 3. f. 1.

bicolor. 21. Eight-valved, thick ridged; the outside sea-green; margin blackish, inside white; $2\frac{1}{4}$ inches long. India. Chemnitz, viii. t. 94. f. 794 and 5.

cerasinus. 22. With eight smooth cherry-coloured valves, and a white crenated border; $1\frac{1}{2}$ inch long. Surinam. Chemnitz, viii. t. 95. f. 797 and 8.

magellanicus. 23. Eight-valved, thick, striated, black brown; $2\frac{1}{4}$ inches long. Straits of Magellan. Chemnitz, viii. t. 95. f. 797 and 8.

fuscus. 24. Eight-valved, brown, smooth; inside teeth of the margin snowy; $2\frac{1}{2}$ inches long. India. Chemnitz, viii. t. 95. f. 799 and 800.

minimus. 25. Eight-valved, smooth, black, very small, mealy, with a transverse band on each; $\frac{1}{2}$ inch long. Norway. Chemnitz, viii. t. 96. f. 814.

cimex. 26. Eight-valved, carinated, diaphanous, banded; terminal valves finely punctured; $\frac{1}{4}$ inch long. Norway. Chemnitz, viii. t. 96. f. 815.

asellus. 27. Eight-valved, deep black, convex above, with a yellowish spot on each valve; $\frac{1}{4}$ inch long. North seas. Chemnitz, vii. t. 96. f. 816.

islandicus. 28. With eight convex black valves, covered with very minute raised dots; margin cinereous, minute. Iceland.

marginatus. * 29. Eight-valved, carinated along the back; the valves projecting over each other in a point; $\frac{1}{8}$ inch long, Salcomb bay, Sandwich. Linn. Tr. viii. t. 1. f. 3.

cinereus. * 30. Eight valves, smooth, carinated, oval, compressed; margin ciliated at the edge; $\frac{1}{4}$ to $\frac{1}{2}$ of an inch long. Goree and Britain.

albus. * 31. Eight valves, smooth, with transverse lines at the margin of the valves; body white, oval; first valve notched on the hinder edge; $\frac{1}{4}$ inch long. Northern seas; on oyster shells from Poole. Linn. Tr. viii. t. 1. f. 4.

achatinus. * 32 With eight valves, oblong, elevated, with indistinct striæ; anterior and posterior valves, with curved striæ; margin very broad, minutely shagreened; $\frac{1}{2}$ inch long. Newhaven. Brown, t. . f. .

lævis. * 33. Eight-valved, smooth, with an elevated band down the back; the length $\frac{1}{8}$ inch. Loch Broom, Ross-shire, Salcomb bay. Pennant, iv. t. 36. f. 3.

spinosus. 34. With eight black valves; anterior one with raised dots; whole shell substriated, and slightly dotted at the sides of the valves; margin broad, with long black tapering spines; $2\frac{1}{2}$ inches long. N. Holland. *Very rare.* Brown's Collection, N° 10.

tuberculatus. 35. Seven-valved, body tuberculated; $1\frac{1}{4}$ inch long. America. Schroeter, t. 9. f. 19.

tesselatus. 36. With seven striated greenish valves; striped with black and white on the back; margin scaly; 2 inches long. St Thomas'. Chem. x. t. 173. f. 1690.

crinitus. * 37. Seven-valved, thick set with short hairs; $\frac{5}{8}$ inch long. Sandwich, Aberdeen. Pennant iv. t. 36. f. 1.

thalassinus. 38. Six-valved, glabrous, oval, a little convex, sea-green; $\frac{1}{2}$ inch long. America. Schroeter, t. 1. f. 1.

hispidus. 39. With six plates or valves striated; colour blackish gray, with white spots and dots. Schroeter, t. 9. f. 18.

quinquivalvis. * 40. With five valves oval, carinated, and strongly shagreened; margin broad, and finely ciliated at the edge, and shagreened; $\frac{1}{8}$ long. Tenby. Brown, p. 1.

25 *Lepas.*

Gen. 2. LEPAS, *Acorn-shell.*

Shell with many unequal valves, fixed by the base.

A. Shells sessile.

* *With the base solid.*

Gen. Char.—Animal a triton; shell affixed at the base, and composed of many unequal erect valves.

SPECIES.

balanus. * 1. Conic, truncated, grooved, with the interstices striated transversely; lid with four valves, sharp-pointed, and bent. European seas, Britain. Brown, t. vi. f. 1.

balanoides. * 2. Conic, truncated, smooth; lid 4-valved, two upper slightly striated transversely, obtuse. American and Indian seas; abundant on the coasts of Britain. Brown, t. vi. f. 4.

punctatus. * 3. Conical, truncated, rugged; lid with four flat valves, punctured. Britain. Brown, t. vii. f. 13.

lævis. 4. Conical, contracted at the aperture; valves and interstices smooth; lid 4-valved and blunt. E. Indies. Chem. viii. t. 79. f. 715.

striatus. * 5. Conical, truncated; longitudinally striated; valves rounded at the summits; interstices straight and smooth. Britain and Holland. Chem. t. 97. f. 823.

rugosa. * 6. Subcylindrical, wrinkled longitudinally; operculum 4-valved, acute. Dorset. Brown, t. vii. f. 1.

elongata. 7. Club-shaped, elongated, and dilated at the aperture; lid with four obliquely striated valves. Newfoundland. Wood, t. 7. f. 2.

conoides. * 8. Conic, smooth, valves pointed, aperture very small; shell small, reddish; valves finely tesselated. Weymouth. Brown, t. vi. f. 7.

angustata. 9. Semiovate, valves longitudinally striated; aperture small, and much contracted. Barbary and E. Indies. Wood, t. 6. f. 5.

costata. * 10. Somewhat conic, with equidistant ribs, divergent from the aperture; lid sharp-pointed. On rocks on the Pembrokeshire coast. Brown, t. vi. f. 3.

stromia. * 11. Depressed, with four serrated interlaced valves, striated obliquely. Britain. Brown, t. vii. f. 30.

hemispherica. 12. Convex, with six equal 3-lobed valves; aperture oval; lid convex, 4-valved. Africa. Chem. viii. t. 98. f. 833.

patellaris. 13. Depressed, with five radiated angular ribs; aperture small, and somewhat pentagonal. Coromandel. Chem. t. 98. f. 839.

14.

violacea. 14. Conical, thick, of a violet colour; valves slightly grooved longitudinally, and the interstices smooth. E. Indies. Chem. viii. t. 99. f. 842.

porcata. 15. Conical, of a violet colour; valves strongly ribbed longitudinally; interstices faintly striated transversely. Wood, t. 8. f. 5.

palmipes. 16. Erect, conic; valves palmated at the base; shell white.

radiata. 17. With six smooth valves, marked with longitudinal violet rays, and the interstices very finely striated transversely. Wood, t. 7. f. 7.

minor. 18. Conical, with unequal transversely striated dotted valves, and the interstices smooth; aperture beaked at one side. Wood, t. 7. f. 6.

spinosa. 19. Conical, with rows of incurved spines on the valves, and the interstices striated transversely. E. Indies. Wood, t. 7. f. 4. and 5.

crispata. 20. With rugged irregularly muricated valves; interstices transversely striated. E. Indies. Wood, t. 8. f. 1. to 4.

cranchii. * 21. Conic, longitudinally striated; aperture very small; lid with four valves striated transversely. Tenby. Brown, t. vii. f. 9. to 12.

tintinnabulum. 22. Conical, purplish, with the valves strongly and irregularly ribbed; interstices delicately striated transversely. W. Indies. Lister, t. 443. f. 385.

tulipa. 23. Subconical; whitish, with the valves slightly wrinkled; interstices striated longitudinally. Iceland. Wood, t. 6. f. 3.

crassus. 24. Conical, strong; valves with deep longitudinal striæ, and the interstices very regularly striated transversely. S. America. Brown's Collection, N° 20.

semistriatus. 25. Conical, strong, irregularly wrinkled; interstices with fine regular transverse striæ. E. Indies. Brown's Collection, N° 19.

candidus. * 26. Subconic, slightly striated longitudinally; interstices substriated; lid 4-valved, upper two strongly striated transversely and longitudinally, under two very slightly, with a longitudinal groove. Hartlepool. Brown, t. vi. f. 10.

A. ** *With radiated cells at the base.*

diadema. 27. Subhemispherical, transversely striated throughout, and strongly ribbed longitudinally. Northern ocean. Wood, t. 4.

balænaris. 28. Depressed, longitudinally ribbed, upper half smooth, lower parts and interstices striated transversely. Northern ocean, adhering to the Balæna Boops. Wood, t. 5. f. 1. to 3.

testudinaria. 29. Oval, depressed, with four nearly smooth valves. Attached to the backs of turtles. Wood, t. 5. f. 4.

A. *** Porous at the base.

porosa. 30. Subconical, with four consolidated rugged valves, and the base porous. Tranquebar. Wood, t. 9. f. 4.

purpurascens. 31. Angular, with four subconsolidated rugged valves, and the base porous. Amboyna. Wood, t. 9. f. 1. to 3.

A. **** *With a cup-like appendage at the base.*

spongiosus * 32. Shell formed of two cones connected by a ligament at their base, of which the upper is 6-valved and spinous. Britain. Brown, t. vii. f. 24. to 26.

galeata. 33. Shell formed of two cones, connected by a ligament at the base, of which the upper is 6-valved and smooth. Mediterranean. Phil. Trans. i. t. 14. f. 19.

A. ***** *Tubular and truncated at both ends.*

34. Tubular, truncated at both ends, longitudinally striated, and transversely ribbed. Inhabits the S. seas, imbedded in the skin of whales. Wood, t. 4. f. 1. to 3. *trachealis.*

B. Shells seated on a fleshy peduncle.

B. * *With more than five valves, and a wreath of smaller ones round the base.*

35. Compressed round the base, irregularly striated transversely, and the peduncle scaly. Amboyna. Wood, t. 10. f. 1. *mitella.*

* 36. Compressed, smooth, and the peduncle covered with minute scales. Britain. Brown, t. v. f. 11. *pollicipes.*

* 37. Compressed, with 13 valves concentrically striated; peduncle hairy, with testaceous scales. Britain. Brown, t. v. f. 8, 9, and 10. *scalpellum*

B. ** *With five contiguous valves.*

* 38. Compressed, with five striated valves; peduncle wrinkled transversely. Britain. Brown, t. v. f. 1. *anserifera*

* 39. Compressed, somewhat triangular, with five smooth valves seated on a red and long peduncle. Britain. Adheres to the bottom of ships, when it is well known by the name of *bernacle*. Brown, t. iv. f. 1. and 2. *anatifera.*

It was from this species of shell that the bernacle goose was supposed to have had its origin. Gerard's account of this transformation, as it affords a remarkable instance of the credulity of the times, is too curious to be omitted. "There are found in the north parts of Scotland, and the islands adjacent called Orchades, certain trees whereon do grow certain shells tending to russet, wherein are contained little living creatures: which shells in time of maturitie do open, and out of them grow those little living things, which falling into the water do become fowles, which we call barnakles; in the north of England brant geese; and in Lancashire, tree geese; but the other that do fall upon the land perish, and come to nothing. Thus much from the writings of others, and also from the mouths of people of those parts, which may very well accord with truth.

"But what our eyes have seene, and hands have touched, we shall declare. There is a small island in Lancashire, called the Pile of Foulders, wherein are found the broken pieces of old and bruised ships, some whereof have been cast thither by shipwracke, and also the trunks and bodies with the branches of old and rotten trees, cast up there likewise: whereon is found a certain spume or froth that in time breedeth into certain shells, in shape like those of the muskle, but sharper pointed, and of a whitish colour: wherein is contained a thing in forme like a lace of silke, finely woven, as it were, together, of a whitish colour, one end whereof is fastened unto the inside of the shell, even as the fish of oisters and muskles are; the other end is made fast unto the belly of a rude mass or lumpe, which in time commeth to the shape and forme of a bird: when it is perfectly formed the shell gapeth open, and the first thing that appeareth is the foresaid lace or string; next come the legs of the bird hanging out, and as it groweth greater it openeth the shell by degrees, till at length it is all come forth and hangeth only by the bill: in short space after it cometh to full maturitie, and falleth into the sea, where it gathereth feathers, and groweth to a fowl bigger than millard, and lesser than a goose, having blacke legs, bill or beake, and feathers blacke and white, spotted in such a manner as is our magpie, called in some places a pie-annet, which the people of Lancashire call by no other name than a tree goose: which place aforesaid, and those parts adjoyning do so much abound therewith, that one of the best is bought for threepence. For the truth hereof, if any doubt, let them repaire unto me, and I shall satisfie them by the testimonie of good witnesses." *Herball*, p. 1588.

sulcata. * 40. Compressed, subtriangular, with five strongly ribbed valves; peduncle short and dusky. Britain. Brown, t. v. f. 6.

pumicicula. * 41. Compressed, five striated, and strongly spinous valves; peduncle short and brown. Devonshire. Brown, t. v. f. 3.

fascicularis. * 42. Compressed, with five smooth, membranaceous, semitransparent valves; dorsal valve dilated at the base, and forming a prominent acute angle. Britain. Brown, t. v. f. 2.

dentata. * 43. Compressed, with five smooth valves, and the dorsal ridge serrated. Britain. Brown, t. iv. f. 5.

villosa. 44. Compressed, with five smooth valves, seated on a short downy peduncle. Mediterranean. Enc. Meth. t. 166. f. 2.

dorsalis. 45. Compressed, with five valves, scaly at the base; dorsal valve transversely wrinkled; peduncle scaly. Mosquito shore. Ellis Zoop. t. 15. f. 5.

B. *** *With minute distant valves placed on a fleshy extension of the peduncle.*

vittata. * 46. Membranaceous, ventricose, truncated, and angular at the summit; green, with black stripes, and five minute narrow distant valves. Mediterranean. Brown, t. v. f. 16, 17, and 18.

aurita. 47. Membranaceous, ventricose, seated on a tube, and ending in two ear-like appendages; aperture with 8 toothed valves. Northern ocean. Brown, t. v. f. 14. and 15.

blainvillii. * 48. Ventricose, membranaceous, seated on a tube, and ending in two ear-like appendages; colour whitish, spotted, and streaked with brownish purple. Devonshire. Brown, t. v. f. 13.

26 Pholas.

Gen. 3. Pholas.

Gen. Char.—The animal is an ascidia, Shell bivalve, divaricate, with several lesser differently accessory ones at the hinge. Hinges recurved, united by a cartilage. Beneath the hinge internally is an incurved tooth.

Species.

dactylus. 1. Oblong, with reticulated, subspinous striæ, on the upper part, and the anterior end strongly muricated and beaked. Europe. Salcomb bay, Devonshire. Five inches long; is found in hard clay, marl, and wood; has a phosphorescent property. Brown, t. viii. f. 1, 2, and 3.

orientalis. 2. Oblong, with a straight margin: one half quite smooth, the other reticulated with striæ. Siam and Tranquebar. Lister, t. 431. f. 274.

costata. 3. Ovate; striated with strong elevated ribs; 6 inches long. American seas. Lister, t. 434. f. 277.

candida. 4. Oblong, muricated on all sides, with decussated prickly striæ. Europe, America, Salcomb bay. Brown, t. ix. f. 6, 7, and 8.

parva. * 5. Ovate, with reticulated striæ; and the teeth of the hinge issuing from a tubercle. Britain. Brown, t. ix. f. 11. and 12.

striata. * 6. Ovate, multifariously striated; wedge-shaped before, and ventricose behind. Europe, India. Brown, t. viii. f. 4. to 9.—This species seems to be nearly equally destructive with the teredo navalis. The pholas perforates the wood across the grain or fibre; the teredo insinuates itself along the fibres, or in the same direction.

pusilla. 7. Oblong, rounded; striæ arched. America, India. This animal penetrates the bottom of ships. Wood, t. xvi. f. 1, 2, and 3.

cordata. 8. Short, turgid, furrowed, with fine elevated transverse striæ; aperture heart-shaped. Ency. Method. t. 169. f. 8. to 10.

falcata. 9. Somewhat oval, variously striated; hiatus very large; hinge with a hooked tooth. Wood, t. 16. f. 5. to 7.

hians. 10. Bivalve, white, with transverse arched striæ: convex in the middle, and wedge-shaped below; aperture large, oval; perforates calcareous rocks. American islands. Chem. t. 172. f. 1678 to 81.

crispata. 11. Oval; part next the hinge more obtuse, waved, striated; tooth of the hinge curved, large, and strong. Two inches long. Europe. West of England. Brown, t. ix. f. 1. to 5.

II. BIVALVE SHELLS.

27 Mya.

Gen. 4. Mya. *Gapers.*

Gen. Char.—The animal is an ascidia. The shell is bivalve, generally gaping at one end. The hinge has broad, thick, strong teeth, seldom more than one, and not inserted into the opposite valve.

Species.

* *Hinge with one or two rounded teeth, not inserted in the opposite valve.*

glycimiris. * 1. Gaping at both ends, thick, transversely wrinkled, lamellous, oblong, oval; 5 inches long, 10 broad. Mediterranean sea. Donovan, t. 142.

truncata. * 2. Ovate, truncated, gaping greatly behind; tooth projecting, obtuse; $2\frac{1}{2}$ inches long. Europe. Brown, t. x. f. 2.

arenaria. * 3. Ovate, rounded behind; hinge with a tooth projecting forwards, and a smaller one by its side; $2\frac{1}{2}$ inches long. European seas, Portsmouth. Brown, t. 10. f. 1.

declivis. 4. Ovate, obliquely angulated, and subtruncated at the anterior end; hinge with a thick tooth; $2\frac{1}{2}$ inches long. Hebrides. A fish much esteemed as food by the inhabitants. Brown, t. xi. f. 5.

convexa. * 5. Oval, convex, brittle; anterior end obliquely angulated; tooth in the hinge semioval. Cramond Island; 2 inches long. Brown, t. xi. f. 3.

distorta. * 6. Sub-oval, with tumid deformed valves; hinge with a thick tooth. Plymouth. $\frac{1}{4}$ inches long. Brown, t. xi. f. 7.

ferruginosa. * 7. Subovate, obsoletely wrinkled; hinge with two projecting teeth, separated by a large triangular notch. Portobello. Brown, t. xi. f. 8. and 9.

prætenuis * 8. Oval, thin, brittle, flat; striæ fine, concentric; hinge with a spoon-shaped tooth; $\frac{1}{2}$ inch long. Brown, t. xiv. f. 1.

anatina. 9. Suborbicular, covered with decussated striæ; hinge with a spoon-shaped tooth. Mouth of the Niger. 6 inches long. Chem. vi. t. 2. f. 13. to 16.

globosa. 10. Suborbicular, with transverse striæ, decussated on one side; hinge with a spoon-shaped tooth. Wood, t. 24. f. 4. to 6.

prismatica * 11. Oblong, attenuated at one end; obsoletely striated and Indian seas. Length 1 inch, breadth 8 inches. Common on the shores of Britain, where it is employed as food. Brown, t. xiii. f. 3.

linearis. 4. Linear, straight, cylindrical, and very thin; hinge with a single tooth in each valve; thickness of a quill; breadth 3 inches. Nicobar islands. Wood, t. 27. f. 3.

ensis. * 5. Linear, in form of a scymeter; one hinge 2-toothed; $\frac{3}{4}$ of an inch long, 5 inches broad. European seas; not uncommon on the British shores. Brown, t. xiii. f. 3.

pellucidus. * 6. Subarched, suboval, pellucid; one hinge 2-toothed; length $\frac{1}{2}$ inch, breadth above 1 inch. Anglesea, Cornwall. Brown, t. xiii. f. 4.

legumen. * 7. Linear, oval, straight; hinge in the middle 2-toothed, one of them bifid; $2\frac{1}{2}$ inches broad. European and Atlantic seas, Anglesea, Hampshire. Brown, t. xiii. f. 8. and 9.

cultellus. 8. Kidney-shaped, a single tooth in one valve, two in the other. Europe and India. Wood, t. 29. f. 2.

** *Shells ovate or oblong.*

gigas. 9. Linear, oval, subdiaphanous, rounded at both ends; a longitudinal rib within extends from the hinge to the margin; 2 inches long and 5 broad. Amboyna. Wood, t. 31. f. 3.

magnus. 10. Linear, oval, subdiaphanous, straight; hinge lateral, with two teeth not shutting into each other, and furnished with a rib; $1\frac{3}{4}$ inch long, 4 broad. Nicobar islands. Chem. vi. t. 5. f. 35.

minimus. 11. Linear, oval, straight; hinge lateral, with two teeth, one bifid, with a longitudinal rib; $\frac{1}{8}$ inch long, $1\frac{1}{4}$ broad. Tranquebar. Chem. vi. t. 5. f. 31.

guineensis. 12. Oblong, oval, ventricose, subpellucid; inside with a longitudinal rib; 1 inch long, 3 broad. Guinea. Chem. xi. t. 198. f. 1937.

inflexus. 13. Ovate-oblong, margin somewhat inflected; hinge with two teeth in one valve, and a prominent longitudinal rib; 1 inch long, 3 broad. Wood, t. 32. f. 1. and 2.

diphos. 14. Oval, straight, smooth, with prominent membranes; $2\frac{1}{8}$ inches long, 5 broad. Indian ocean. Wood, t. 32. f. 3.

radiatus. 15. Oval, straight, smooth, with two teeth in one valve; and a transverse depressed rib on one side. India. Wood, t. 31. f. 1. and 2.

strigilatus 16. Oval, obliquely and concentrically striated, except at one end; $1\frac{1}{2}$ inch long, 3 broad. Atlantic and Indian seas. Wood, t. 30. f. 1.

triangularis. 17. Flat, fore-part truncated, yellow; $1\frac{1}{8}$ inch long, and 2 broad. Chem. vi. t. 10. f. 87.

coarctatus 18. Transversely wrinkled, contracted in the middle, rounded at both ends; $\frac{1}{4}$ of an inch long, $2\frac{1}{8}$ broad. Nicobar islands. Wood, t. 29. f. 3.

fragilis. 19. Linear-oval, nearly smooth, and marked with a brown longitudinal stripe in the middle; $\frac{1}{8}$ inch long, 1 broad. Nicobar islands. Wood, t. 29. f. 4. and 5.

anatinus. 20. Membranaceous, gibbous, with a short longitudinal suture at the apex; hinge with a spoon-shaped tooth, and crooked rib; $1\frac{1}{2}$ inch long and 2 broad. Amboyna. Wood, t. 30. f. 2. to 4.

roseus. 21. Equivalve, rosy, tooth of the hinge subbifid; 1 inch long, 2 broad. Red sea. Chem. vi. t. 7. f. 55.

striatus. 22. Equivalve, diaphanous, transversely striated; hinge with a single tooth; $\frac{5}{8}$ long. Nicobar islands. Chem. vi. t. 7. f. 57. and 58.

23. Oval, pellucid, smooth, marked with triangular characters, umbones prominent; hinge with a single tooth; 10 inches long. Guinea. Chem. xi. t. 198. f. 1935. and 1936. *castrensis.*

24. Oval, with two white rays on the anterior side; hinge with two bifid teeth in each valve; $1\frac{1}{2}$ inch long, $2\frac{1}{8}$ broad. Wood, t. 33. f. 1. *biradiatus*

25. Suboval, quite smooth; hinge callous, two-toothed, flesh-coloured or rosy; $1\frac{1}{4}$ inch long and 2 broad, Jamaica. Wood, t. 33. f. 4. and 5. *sanguinolentus.*

26. Concentrically striated; hinges 2-toothed, with a hollow in the middle; 4 inches broad and 2 long. Nicobar islands. Chem. vi. t. 7. f. 61. *occidens.*

27. Oblong-oval, truncated at the anterior end; hinge with two teeth in one valve and one in the other; $\frac{1}{2}$ inch long and 2 broad. Wood, t. 34. f. 2. to 4. *variegatus*

28. Oblong-oval, compressed, transversely striated, and longitudinally rayed; hinge with two teeth in each valve; $1\frac{1}{4}$ inch long and $2\frac{1}{8}$ broad. India. Wood, t. 34. f. 1. *amethystus.*

29. Roundish-ovate, inflated, longitudinally grooved, gaping and muricated at the anterior margin; 1 inch long, $1\frac{1}{2}$ broad. Jamaica. Wood, t. 56. f. 3. *bullatus.*

* 30. Oval; angles of the valves serrated; size of a cucumber seed. Coral rocks in Norway and Greenland; in hard limestone at Plymouth. Brown. t. xiii. f. 1. *minutus.*

31. Ovate, oblong, with tumid bosses. Java. *virens.*

32. Suborbicular, minutely punctured; hinge with two bifid teeth diverging from the umbo; $\frac{1}{8}$ inches long, $\frac{1}{2}$ broad. *squamosus*

Gen. 6. TELLINA, *Tellin*. 29 Tellina.

Gen. Char.—The animal is a tethys: the shell is bivalve, generally sloping on one side; in the fore part of one valve there is a convex, and in that of the other, a concave fold; the hinge has usually three teeth, the lateral ones flat or nearly obsolete, in one valve.

SPECIES.

* *Shells ovate and thickish.*

1. Roundish, compressed, wrinkled on the fore-part; $1\frac{1}{4}$ inch long, $1\frac{1}{2}$ broad. Indian ocean, very rare. Chem. vi. t. 8. f. 65. *gargadia.*

2. Wrinkles transversely undulated; hinged with two lateral teeth. Indian and American seas. Wood, t. 41. f. 1. and 2. *rugosa.*

3. Subovate, rough, with lunated scales, disposed in a quincunx order; $1\frac{1}{4}$ inch long. Indian ocean. Wood, t. 40. f. 2. and 3. *lingua-felis.*

4. Ovate-roundish, angulated at the anterior end, striated transversely; hinge subcentral; $2\frac{1}{4}$ inches long. China. Wood, t. 36. f. 2. *marginalis.*

5. Angular, with transverse, recurved striæ; 2 inches long, and $2\frac{1}{8}$ broad. Indian and Atlantic oceans. Wood, t. 35. f. 2. and 3. *virgata.*

6. Ovate-oblong, beaked, angulated, and bent at the anterior end; rough, with transverse striæ; $1\frac{1}{8}$ inch long. W. Indies. Wood, t. 36. f. 3. *interrupta*

7. Rounded, thick, gibbous; striæ longitudinal, fine; lateral teeth remote; $1\frac{1}{8}$ inch long. Chem. vi. t. 9. f. 76. *inflata.*

8. Subovate

angulata. 8. Subovate, angular before, with transverse, recurved striæ; no lateral teeth; $1\frac{1}{2}$ inch long, and 2 broad. Indian ocean. Wood, t. 43. f. 1.

polygona. 9. Subventricose, transversely striated, orbicular, angular on the fore-part; $1\frac{1}{4}$ inch long. Tranquebar. Chem. vi. t. 9. f. 77.

lacunosa. 10. Ovate, thin, ventricose; hinge without lateral, but with two primary teeth; $1\frac{1}{4}$ inch long. Guinea. Chem. vi. t. 9. f. 78.

gibbosa. 11. Angular, ventricose, and finely striated transversely. Gualteri, t. 77. f. Q.

gari. 12. Striæ recurved, transverse; lateral teeth obsolete; $\frac{1}{2}$ inch long. Indian ocean. Chem. vi. t. 10. f. 92.

ferröensis. * 13. Oblong, ovate, compressed, with fine, transverse striæ; 1 inch long, and 2 broad. North seas, Weymouth, Yorkshire. Brown, t. xvi. f. 182.

fragilis. 14. Ovate, white, gibbous, with transverse, recurved striæ; beaks yellowish; $\frac{1}{2}$ inch long. European seas. Chem. vi. t. 9. f. 84.

obliqua. 15. Oval, very smooth, and marked with interrupted purple lines; lateral teeth rather prominent; 1 inch long. Wood, t. 41. f. 4. and 5.

** *Shells ovate, and compressed.*

albida. 16. Oval, smooth, with prominent membranes, without lateral teeth; $1\frac{1}{2}$ inch long. W. Indies and Britain. Brown, t. xvi. f. 3.

triangularis. 17. Slightly wedged, whitish, and transversely striated; $1\frac{1}{2}$ inch broad, and 1 long. Chem. vi. t. 10. f. 85.

oblonga. 18. Oblong, brittle, yellowish; rounded on one side; $\frac{1}{2}$ inch long. Europe. Chem. vi. t. 10. f. 87.

spengleri. 19. White, transversely striated, and bifariously hooked on each side; $\frac{1}{2}$ inch long. Nicobar islands. Wood, t. 37. f. 2.

foliacea. 20. Oval, with rough pubes, flattened sides, serrated; $1\frac{1}{2}$ inch long, and 3 broad. Indian ocean. Wood, t. 36. f. 1.

acuta. 21. Oval, compressed, very minutely striated longitudinally; margins sharp; 2 inches long. W. Indies. Wood, t. 44. f. 1.

planata. 22. Ovate, compressed, transversely substriated, smooth, with acute margins; $1\frac{1}{4}$ inch long, 2 broad. European and Mediterranean seas. Born, t. 2. f. 9.

strigosa. 23. With whitish bands, glabrous and wrinkled at the margin. African shores. Adamson, t. 17. f. 19.

lævigata. 24. Ovate, smooth, lateral teeth, margined. European and Indian seas. Wood, t. 41. f. 1.

madagascariensis. 25. Oval, a little pointed at one end; $2\frac{1}{2}$ inches long and $3\frac{1}{2}$ broad. Madagascar. Wood, t. 39. f. 2. and 3.

radiata. 26. Oblong; striæ faint, longitudinal. European and American seas. Wood, t. 38. f. 2. and 3.

pallescens. 27. Oblong, striated transversely, beaked, and obliquely angulated; hinge central. E. Indies. Lister, 398. f. 237.

rostrata. 28. Oblong, the fore-part produced into an angular beak. Indian ocean. Woon, t. 37. f. 3.

rufescens. 29. Purple, with white bands, and decussated striæ; one valve convex, the other flat; $2\frac{1}{2}$ inches broad, and $1\frac{1}{4}$ long. Wood, t. 42. f. 1.

flavescens. 30. Oval, yellowish white, with decussated striæ, and one valve much more convex than the other; $1\frac{1}{4}$ inch long, $12\frac{1}{4}$ broad. E. Indies. Chem. vi. t. 11. f. 98.

31. Oval, inequivalve, flat, pellucid, with fine decussated striæ; $\frac{1}{2}$ inch long, 3 broad. Guinea. Chem. vi. t. 11. f. 99. *hyalina.*

32. Oblong, produced into a beak, upper valve flat, lower convex; length $\frac{1}{2}$ inch, breadth 1 inch. European and North seas. Wood, t. 47. f. 2 to 4. *inæquivalvis.*

33. Ovate, smoothish, triradiate with red, and slightly striated transversely. European seas. Chem. vi. t. 12. f. 114. *trifasciata*

34. Oval, pellucid, scarlet, transversely striated, very thin; $\frac{1}{2}$ inch long, $1\frac{1}{2}$ broad. Mediterranean. Chem. vi. t. 12. f. 109. *coccinea.*

35. Ovate, a little produced on the fore-part, flattish; 2 inches broad. European and Mediterranean seas. Gualteri, t. 88. f. M. *incarnata.*

36. Oval, pellucid, with a rib in each valve, reaching from the hinge to the outer margin; very thin. Nicobar. Chem. vi. t. 112. f. 107. *apalina.*

37. Oval, very thin, transversely striated; 10 lines long, $1\frac{1}{2}$ inch broad. India. Wood, t. 45. f. 2. *lanceolata.*

38. Oblong-oval, transversely striated, angular, and somewhat beaked at the anterior end; hinge with pointed lateral teeth; $\frac{1}{2}$ inch long. Wood, t. 44. f. 2. *sanguinea*

39. Oval, compressed, somewhat angular on the anterior side; hinge with a solitary cleft primary tooth, in one valve, inserted between two in the opposite. American ocean. Wood, t. 46. f. 1. *nivea.*

40. Oval, flat, transversely grooved, and angulated; hinge with two teeth in one valve, and the lateral tooth prominent; $\frac{2}{3}$ inch long. Wood, t. 47. f. 1. *sulcata.*

* 41. Ovate, flattish, very obtuse on the fore-part; striated concentrically. Mediterranean, Sandwich, Weymouth. Brown, t. xvi. f. 6. *donacina.*

42. Flattish, red, with white rays; one end pointed, the other rounded. Lister, t. 383. f. 226. *angusta.*

43. Oval, compressed, substriated; fore-part truncated. Java. *truncata.*

44. Oval, flat, equal sided, transversely striated; 1 inch long, 2 broad. Don, t. 123. *punicea.*

* 45. Very thick, depressed, oblong, with transverse concentric striæ; anterior end pointed. Europe, Britain. Brown, t. xvi. f. 12. *depressa.*

46. Ovate, compressed, inflated, lengthened before; one valve smooth, the other with oblique reflected striæ. Mediterranean, American and North seas, Wales. Wood, t. 45. f. 4. *fabula.*

47. Yellowish, very thin, perpendicularly striated. North and Baltic seas. Chem. vi. t. 11. f. 101. *vitrea.*

48. Unequal sided, round at both ends, rosy white, pellucid; 2 inches broad, $1\frac{1}{4}$ long. Gualteri, t. 89. f. C. *striata.*

49. Dilated, orbicular, lateral teeth in one valve. Mediterranean. Wood, t. 44. f. 3. and 4. *balaustina*

50. Ovate, very brittle, glabrous, and inflected at the anterior end; hinge with a primary cleft tooth in one valve, which shuts into a cavity in the other. Iceland. Chem. t. 13. f. 136. *calcaria.*

*** *Shells suborbicular.*

51. Compressed and transversely wrinkled; 3 inches long, $3\frac{1}{2}$ broad. Indian and American oceans. Wood, t. 38. f. 1. *remies.*

52. Roundish-ovate; somewhat truncated at the anterior end, and obsoletely striated transversely. Jamaica. Lister, 265. f. 101. *fausta.*

53. Lentiform,

reticulata. 53. Lentiform, compressed, recticulate. India. Wood, t. 42. f. 2. and 3.

cancellata. 54. Thin, with numerous longitudinal grooves crossing the transverse wrinkles. Atlantic. Adanson, t. 17. f. 19.

guinaica. 55. With transverse, minute, longitudinal striæ; and the anterior surface waved. Guinea. Chem. x. t. 170. f. 1651. to 1653.

scabra. 56. Squarish, convex, inflected on the anterior side, strongly striated transversely; hinge with a single primary tooth. W. Indies. Chem. xi. t. 199. f. 1943. and 1944.

crassa. 57. Very thick, broad, depressed; concentric striæ numerous, $1\frac{1}{4}$ inch broad, and $1\frac{1}{4}$ long. Europe, Britain. Brown, t. xvi. f. 16.

decussata. 58. With fine decussated striæ, inside variegated with purple-brown zig-zag streaks; 1 inch long. Wood, t. 43. f. 2. and 3.

cordiformis. 59. Densely striated longitudinally, and transversely; two primary teeth in each valve, and oblong lateral teeth. W. Indies. Chem. xi. t. 199. f. 1941. and 2.

muricata. 60. Compressed, closely striated longitudinally, with imbricated serrated striæ. W. Indies. Chem. 209. t. 199. f. 1945.

scobinata. 61. Lentiform, rough, with lunated scales disposed in a quincunx; $2\frac{1}{2}$ inches long, $2\frac{1}{4}$ broad. Indian ocean. Wood, t. 35. f. 1.

lactea. 62. Lentiform, gibbous, white, pellucid, smooth. Mediterranean. Montagu, t. 2. f. 4.

rotundata. 63. Rather convex; hinge with two teeth in each valve; one is bifid, the other a little diverging. Mont. t. 2. f. 3.

flexuosa. 64. Convex, thin, with a longitudinal furrow at the anterior end extending from the apex. Britain. Wood, t. 47. f. 7. and 8.

carnaria. 65. White, with a rosy tinge within and without; fine striæ, disposed obliquely. Europe and American islands. Wood, t. 40. f. 4. and 5.

zonata. 66. Rosy, with a white band. Shores of Tuscany. Lister, 405. f. 250.

bimaculata. 67. Triangularly rounded, smooth, whitish, with two oblong red spots on the inside; scarcely an inch broad. Europe and American seas. Don, t. 19. f. 1.

balthica. 68. Roundish, smooth, outside bloom colour; size of a horse bean. Baltic. Chem. vi. t. 11. f. 128.

pisiformis. 69. Subglobular, smooth, obliquely substriated; size of a pea. Mouths of rivers in Europe.

divaricata 70. Subglobular, white, with oblique bifarious striæ. American seas. Wood, t. 46. f. 6.

dentata. 71. Suborbicular, convex, with the two sides obliquely striated, in opposite directions; margin serrated. Bahamas. Wood, t. 46. f. 6.

digitaria. 72. Subglobular, pale, surrounded with oblique uniform striæ; size of a pea, nearly an inch long. American and Indian seas. Chem. t. 12. f. 121.

cornea. * 73. Globular, glabrous, horn-colour, with a transverse groove; size of a pea. Ponds and fresh waters of Europe, Britain. Wood, t. 45. f. 3.

lacustris. 74. Rhombic, flattish, glabrous, with an acute protuberance. Pools and marshes of Europe. Wood, t. 49. f. 5.

amnica. 75. Heart-shaped, transversely grooved. Pools and ditches of Europe. Wood, t. 47. f. 6.

pulsilla. 76. Ovate, ventricose, thin, transversely striated, very minute. Rivers of Europe. Lister, t. 159. f. 15.

limosa. 77. Ovate, transversely striated, and purple within; umbones prominent and acute. S. American rivers; $\frac{1}{2}$ inch long. Linn. Tr. x. t. 24. f. 8. and 9.

fluminalis 78. Triangular, gibbous, transversely striated. River Euphrates. Chem. vi. t. 30. f. 320.

fluminea. 79. Triangular, gibbous, transversely ribbed. China. Chem. vi. t. 30. f. 322. and 323.

fluviatilis. 80. Triangular, transversely wrinkled. Canton. Chem. vi. t. 30. f. 321.

hermaphrodita. 81. Heart-shaped, triangular, thick, ponderous, coarse, but very smooth. Rivers in Guinea. Chem. vi. t. 31. f. 327. to 329.

rivalis. 82. Obliquely subovate, transversely grooved; size of a pea. River Avon near Salisbury.

Gen. 7. Cardium, *Cockle.*

30 Cardium.

Gen. Char.—The animal is a tethys: the shell is bivalve, nearly equilateral, equivalve, generally convex, longitudinally ribbed, striated or grooved, with a toothed margin. Hinge of the two teeth near the beak, and a larger remote lateral one on each side; each looking into the opposite.

Species.

costatum. 1. Gibbous, equivalve, with elevated, carinated, concave, membranaceous ribs; three inches long, three and a half broad, three high. African ocean. Wood, t. 56. f. 1.

lima. 2. Gibbous, with prickly ribs; anterior ones with recurved, membranceous tubercles, crenated at the sides. Nicobar islands. Chem. vi. t. 15. f. 153.

cardissa. 3. Heart-shaped; valves compressed and carinated with teeth; two inches and a half long, above two broad. Indian ocean. Wood, t. 59. f. 1. and 2.

humanum 4. Heart-shaped, valves compressed and keeled; anterior side convex; umbones approximate. Wood, t. 59. f. 3. and 4. East Indies.

roseum. 5. Heart-shaped; fore part surrounded with lines, hind part with broader striæ, forming by their union the figure of a heart. Nicobar islands. Wood, t. 57. f. 6.

monstrosum. 6. Gibbous; one side impressed and ochraceous, the other convex, heart-shaped, and whitish, spotted with yellow. Nicobar islands. A very rare species. Chem. vi. t. 14. f. 149. and 50.

retusum. 7. Heart-shaped; valves striated, notched; behind the beaks a lunated heart-shaped gape; two inches long, and nearly the same breadth. India, Arabia, and Egypt. Wood, t. 58. f. 4. and 5.

hemicardium. 8. Heart-shaped, subquadrilateral, with punctured grooves; valves carinated, beaks distant; $1\frac{1}{4}$ inches long. Indian ocean. Wood, t. 57. f. 7.

medium. 9. Something heart-shaped, subangular; valves angular, grooved, smooth. European and American seas. Wood, t. 50. f. 3.

donaciforme. 10. Somewhat heart-shaped, longitudinally grooved; anterior end truncated; umbones cancellated. West Indies. Chem. vi. t. 16. f. 165.

exiguum. * 11. Somewhat heart-shaped, subangular; grooves imbricated, or beset with recurved scales. Falmouth, Sandwich. Don, t. 32. f. 3.

aculeatum * 12. Somewhat heart-shaped, ribs high, and grooved down the middle, and beset with large hollowed spines

near

near the circumference. European and Mediterranean seas, Devonshire. Wood, t. 48.

spinosum. 13. Somewhat heart-shaped, nearly equilateral, with crowded longitudinal ribs, marked along the middle with an obsolete groove, and very spinous. Mediterranean. Wood. t. 51. f. 1.

echinatum * 14. Slightly heart-shaped; ribs spinous, carinated. European seas, Britain. Wood, t. 49. f. 1. and 2.

ciliatum. 15. Slightly heart-shaped, with elevated subtriangular, ciliated grooves. North seas.

tuberculatum. * 16. Somewhat heart-shaped, with obtuse, knotty, transversely striated grooves. Mediterranean. Wood, t. 50. f. 1. and 2.

isocardia. 17. Heart-shaped, with arched imbricated scales along the grooves. Mediterranean. Wood, t. 52, f. 1. and 2.

fragum. 18. Somewhat heart-shaped, subangular. India. Wood, t. 58. f. 1. and 2.

unedo. 19. Subcordate, with lunated, coloured grooves. India. Wood, t. 58. f. 3.

ringens. 20. Rounded, ventricose, white, with deep teeth on the margin; anterior ones rosy. Africa and America. Lister, t. 330. f. 167.

muricatum. 21. Subcordate, grooved, and muricated at the sides. America. Wood, t. 51. f. 2. and 3.

magnum. 22. Oblong, with angular grooves, serrated at the side. America and India.

leucostomum. 23. Oblong, with numerous longitudinal ribs, crenated on both sides, and imbricated at the anterior. Jamaica. Wood, t. 53. f. 3.

maculatum. 24. Ventricose, with longitudinal angular ribs, striated transversely on the posterior side. Virginia. Lister, t. 328. f. 165.

flavum. 25. Subovate, grooved; anterior margin rough, posterior, one toothed. India. Schroeter, t. 7. f. 11.

lævigatum 26. Obovate, with obsolete, longitudinal striæ, and a few transverse ones concealed by a glossy, yellowish brown epidermis. European and American seas. Wood, t. 54. f. 1.

oblongum. 27. Oblong, ventricose, ribbed longitudinally, except at the ends, which are nearly smooth. Mediterranean. Wood, t. 55. f. 1.

lineatum. 28. Heart-shaped, carinated; fore part obliquely truncated, thin, quite smooth, snowy, with gilt striæ above an inch long. Wood, t. 52. f. 3.

serratum. 29. Obovate, smooth, with obsolete striæ; interior margin serrated. Mediterranean and Indian seas. Wood, t. 54. f. 3.

papyraceum. 30. Pellucid, cinereous, with numerous thin longitudinal ribs. India. Wood, t. 55. f. 5.

rugatum. 31. With obsolete slightly crenated longitudinal ribs; anterior end produced and gaping. Jamaica. Wood, t. 56. f. 2.

latum. 32. Broad, unequal sided, within white; ribs flat and spinulous: two inches long, two and a half broad. Tranquebar and Nicobar islands. Wood, t. 57. f. 4. and 5.

rigidum. 33. Roundish, angulated at the anterior end, and produced at the margin; ribs crenulated and somewhat nodulous. Wood, t. 57. f. 2. and 3.

pectiniforme. 34. Roundish, compressed, with triangular ribs, and sides muricated. Chem. vi. t. 17. f. 180.

regulare. 35. Ovate, equilateral, with convex longitudinal ribs, and elevated crescent-shaped transverse striæ; lamellated at the anterior end. St Domingo.

* 36. Antiquated, with 28 depressed ribs, with obsolete recurved scales. Abounds frequently on all sandy coasts, and is lodged a little beneath the sand. This is employed as a wholesome and nourishing food. It is the common cockle of this country. Wood, t. 55. f. 4. *edule.*

37. Heart-shaped with 24 longitudinal ribs; margin fringed. Wood, t. 56. f. 4. and 5. *fimbriatum.*

38. Antiquated, with 20 remote grooves, the intermediate spaces rugged. Mediterranean seas. Wood, t. 55. f. 2. and 3. *rusticum.*

39. Grooved with about 36 triangular, smooth ribs. Iceland and Greenland seas. Chem. vi. t. 19. f. 196. and 7. *islandicum.*

40. Antiquated, glabrous, thin, with angular ferruginous lines; two and three fourth inches long, three and a half broad. Greenland and Iceland. Chem. vi. t. 19. f. 198. *groenlandicum.*

41. Slightly heart-shaped and pectinated. Mediterranean. Wood, t. 57. f. 1. *pectinatum.*

42. Subantiquated, hind part with 20 grooves imbricated upwards. Barbary. *glaucum.*

43. Rounded, whitish, with a brown band; ribs flattened 27, with distant transverse striæ. Montagu, t. 27. f. 6. *fasciatum.*

* 44. Suboval, angulated, compressed, with 21 rounded and slightly wrinkled ribs. Devonshire. *elongatum*

* 45. Minute, rounded, convex, glabrous, and pellucid; hinge with nearly obsolete primary teeth. Devon and Tenby. Montagu, t. 27. f. 4. *rubrum.*

* 46. Minute, heart-shaped, opake, margin muricated. Kent. Walker, f. 84. *muricatulum.*

Gen. 8. Mactra.

31 Mactra.

Gen. Char.—The animal is a tethys; the shell is bivalve, unequal sided and equivalve; the middle tooth of the hinge is complicated, with a small hollow on each side; the lateral ones are remote, and inserted into each other.

Species.

* *Shells subtriangular.*

1. Smooth, with a flat anterior margin, on which is a lunated cape, $3\frac{1}{2}$ inches broad. Cape of Good Hope. Chem. vi. t. 20. f. 199. to 201. *spengleri.*

2. With transverse, wrinkled plaits, diaphanous; anterior margin flattish, shell thin like paper; from 1 to 2 inches long, $2\frac{1}{2}$ broad. Indian ocean. Chem. vi. t. 20. f. 202. to 204. *plicatoria.*

3. Thin, pellucid, white, convex, fore-part a little gaping, finely striated and ribbed. Nicobar islands. Very rare. Chem. vi. t. 23. f. 201. *papyracea.*

4. Somewhat heart-shaped, diaphanous and brittle, transversely plaited; anterior depression lanceolate; posterior ovate-oblong. Chem. xi. t. 200. f. 1959. *vitrea.*

5. Smooth, diaphanous; back substriated, with a smooth marginal impression before them, surrounded with a rim; $2\frac{1}{4}$ inches long, 3 broad. Mediterranean and Coromandel coasts. Chem. vi. t. 21. f. 205. and 206. *striatula.*

6. Three-sided, finely striated transversely; fore-part flattish and slightly wrinkled; 1 inch long and rather broader. Tranquebar. Chem. vi. t. 21. f. 207. *cygnea.*

7. Obtusely triangular, smooth, thin, with pellucid chesnut *maculata.*

chesnut spots; within white, and finely striated; a heart-shaped impression behind the beaks; $1\frac{1}{2}$ inch long, and rather broader. Nicobar islands. Chem. vi. t. 21. f. 208.

turgida. 8. Inflated, faintly striated, ochraceous and white within; hinge with a supernumerary, triangular, double tooth; $2\frac{1}{4}$ inches long, $3\frac{1}{2}$ broad. Tranquebar. Chem. vi. t. 21. f. 210. to 212.

violacea. 9. Thin, obsoletely radiated, finely striated transversely; margins on each side the beaks whitish; 2 inches long and 3 broad. Tranquebar. Chem. vi. t. 200. f. 1954.

cuneata. 10. Wedge-shaped, blue, with fine transverse striæ; margin notched within; 1 inch long, and scarcely so broad. Tranquebar. Chem. vi. t. 22. f. 213. and 214.

rotundata. 11. Obtusely triangular, whitish, with milk-white bands on the beak; margins on each side the beaks violet; $1\frac{1}{4}$ inch long, and nearly 2 broad. Mediterranean. Lister, t. 263. f. 99.

glabrata. 12. Smooth, diaphanous, striated; beaks smooth, margins on each side of them striated; $1\frac{1}{2}$ inch long and 2 broad. African and Indian oceans. Chem. t. 22. f. 216. and 217.

nitida. 13. Snowy, glossy, thick, diaphanous, smooth; depressions on each side the beaks striated. Schroeter, t. 8. f. 2.

corallina. 14. Smooth, subdiaphanous, white, with paler bands; 2 inches broad, $1\frac{1}{2}$ long. Mediterranean and Guinea. Chem. vi. t. 22. f. 218. and 219.

lactea. 15. Thin, turgid, pellucid, white; fore-part finely striated, with paler bands. Indian ocean. Chem. vi. t. 22. f. 220. and 221.

striata. 16. Triangular, thick, with strong, thick crowded, arched striæ. Chem. vi. t. 22. f. 222. and 223.

radiata. * 17. Subtriangular, thin, brittle, compressed, with five transverse and minute longitudinal striæ. Portsmouth. Don. t. 161.

stultorum. * 18. Semitransparent, smooth, glossy, obsoletely radiated, white without, purplish within; sides nearly equal; length $1\frac{1}{4}$ inch, breadth $1\frac{1}{2}$. European and American seas, England, and shores of Scotland. Brown, t. xv. f. 2.

grandis. 19. Semitransparent, smooth, fawn colour with pale rays; beak and hinge placed beyond the middle; $2\frac{1}{2}$ inches long, $3\frac{1}{2}$ broad. New Jersey. Chem. vi. t. 23. f. 228.

achatina. 20. Heart-shaped, smooth, radiated towards the margin, with two violet spots on the anterior and two on posterior slope. Tranquebar. Chem. xi. t. 200. f. 1957. and 1958.

solida. * 21. Strong, subtriangular, of a yellowish-white colour, with a few concentric ridges; equal sided; $1\frac{1}{2}$ inch long, $1\frac{3}{4}$ broad. Common on European shores, and also in Britain. Brown, t. xv. f. 4.

solidissima. 22. Ovate, subtriangular, solid, with obsolete concentric ridges; lateral teeth striated; hinge central. N. Jersey. Chem. x. t. 170. f. 1656.

truncata. * 23. Triangular, equilateral, strong; with concentric ridges; umbones thick and prominent; lateral teeth striated. Britain. Brown, t. xv. f. 5.

subtruncata. * 24. Triangular, thickish, finely striated transversely; umbones thick and prominent. Britain. Brown, t. xv. f. 7.

australis. 25. Transversely oval and wrinkled, compressed, nearly equilateral, and rounded at both ends; hinge with two lateral teeth. N. Zealand. Chem. vi. t. 3. f. 19. and 20.

26. Ovate, compressed, transversely striated; hinge teeth very minute, with a large oblique hollow. Mediterranean. Lister, t. 253. f. 88. *piperata.*

* 27. Subtriangular, rounded, compressed, and transversely wrinkled; hinge with lateral teeth in one valve only. Britain. Montagu, t. 17. f. 7. *tenuis.*

* 28. Ovate, compressed, glabrous; hinge with lateral teeth in one valve only. Britain. Montagu, t. 3. f. 7. *boysii.*

* 29. Subtriangular, minute, strong, opaque; umbones prominent; margin crenated. Britain. Montagu, t. 3. f. 5. *triangularis.*

* 30. Subtriangular, minute; umbones prominent; margin entire. Britain. Montagu. *minutissima.*

*** Shells ovate oblong.*

* 31. Ovate, dirty white, with glaucous rays, and fine transverse striæ; $2\frac{1}{4}$ inches long, $3\frac{1}{2}$ broad. Mediterranean. Brown, t. xv. f. 1. *glauca.*

32. Ovate, thin, pellucid, white, with unequal transverse striæ; $1\frac{1}{4}$ inch long, and 2 broad. Guinea. Chem. vi. t. 24. f. 234. *pellucida.*

33. Ovate, thin, smooth, pellucid, flattish; anterior gape transversely striated, and wrinkled. Nicobar islands. Chem. vi. t. 24. f. 235. *fragilis.*

34. Ovate, dirty white, with elevated longitudinal striæ, crossing the transverse ones, which are a little more raised; $2\frac{1}{2}$ inches long, $2\frac{1}{4}$ broad; thick, and white within. Mediterranean. Chem. vi. t. 24. f. 236. *rugosa.*

35. Oblong-oval, coated with a yellowish epidermis; longitudinally striated. Red sea. Chem. xi. t. 200. f. 1955. *aegyptica.*

36. Oblong-oval, gaping, compressed, thick, finely striated and ridged transversely; hinge without lateral teeth. Tranquebar. Chem. vi. t. 24. f. 238. and 239. *planata.*

* 37. Oval, oblong, smooth, with irregular concentric striæ; inside glossy white, gaping a little at both ends. Europe, near the mouths of rivers. Found very large on the coast of Caermarthen, and some parts of Cornwall.—The animal which inhabits this shell, according to Montagu, is an ascidia; and he observes that it frequently protrudes not less than 7 or 8 inches from the smaller end in search of food. Brown, t. xii. f. 2. *lutraria.*

* 38. Oblong, gaping, marked with irregular rugged transverse striæ, and the upper margin incurved; hinge without lateral teeth. Britain. Brown, t. xii. f. 1. *hians.*

Gen. 9. Donax, or *Wedge-shell.*

32 Donax.

Gen. Char.—The animal is a tethys. The shell is bivalve, with generally a crenulate margin; the anterior margin very obtuse; hinge with two teeth, and a single marginal one placed a little behind; rarely double or triple.

Species.

1. Triangular, heart-shaped, with a flat frontal margin. Indian ocean. Chem. vi. t. 25. f. 242 to 247. *scrotum.*

2. Ciliated, with spines on the anterior margin. Indian ocean. Chem. vi. t. 25. f. 248. *pubescens.*

3. Wrinkled and gibbous before, with notched margins. *rugosa.*

margins. Mediterranean and Atlantic seas. Chem. t. 25. f. 250.

serra. 4. Wedge-shaped; anterior end wrinkled; margin crenated; hinge without lateral teeth; cartilage cleft, oblong. Cape of Good Hope. Chem. vi. t. 25. f. 251 and 252.

trunculus. * 5. Oblong, smooth, glossy, finely striated longitudinally; margin crenated; 1 inch broad. European coasts, Wales. Don. t. 29. f. 1.

complanata. * 6. Oblong, smooth, glossy, light yellow, with small spots or streaks of white, and one broad ray of the same from the back to the opposite margin; ½ inch long, ¾ broad. Devonshire, but rare. Montagu, t. 5. f. 4.

striata. 7. Obtuse before, striated, the margin denticulated. Southern Europe. Chem. t. 26. f. 255.

denticulata. 8. Obtuse in front, lips transversely wrinkled; finely striated longitudinally; margin denticulated. European and American seas. Lister, t. 376. f. 218.

plebeia. * 9. Oblong, suboval, smooth, glossy, commonly marked with two brown stripes longitudinally from the beak; margin smooth; scarcely ½ inch long, ¾ broad. Weymouth, Dorsetshire. Montagu, t. 5. f. 2.

castanea. 10. Ovate, glossy, and slightly wrinkled transversely; hinge with one large and one small primary tooth, in each valve, and no lateral teeth. Britain. Montagu, t. 17. f. 2.

spinosa. 11. Hind-part smooth and perpendicularly striated; fore-part truncated, and finely cancellated; angles spinous. Tranquebar. Very rare. Chem. vi. t. 26. f. 258.

incarnata. 12. Flesh-coloured, anterior part truncated, wrinkled, and marked with reticulated striæ; hind-part wedge-shaped, and furrowed with fine perpendicular striæ. Tranquebar. Chem. vi. t. 26. f. .

cuneata. 13. Wedge-shaped, margins very entire; 1 inch long, 1½ broad. Tranquebar. Chem. vi. t. 26. f. 260.

lævigata. 14. Obtuse before; obsoletely striated at the sides; margin very entire; hinge without marginal teeth; 1½ inch long, 2 inches broad. Tranquebar. Chem. vi. t. 25. f. 249.

scripta. 15. Ovate, compressed, smooth, marked with purple waved lines; margins crenulate. Malabar coasts. Chem. vi. t. 26. f. 261 to 265.

meroe. 16. Ovate, with narrow transverse grooves; anterior depression excavated; posterior lanceolate; margin crenulated. East Indies. Chem. vii. t. 43. f. 452.

faba. 17. Gibbous, finely striated transversely, spotted with yellow. Malabar. Chem. vi. t. 26. f. 266 and 267.

radiata. 18. Brown, with hyaline spots; outside with crowded, arched, transverse striæ, inside with perpendicular ones; 1 inch broad, 1½ long. Tranquebar. Schroeter, t. 8. f. 3.

muricata. 19. Ovate, striæ muricated; margin denticulated. Indian ocean.

straminea 20. With thin perpendicular striæ, crossing the transverse ribs on the fore-part; straw colour, with darker transverse bands; margin tawney and entire behind; 1 inch long, ¾ broad. Schroeter, t. 8. f. 4.

candida. 21. Entirely white, with a few thin, arched, transverse striæ, which are oblique towards the rim; hinge with three oblique middle teeth; margin entire; 1 inch long, and something broader. Tranquebar. Schroeter, t. 8. f. 5.

* 22. Oval, with transverse, waved, erect, striated, membranaceous wrinkles; size of a small kidney bean. Mediterranean, shores of Devonshire and Cornwall, where it is found in the hardest limestone. Chem. vi. t. 26. f. 268 to 270. *irus.*

Genus 10. Venus. 33 Venus.

Gen. Char.—The animal a tethys; shell bivalve, frontal margin flattened, with incumbent lips; hinge with three teeth, all of them approximate; the lateral ones divergent at the tip.

Species.

* *With the anterior depression spinous or toothed on the margin.*

1. Transversely grooved, with a double row of spines on the anterior slope. American ocean. This shell is very rare. Lister, t. 307. f. 140. *dione.*

* 2. Somewhat heart-shaped, with thickened wrinkles; flattened side with attenuated wrinkles; lips complicated; 2 inches long, 1¼ broad. American islands. Lister, t. 279. f. 116. *paphia.*

3. Somewhat heart-shaped, with thick depressed transverse ribs, of an uniform thickness throughout. W. Indies. Chem. vi. t. 27. f. 277 and 278. *fasciata.*

4. Heart-shaped, with decussated striæ, flattened; margin lamellated. American ocean. Very rare. Chem. vi. t. 27. f. 282 to 286. *marica.*

5. Somewhat heart-shaped and compressed, with transverse remote reflected ribs, and longitudinal striæ. W. Indies. Lister, t. 278. f. 115. *cingenda.*

6. Somewhat heart-shaped, with transverse, remote, reflected grooves; margin crenulated. American ocean. Lister, t. 277. f. 114. *dysera.*

7. Heart-shaped, with transverse, remote, excavated grooves; margin crenulated. *succincta.*

8. Somewhat heart-shaped, and angulated towards the anterior end, with a few distant much elevated ribs; striated strongly on the lower sides. E. Indies. Chem. t. 27. f. 279 to 281. *tiara.*

9. Somewhat heart-shaped, and angulated towards the anterior end, with numerous transverse, membranaceous ribs; cordiform depression, nearly smooth. Levant sea. Chem. vi. t. 28. f. 295 and 297. *plicata.*

10. Lentiform, transversely striated, with a deep, heart-shaped depression behind the beaks; flat side, broad. Schroeter, iii. t. 8. f. 10. *excavata.*

* 11. Sub-triangular, with numerous equidistant ribs, becoming confluent in pairs, and forming short obtuse spines on the margin of the anterior slope. Devonshire. Montagu, t. 17. f. 1. *spinifera.*

** *Somewhat heart-shaped.*

* 12. With membranaceous, transverse, striated grooves, forming tubercles towards the outer margin; margin crenulated; 2 inches long, 2 broad. Mediterranean, Antilles islands, Cornwall. Don. t. 44. *verrucosa.*

13. Longitudinally striated forwards, and transversely backwards. American islands. Chem. x. t. 172. f. 1664. *lapicida.*

* 14. With transverse, recurved, acute grooves; posterior margin crenated, and grooved behind the beaks. *casina.*

European seas. It is often found in a fossil state. Britain. Don. t. 147.

divergens. 15. White, with fine crowded, divergent striæ. American islands. Chem. x. t. 172. f. 1666.

cancellata. 16. With transverse, membranaceous, remote striæ, and a heart-shaped depression behind the beaks; 1 inch long, $1\frac{1}{4}$ broad. Indian ocean. Don. t. 115.

gallina. * 17. Radiate, with transverse, obtuse striæ; hind tooth of the hinge minute; margin crenulated; 1 inch long, $1\frac{1}{4}$ broad. American and European seas, Cornwall. Don. t. 68.

circinata. 18. With transverse, acute striæ; lips finely striated and rosy; margin very entire. Africa. Lister, t. 306. f. 109.

petulca. 19. Slightly grooved, margin crenated; size of a hazel-nut. South of Europe.

flexuosa. 20. Grooves obtuse, transverse; lips of the anterior margin with an elevated angle; 1 inch long, $1\frac{1}{4}$ broad. American and Indian oceans. Lister, t. 281. f. 119.

erycina. 21. Grooves transverse, parallel, obtuse; anterior margin glabrous; depression behind the beaks ovate; $2\frac{1}{4}$ inches long, 3 broad. India. Lister, t. 268. f. 104.

mercenaria. 22. Strong and thick, with slight transverse striæ, and covered with a brown cuticle; within, pale violet; margin crenated; 3 inches long, and nearly 3 broad. North America. Shells of this species are found fossil in the mountains of Sweden. In North America they are called *clams*, and the Indians make wampum or money of them. Lister, t. 271. f. 107.

islandica. * 23. Thick and strong, with slight transverse striæ, and covered with a brown cuticle; within pure white, and smooth; margin entire; $3\frac{1}{2}$ inches long, 4 broad. Europe, Africa, Caspian sea, Caermarthenshire, and shores of Scotland. The fish is employed as food by the Icelanders. Don. t. 77.

lusoria. 24. Somewhat heart-shaped, ponderous, with the anterior slope truncated, and the margin very entire. Amboyna. Chem. vi. t. 32. f. 340.

chione. * 25. Smooth, with fine transverse wrinkles; margin entire; hind tooth of the hinge lanceolate; 3 inches long, $3\frac{1}{4}$ broad. Asiatic seas; Cornwall, where this species is called *queen*. Don. t. 17.

maculata. 26. Smooth, with a few faint spots; $1\frac{1}{2}$ inch long, $2\frac{1}{2}$ broad. American ocean. Lister, t. 270. f. 106.

meretrix. 27. Glabrous, with a brown gibbous slope before, and gaping membranes; margin entire. Near the mouths of rivers, Indian ocean. Chem. vi. t. 33. f. 347 to 352.

paradoxa. 28. Somewhat heart-shaped, solid, compressed at both ends, and the cartilage slope protruded in the middle. Peru. Born, t. 4. f. 12 and 13.

læta. 29. Smooth, radiated with white; lips of the anterior slope violet; $1\frac{1}{2}$ inch long, $1\frac{1}{2}$ broad. Mediterranean and Indian seas. Chem. vi. t. 34. f. 353.

castrensis. 30. Triangular, rounded, gibbous, smooth, and marked with angular characters; $1\frac{1}{2}$ inch long, 2 broad. Indian ocean. Lister, t. 262. f. 98.

phryne. 31. Smooth, transversely striated before and behind; posterior slope obcordate, with violet veins. Southern ocean. Rumphius, t. 42. f. O.

minuta. 32. Subovate, transversely striated, and subpellucid; membranes closed; from 1 to 2 inches broad, $1\frac{1}{2}$ long. Iceland.

rigida. 33. Heart-shaped, ventricose, with numerous transverse membranaceous reflected ribs; posterior depression kidney-shaped; margin crenulated. Jamaica. Lister, 286. f. 123.

subcordata. * 34. Heart-shaped, with strong longitudinal striæ, and remote elevated transverse ribs. Montagu, t. 3. f. 1.

minima. * 35. Rather compressed, very glossy, with broad transverse striæ, and two red streaks at the margin. Falmouth. Montagu, t. 3. f. 3.

sulcata. * 36. Somewhat triangular, with transverse ribs, becoming obsolete towards the umbones, and the depression oblong oval; margin crenulated. Dunbar. Linn. Tr. viii. t. 2. f. 2.

scotica. * 37. Slightly compressed, with many regular parallel transverse ribs; margin entire. Linn. Tr. viii. t. 2. f. 3.

danmonia. * 38. Slightly compressed, with regular strong equidistant transverse ribs; margin crenulated. Devonshire. Montagu, t. 29. f. 4.

reflexa. 39. Suborbicular, with numerous, thin, elevated, distant ribs, and the interstices minutely striated, longitudinally; margin crenulated. Gualter, t. 75. f. o.

compressa. * 40. Heart-shaped, much compressed, transversely grooved. Newhaven. Montagu, t. 26. f. 1.

exalbida. 41. Flattish, with transverse, elevated, slightly membranaceous striæ; anterior depression lanceolate and wrinkled. Falkland islands. Chem. xi. t. 202. f. 1977.

granulata. 42. Slightly gibbous, with elevated, decussated striæ; and the margin crenulated. Jamaica. Lister, t. 338. f. 175.

ovata. * 43. Oval heart-shaped, slightly compressed, with longitudinal grooves, and transverse striæ; posterior depression oblong, and elevated in the middle; margin crenulated. Britain. Linn. Tr. viii. t. 2. f. 4.

paupercula. 44. Smooth, with the anterior depression oval, and the posterior, cordiform. Coromandel. Chem. xi. t. 202. f. 1977.

triangularis. * 45. Subtriangular, with a few transverse antiquated ridges, and the margin entire; hinge with three teeth in one valve; and two, besides a semilunar lamina, in the other. Devonshire. Montagu, t. 17. f. 3.

costata. 46. Oblong, heart-shaped, polished, with broad transverse ribs; anterior depression lanceolate, and the posterior cordiform. Ceylon. Chem. xi. t. 202. f. 1975.

pacifica. 47. Oblong, heart-shaped, polished, with flattish transverse striæ, and the posterior depression cordiform. South seas. Chem. xi. t. 202. f. 1976.

pinguis. 48. Somewhat heart-shaped, glabrous, thick, and tumid; anterior depression oval; posterior rounded and impressed; margin entire. East Indies. Chem. vi. t. 34. f. 355 to 357.

triradiata. 49. Somewhat heart-shaped, glabrous, with three blackish rays; anterior depression oval; posterior ovate. Tranquebar. Chem. vi. t. 34. f. 358.

exilis. 50. Somewhat heart-shaped, very smooth, without any posterior depression; anterior tooth of the hinge slightly crenulated. Malabar. Chem. vi. t. 34. f. 362 and 363.

recens. 51. Somewhat heart-shaped, with three longitudinal rays, and transversely striated; posterior depression impressed and oval. Coromandel. Chem. xi. t. 202. f. 1979.

pectunculus. 52. Somewhat heart-shaped, ventricose; transversely striated; posterior depression oblong-oval, striated, and rather naceous striæ; 1½ inch long, 2 broad. European seas, Britain. Chem. vii. t. 39. f. 412. to 414.

dispar. 92. With the posterior side transversely striated, and the anterior obliquely ribbed. South seas. Chem. xi. t. 202. f. 1981. and 1982.

equivoca. 93. Slightly compressed, with angulated diverging ribs; posterior depression lanceolate; margin crenated. E. Indies. Chem. xi. t. 202. f. 1980.

divaricata 94. With narrow transversely striated ribs, obliquely divaricating from the centre; margin crenulated. E. Indies. Lister, t. 310. f. 146.

contraria. 95. Suboval, convex, with oblique curved striæ; margin crenulated. Guinea. Chem. vi. t. 30. f. 317. to 319.

corrugata. 96. Ovate, whitish; striæ transverse, anteriorly thick and strong, posteriorly thin and undulating. Mediterranean. Chem. vii. t. 39. f. 410.

scripta. 97. Lentiform, compressed, striated, angular; the hinder angle straight. Indian ocean, and Red sea. Very rare. Chem. vii. t. 40. f. 420. to. 426.

edentula. 98. Subglobular, lenticular, wrinkled, without teeth; posterior slope ovate. American ocean. Chem. vii. t. 40. f. 427. to 429.

concentrica. 99. White, suborbicular, compressed, with concentric striæ; margin very entire; posterior slope heart-shaped. Atlantic and American seas. A large shell. Lister, t. 288. f. 124.

juvenis. 100. Lentiform, with transverse, crowded striæ; anteriorly circular, and terminating in wrinkles behind; posterior slope heart-shaped; margin very entire. India. Chem. vii. t. 38. f. 405.

histrio. 101. Lentiform, with transverse, acute, arched striæ; margin entire; posterior slope heart-shaped. India. Rare. Chem. vii. t. 38. f. 407.

globosa. 102. Globular, with fine transverse striæ; margin very entire; hinge with two teeth; 1 inch long, 1⅞ broad. Red sea. Very rare. Chem. vii. t. 40. f. 430. 431.

discors. 103. Orbicular, a little convex, with longitudinal striæ perpendicular in the middle, obliquely divergent towards the outside, and crossed by transverse ones; intermediate grooves and inner margin crenated. Isle of France. Lister, 312. f. 148.

aculeata. 104. Orbicular, subequilateral, with elevated, acute, tuberculated ribs; margin denticulated, and crenated. Schroeter, iii. t. 8. f. 13.

**** *Suboval, and slightly angulated on the anterior side.*

gigantea. 105. Ovate, livid, with numerous, interrupted, bluish rays; posterior slope ovate. Shores of Ceylon and Florida. Chem. x. t. 171. f. 1661.

literata. 106. Ovate, anteriorly angular, with undulated transverse striæ; 2 inches long, 2½ broad. Europe and India. Lister, t. 402. f. 246.

geographica. 107. Inequilateral, thin, with fine decussated striæ; white, reticulated with brown. Mediterranean. Chem. vii. t. 42. f. 260.

rotundata 108. Ovate, anteriorly angular, with transverse striæ; intermediate tooth of the hinge bifid; 1½ inch long, 3 broad. Indian ocean. Chem. vii. t. 42. f. 441.

decussata. * 109. Ovate, with decussated striæ anteriorly angular; 1½ inch long, 2 broad. Mediterranean, British coasts. Don. t. 67.

undulata. 110. Oval, quite smooth, inequilateral; slopes oblong; margin very entire; 1¼ inch long, 2¼ broad. Malabar, Red sea. Lister, t. 400. f. 239.

* 111. Subovate, anteriorly subangular, with unequal, *virginea.* transverse striæ; anterior slope tumid. Adriatic. Britain. Lister, t. 403. f. 247.

112. Oval, with transverse striæ, which are stronger *obsoleta.* on the anterior side, and undulated in the middle. Mediterranean. Chem. vii. t. 42. f. 144.

113. Ovate, with fine decussated striæ; white or *senegalensis.* flesh-coloured, varied with brown; 1½ inch broad, not 1 inch long. Senegal. Linn. Tr. vi. t. 17. f. 3.

* 114. Thin, convex, somewhat triangular, with a *perforans.* deep obtuse sinus in the middle of the front. Britain, Montagu, t. 3. f. 6.

* 115. Suborbicular, inequilateral, transversely stri- *aurea.* ated, and marked with faint longitudinal striæ; 1 inch long, 1¼ broad. Dorsetshire. Lister, t. 404. f. 149.

116. Ovate, whitish; striæ decussated; hinge with *monstrosa.* only two teeth in the left valve. Nicobar islands. Chem. vii. t. 42. f. 445.

Gen. 11. Spondylus. 34 Spondylus.

Gen. Char.—The animal a tethys; shell solid, with unequal valves, one of them convex, the other rather flat; hinge with two recurved teeth, separated by a small hollow.

Species.

* *Shells with ears.*

1. Slightly eared and spinous. Mediterranean, In- *gædaropus.* dian, and other seas.—This species varies greatly in size, thickness, and colours. Sometimes it is entirely purple, orange, white or bloom colour, and sometimes it is marked with various streaks, spot, dots, or bands. Lister, t. 206. f. 40.

2. White, base deep orange-coloured, longitudinally *americanus.* sulcated; spines very long, and somewhat tongue-shaped; apice subfoliated. S. America. Chem. vii. t. 45. f. 465.

3. Thin upper valve, deep rose-coloured, with short *arachnoides.* spines; the smaller valve with lamellated foliations, and long submarginated spines. Knorr. Vig. v. t. 9. f. 1.

4. With distinct longitudinal striæ, white and un- *candidus.* spotted, rough. N. Holland.

5. Round, white, larger valve purple, with longitu- *multilamellatus.* dinal striæ; with tongue-shaped spines. E. Indies. Chem. vii. t. 46. f. 472. and 473.

6. With white and purple longitudinal ribs and *costatus.* stripes; ribs spinous, and with subserrated teeth. Red sea. Knorr. Vig. i. t. 9. f. 2.

7. Longitudinally sulcated and ribbed; ribs with *variegatus* very long white spines. E. Indies. Chem. vii. t. 45. f. 464.

8. Longitudinally sulcated and ribbed, thickly spin- *longispina.* ed, of a reddish colour; alternate spines arenated, and tongue-shaped; umbones orange-coloured. E. Indies. Chem. vii. t. 46. f. 472. and 473.

9. Without ears, and spinous. In this species the *regius.* shell is sub-globular, white within, without purplish, scarlet, flame colour, orange or white; spines generally two inches long, sometimes cylindrical, with a crenated margin. India, Malta. Very rare. Chem. vii. t. 46. f. 471.

10. Oblong-

avicularis. 10. Oblong-oval, purple, longitudinally sulcated, ribbed, and spinous; smaller valve, with the base turned upwards, and very much produced. E. Indies. Gualt. t. 101. f. B.

coccinus. 11. Round, longitudinally sulcated, of a scarlet and purple colour, with short subulate spines; base extorted and flexuous. Gualt. t. 99. f. E.

crassisquama. 12. Red on both sides, longitudinally ribbed and sulcated; ribs with distant scales; scales strong, and somewhat spoon-shaped, sometimes palmated. Rumph. t. 48. f. 1.

spathuliferus. 13. Purple, or whitish purple, longitudinally sulcated and ribbed; scales spoon-shaped, erect and undivided. E. Indies. Chem. vii. t. 47. f. 474. and 475.

ducalis. 14. Whitish, with brown and violet-coloured spots, or longitudinally lineated; scales white, spoon-shaped, or palmated. E. Indies. Chem. vii. t. 47. f. 477. and 478.

longitudinalis. 15. Oblong-oval, longitudinally sulcated, and scaly; umbones white; scales orange-coloured; underneath scarlet.

microlepos 16. Red on both sides, longitudinally ribbed and striated; ribs with five or six truncated scales. E. Indies. Knorr. vi. t. 12. f. 3.

croceus. 17. Scarlet on both sides, longitudinally costated; with twenty distant ribs, variously spined. E. Indies. Chem. vii. t. 45. f. 463.

aurantenus. 18. Orange on both sides, with longitudinal ribs; and from 20 to 26 subulated spines on each. China. Ency. Method. t. 191. f. 3.

radians. 19. Whitish, spotted, with scarlet and purple, or brown rays, sulcated and spined; spines frequently thin. Nicobar islands. Chem. vii. t. 45. f. 469. and 470.

zonalis. 20. Inequivalve, sulcated, radicated, and spined; umbones white, spotted with black and white; broad. E. Indies.

violacescens. 21. Ash-coloured and violet, with longitudinal ribs and striæ; with sulcated scales, subcylindrical spines.

** *Shells without ears, and base attenuated.*

plicatus. 22. Without ears or spines, and plaited longitudinally. Java. Lister, t. 210. f. 44.

cristatus. 23. Oblong wedge-shaped, rust-coloured, subcrestated; with large simple plaits, and scaly. America. Lister, t. 210. f. 44.

reniformis 24. Round, subarcuated, white; plaits simple, and scaly. Jamaica. Sloan, ii. t. 241. f. 20. and 21.

australis. 25. Round, spined, white; with a waved margin and no plaits. N. Holland.

35
Chama.

Gen. 12. Chama, or *Gaping Cockle.*

Gen. Char.—The animal a tethys: the shell bivalve, rather coarse; hinge with a callous gibbosity, obliquely inserted in an oblique hollow; anterior slope closed.

Species.

* *Shells detached.*

cor. * 1. Roundish, smooth; beaks recurved; anterior sloped with a gaping fent. Adriatic and Caspian seas, Hebrides. Sometimes it is found of a large size. Chem. vii. t. 48. f. 483.

moltkiana. 2. Obtusely triangular, equilateral, plaited; anterior slope elevated, with oblique plates and striæ: size of a hazel nut. Chem. vii. t. 48. f. 484. to 487.

gigas. 3. Plaited, with arched scales; posterior slope gaping, with crenulated margins. Indian ocean.—This species sometimes measures only about an inch in length, but sometimes it is found to be the largest of shells, and equal to 532lb. weight. The fish which it contains is said to furnish a meal to 120 men, and its muscular strength is so great as to cut asunder a cable, or lop off the hand of a man. South Sea. Chem. vii. t. 49. f. 492. to 494.

hippopus. 4. Plaited, muricated, posterior slope retuse, closed, toothed; 5 inches long, and 7 broad. Indian ocean. Chem. vii. t. 50. f. 498. and 499.

plumbea. 5. Suborbicular, solid, tuberculated, and coated with a brown epidermis; apices recurved, and the margin entire. South Sea. Chem. xi. t. 203. f. 1991.

antiquata. 6. Somewhat heart-shaped, with longitudinal grooves, and transverse striæ; ribs from 19 to 22. Atlantic and Indian seas. Chem. vii. t. 48. f. 488. and 489.

ajax. 7. Somewhat heart-shaped, slightly produced at the anterior end, with longitudinal flattish ribs, and transversely striated and tuberculated; posterior depression suborbicular. Mouth of the Niger. Chem. vii. t. 48. f. 490. and 491.

trapezia. 8. Trapeziform, gibbous, with longitudinal, crenulated grooves; about the size of a pea. Norway seas. Chem. xi. t. 204. f. 2005.

semiorbiculata. 9. Suborbicular, compressed, coarse, with decussated striæ. Arabia. Chem. vii. t. 50. f. 502. and 503.

calyculata. 10. Oblong, with imbricated grooves; anterior part retuse; ¾ inch long, 1½ broad. American and Indian seas. Chem. vii. t. 50. f. 500.

cordata. 11. Heart-shaped, transversely striated; one side elongated, compressed. Indian and Red seas.

satiata. 12. Roundish, with toothed grooves, mixed with dots; posterior slope retuse; heart-shaped.

oblonga. 13. Oblong, fore-part angular, with anterior acute teeth. Shores of Guinea. Chem. xi. t. 203. f. 1993.

rugosa. 14. Suborbicular, with very deep grooves; wrinkles slightly imbricated; margin doubly folded. The grooves are about 30 in number.

concamerata. 15. Transversely wrinkled, and longitudinally striated. In the middle of each valve within is an additional chamber. American ocean. Small, whitish. Very rare. Chem. vii. t. 50. f. 506.

pectunculus. 16. Oblong, oblated above, and produced at the base, with smooth longitudinal ribs. Lister, t. 347. f. 185.

corraliophaga. 17. Cylindrical, white, diphanous, with decussated striæ; the transverse striæ arched and imbricated. East Indies. Chem. x. t. 172. f. 1673.

** *Shells attached to some other substance.*

lazarus. 18. Imbricated, with jagged lamellæ; beak a little spiral obliquely. India. Chem. vii. t. 51. f. 507.

gryphoides. 19. Orbicular, muricated; one valve flatter, the other with a subspiral, produced beak. Mediterranean, American, and Indian seas. Chem. vii. t. 52. f. 514.

cornuta. 20. With conic valves, and horn-shaped, oblique, tubular beaks, longer than the valve. Indian and American seas.

12, Grooved,

arcinella. 21. Grooved, muricated, with excavated dots: hinge with a sessile callus; 2 inches broad and 2 long. American ocean. Lister. t. 355. f. 192.

lamellosa. 22. White, with foliaceous, serrated, transverse, striæ, the insterstices crenated, beaks recurved. Mediterranean and American seas.—This species is found fossil in Campania; it is sometimes round, and sometimes oblong. Chem. vii. t. 52. f. 521.

punctata. 23. Suborbicular, with transverse rows of rather distant scales, and the inside dotted. Guadaloupe. Ency. Meth. t. 197. f. 3.

sinerostra. 24. Ear-shaped, thick, scaly, with one or two longitudinal furrows; margin crenulated, and the summits reversed. West Indies. Chem. xi. t. 116. f. 992. and 993.

arcinella. 25. Somewhat heart-shaped, with spinous longitudinal ribs, and excavated dots; margin crenulated and slightly plaited. Brazil. Lister, t. 355. f. 192.

Arca.[36]

Gen. 13. ARCA, or *Ark-shell.*

Gen. Char.—The animal a tethys: The shell bivalve, equivalve; the hinge with a number of teeth, sharp, alternate, and inserted all along the rim.

SPECIES.

* *With the teeth in a straight line.*

tortuosa. 1. Parallelopiped, distorted, with unequal valves and sides, deeply striated longitudinally; lesser valve obliquely carinated. Indian ocean. Very rare. Chem. vii. t. 53. f. 524. and 525.

noæ. * 2. *Noah's ark;* oblong, striated, and emarginated at the tip; beaks very remote, bent in; margin gaping. Mediterranean and Atlantic seas, Cornwall. Don. t. 158. f. 1. and 2.

barbata. * 3. Oblong, striated, bearded with byssus; beaks approximate; margin closed. Europe and Indian seas. Lough Strangford, Ireland. Chem. vii. p. 186. t. 54. f. 535.

imbricata. 4. Ovate, rhomboidal, with decussated striæ, of which the transverse are imbricated and acute; apices recurved and very remote. Jamaica and Ireland. Lister, t. 367. f. 207.

navicularis. 5. Oblong, rhomboidal, compressed in the middle, and longitudinally ribbed; apices incurved, and very remote; margin crenulated at both ends. West Indies. Chem. vi. t. 5. f. 533.

plicata. 6. Rhomboidal, with decussated striæ on the sides, and plaited and angulated at the anterior end; margin crenated, and sinuated. Red sea. Chem. xi. t. 204. f. 2008.

candida. 7. Oblong, subrhomboidal, with longitudinal, slightly decussated, crenulated striæ, and intermediate smaller ones towards the anterior end; margin obsoletely toothed. Guinea. Lister, t. 229. f. 64.

lacerata. 8. Transversely subovate, depressed, with longitudinal decussated striæ, alternately larger; margins crenulated and closed. East Indies. Chem. vii. t. 54. f. 536. and 537.

bicolorata. 9. Transversely oval, tumid, with decussated striæ; summits approximated and recurved. Red sea. Chem. xi. t. 204. f. 2007.

modiolus. 10. Oblong, striated, anteriorly angular; posterior slope incurved. Mediterranean. Lister, t. 365. f. 205.

pella. 11. Ovate, pellucid, substriated; anterior slope beaked, prominent; hinge ciliar. Mediterranean. Chem. vii. t. 55. f. 546.

nivea. 12. Ovate, with decussated striæ, snowy, and covered with russet brown epidermis; margin gaping. Red sea. Chem. vii. t. 54. f. 538.

lævigata. 13. Pellucid, brittle, round at each end, obsoletely striated; teeth of the hinge very sharp. Nicobar islands. Ency. Method. t. 309. f. 8.

cancellata. 14. With cancellated striæ, and bearded; margin gaping in the middle. American ocean. Schroeter, iii. t. 9. f. 2.

fusca. 15. Transversely ovate, with longitudinal granulated striæ; summits approximated; margins nearly entire and closed. Barbadoes. Lister, t. 231. f. 65.

rhombea. 16. Entirely white, rhomboid, heart-shaped, and ribbed; anterior and dorsal ribs knotty; beaks remote. Indian and American oceans. Chem. vii. t. 56. f. 553. a.

lactea. * 17. With a rhomboidal, yellowish white shell, and obsolete, decussated striæ; size of a horse bean. European seas, Devonshire. Don. t. 135.

antiquata. 18. Obliquely heart-shaped, with numerous unarmed grooves. Mediterranean and Indian seas. Lister, t. 230. f. 64. a.

senilis. 19. Obliquely heart-shaped, smooth, with grooves; margin plaited; 3 inches long, 4 broad. America, Africa. Lister, t. 238. f. 72.

granosa. 20. Slightly heart-shaped, with muricated grooves; $1\frac{1}{2}$ inch long, $1\frac{3}{4}$ broad. American and Indian oceans. Lister, t. 241. f. 78.

corbula. 21. Ovate compressed; with perpendicular knotty striæ; beaks obtuse, approximate. Nicobar islands. Lister, t. 234. f. 68.

concamerata. 22. Ventricose; striæ decussated; anterior slope heart-shaped; 2 inches long, and 3 broad. Nicobar islands. Chem. vii. t. 53. f. 526. and 527.

magellanica. 23. Rounded on each side; chesnut, and marked with decussated striæ; external margin inflected, and repand in the middle; beaks approximate. Straits of Magellan. Chem. vii. t. 53. f. 539.

reticulata. 24. Rhomboidal, white, with decussated striæ; beaks approximate; anterior slope heart-shaped. West Indies. Chem. vii. t. 54. f. 541.

complanata. 25. Pellucid, rhomboid, with decussated striæ; forepart produced; hind-part truncated. American ocean and African shores. Chem. vii. t. 55. f. 544. and 555.

indica. 26. Inequivalve, ovate, with flat, longitudinal striæ and deep grooves; anterior slope heart-shaped; $\frac{1}{4}$ inch long, $1\frac{1}{2}$ broad. Indian ocean. Lister, t. 232. f. 66.

senegalensis. 27. Ovate, longitudinally grooved, with slight transverse wrinkles; white; 8 lines long, 10 broad. Africa. Adanson, t. 18. f. 6.

** *With the teeth in a curved line.*

campeachiensis. 28. Ovate, with broad, crenated, or scaly perpendicular striæ; hinge arched. Campeachy bay and Barbadoes, Lister, t. 237. f. 71.

undata. 29. Lenticular, without ears, smooth, with a plaited margin; 2 inches long, 2 broad. American ocean. Chem. vii. t. 57. f. 560.

pectunculus. 30. Lenticular, slightly eared, with slightly imbricated grooves; margin plaited; $1\frac{1}{2}$ inch long, and something broader. American ocean and Red sea. Lister, t. 239. f. 73.

31. Lenticular

pectinata. 31. Lenticular, without ears, with smooth longitudinal striæ. American ocean. Lister, t. 243. f. 74.

decussata. 32. Lenticular, with longitudinal striæ, crossed by faint, transverse ones; anterior slope closed. American ocean. Chem. vii. t. 57. f. 561.

æquilatera. 33. Lenticular, nearly equilateral, perpendicularly striated without and within; white, with chesnut spots. American ocean. Chem. vii. t. 57. f. 562.

pallens. 34. Lenticular, a little oblique, with decussated striæ; anterior slope, with a very narrow vent. Indian and American oceans. Schroeter, iii. t. 9. f. 1.

angulosa. 35. Ventricose, with longitudinal striæ and lines; and angular on one side; beaks approximate; hinge arched; brown with a few spots. Shores of Africa and American ocean. Lister, t. 245. f. 76.

glycymeris. * 36. Suborbicular, gibbous, and faintly striated transversely. European and Indian seas. Cornwall. Chem. vii. t. 57. f. 564.

pilosa. * 37. Suborbicular, equilateral, hairy; 1⅞ inch long, 2¼ broad. Asiatic and American seas. Britain. Don. t. 37.

stellata. 38. Orbicular, with minute decussated striæ; summits curved obliquely, and stellated; margin crenulated. Coasts of Portugal. Adanson, t. 18. f. 10.

scripta. 39. Suborbicular; convex, with decussated striæ, and transverse zig-zag lines; summits curved obliquely; margin crenated. St Domingo. Lister, t. 246. f. 80.

nummaria 40. Roundish, smooth, slightly eared, and transversely striated; summits incurved, margin crenulated. Mediterranean. Lister, t. 239. f. 81.

multistriata. 41. Ovate, suborbicular, rather compressed, with crowded longitudinal and minute transverse striæ; margin very entire. Red sea. Chem. vii. t. 58. f. 573.

*** *With the teeth in a broken line.*

nucleus. * 42. Obliquely ovate, smoothish, with a triangular hinge; size of a hazel nut. European seas. It is sometimes found fossil. Shores of Britain. Don. t. 63.

rostrata. 43. Convex, with transverse striæ; hind-part rounded, fore-part extended into an acute beak; 1⅞ inch long, 1¼ broad. Baltic and Norway seas. Ency. Method. t. 309. f. 7.

minuta. * 44. A little compressed, transversely striated, tapering at the remoter end, and rounded at the opposite ones; 2⅓ lines long, and 4 broad. Greenland seas. Sandwich and Newhaven. Don. t. 78.

tenuis. * 45. Somewhat heart-shaped, smooth; umbones small, with the summits slightly inflected, and placed near to one end; margin entire. Dunbar and Leith. Montagu, t. 29. f. 1.

37 Ostrea.

Gen. 14. OSTREA, *Oyster.*

Gen. Char.—The animal is a tethys; the shell bivalve, generally with unequal valves, and slightly eared; hinge without teeth, but furnished with an ovate hollow, and mostly lateral, transverse grooves.

SPECIES.

* *Valves with auricles equal.* SCALLOPS.

maxima. * 1. With 14 or 15 rounded ribs, longitudinally grooved, with fine transverse striæ; 5 inches long, 5½ broad: ears large, with decussated striæ; lower valve convex, white, often varied with red bands or spots; upper valve flat, reddish. Found in large beds in most European seas, where they are dredged up, pickled, and barrelled for sale, It is said, that the greatest quantity is taken after a fall of snow. This is the shell worn formerly by pilgrims on the hat or coat, as a mark that they had crossed the sea for the purpose of paying their devotion to the Holy Land; in commemoration of this it is still preserved in the arms of many families. Donovan, t. 49.

* 2. With about 14 angular and longitudinally striated rays; upper valves flat, with rounded rays, which are finely striated transversely; lower valve with angular rays, which are striated longitudinally. Ears concave and smooth on the upper side. European seas. Dorsetshire, but rare. Don. t. 137. *jacobæa.*

3. With 18 flattened rays; ears finely wrinkled; lower valve convex; rays finely striated transversely; upper valve flat, with about twice as many angular lines as there are rays. American ocean. Lister, t. 168. f. 5. *zic-zac.*

4. With 16 faint rays, and transverse membranaceous striæ; margin very entire; valves nearly equally flat. Indian ocean. *striatula.*

5. With 20 convex rays; lower valve white and very convex; upper valve white, clouded with brown, flatter and plaited. Indian ocean. *minuta.*

6. Equivalve, with 12 doubled rays, and smooth on the outside; 4½ inches long, gaping at each end. Indian ocean. Chem. vii. t. 61. f. 595. *pleuronectes.*

7. Equivalve, a little convex, margined with yellow; upper valve with faint lines crossing transverse concentric bands, and 48 elevated striæ within; 5½ inches long, about the same breadth. Guinea and Japan. Chem. vii. t. 62. f. 596. *japonica.*

8. Equivalve, glabrous, with oblong crowded striæ; upper valve more convex, lower flatter than in most others. Straits of Magellan. Chem. vii. t. 62. f. 597. *magellanica.*

9. With 9 or 10 rays; the interstices longitudinally striated; margin repand within. Norway seas. Chem. vii. t. 63. f. 601. and 602. *hybrida.*

10. Nearly equivalve; with 12 convex rays crossed by crenated striæ; 3½ inches long, 2⅔ broad. Indian ocean. Lister, t. 175. f. 12. *radula.*

11. Equivalve, flattish, with 9 unequal rays, imbricated with scales. Red sea. Chem. vii. t. 69. f. G. *imbricata.*

12. Nearly equivalve, with 16 convex smoothish rays, and striated across; 1¼ inch long, 1 inch broad. India. Chem. vii. t. 62. f. 598. *plica.*

13. Somewhat wedge-shaped, with six convex ribs and longitudinal striæ; auricles small and unequal. Lister, t. 171. f. 8. *pes lutra.*

** *Valves with the auricles equal.*

14. *Ducal mantle.* Equivalve, with 12 convex rays, striated, rough, and imbricated with scales; red, varied with brown and white; ears striated, crenated or scaly. India. Lister, t. 187. f. 25. *pallium.*

15. Equivalve, with 9 thick obtuse rays; interstices longitudinally striated, tuberculated and prickly. Red sea. Chem. vii. t. 64. f. 608. *sanguinolenta.*

16. With about 20 angulated ribs, and slightly imbricated transverse striæ. Knorr. i. t. 19. f. 2. *palliata.*

17. With

nodosa. 17. With 9 rays, covered with apparently vesicular tubercles. American and African oceans. Lister, t. 174. f. 11.

pes felis. 18. With 9 striated rough rays; one of the ears very small. African seas. Chem. vii. t. 64. f. 612.

pellucens. 19. Nearly equivalve, with 9 rays; smooth, with spoon-like hemispherical scales on the lower valve; minute, pellucid; upper valve spotted with red. African seas. Lister, t. 184. f. 21.

obliterata. 20. Smooth on the outside, with 24 doubled rays. Indian ocean. Chem. vii. t. 66. f. 622. to 624.

sulcata. 21. Suborbicular, compressed; with about 11 prominent, convex, transversely scaly ribs, and striated longitudinally. Chem. vii. t. 65. f. 614.

senatoria. 22. With about 22 rounded, transversely wrinkled ribs; and granulated striæ in the interstices; valves equal. Molucca islands. Chem. vii. t. 65. f. 617.

exotica. 23. Suborbicular, slender, and smooth; margin acute and entire. Chem. xi. t. 207. f. 2037. and 2038.

sanguinea 24. Equivalve, with 22 rays; ears small; 2 inches long, $1\frac{3}{4}$ broad. Mediterranean and Atlantic seas. Chem. vii. t. 66. f. 628.

varia. * 25. Equivalve; rays about 30; compressed, and beset with transverse, prickly scales; one ear very small; $2\frac{1}{4}$ inches long, 2 broad. European seas, coasts of Britain. Don. t. 1. f. 1.

pusio. 26. Equivalve, rays about 40, filiform; surface often irregular or distorted; 2 inches long, $1\frac{1}{2}$ broad. European and American seas. Chem. vii. t. 67. f. 635.

sinuosa. * 27. Ovate, irregularly tumid; with about 45 unequal filiform ribs, and the auricles nearly equal. Britain. Don. t. 34.

muricata. 28. Subovate, with numerous muricated filiform ribs, and the auricles nearly equal.

obsoleta. * 29. Equivalve, semi-transparent, smooth; dark purple; with 8 nearly obsolete rays; $\frac{3}{4}$ inch long. British coasts. Don. t. 1. f. 2.

levis. * 30. Smooth; ears red; $\frac{5}{8}$ inch long. Anglesea, Falmouth. Montagu, t. 4. f. 4.

solaris. 31. Orbicular, flattish, glabrous; with 20 convex rays, and intermediate longitudinal striæ; ears nearly equal. Adriatic. Chem. vii. t. 67. f. 638. to 640.

glabra. 32. Ears nearly equal, equivalve, smooth, with from 10 to 15 smooth flattish rays; inside with elevated double striæ; 2 inches long, 2 broad. European and American seas. Chem. vii. t. 67. f. 641. to 645.

proteus. 33. Suborbicular, with about 5 broad convex plaits, and numerous longitudinal striæ; auricles nearly equal. Mediterranean. Chem. xi. t. 207. f. 2042.

opercularis. * 34. Rays 20; roundish and rough, with decussated striæ; upper valve a little more convex; $2\frac{1}{2}$ inches diameter. North seas, Devonshire and Cornwall, where it is called *frill* or *queen*. Don. t. 12.

lineata. * 35. Suborbicular, with about 20 subcarinated ribs, and crowded decussated striæ; upper valve more convex than the lower. Britain, and coast of France. Don. t. 116.

nucleus. 36. With 20 rounded rays; interstices finely wrinkled; margin repand; upper valve more convex. Tranquebar. Lister, t. 179. f. 16.

gibba. 37. Equivalve, gibbous, with 20 glabrous rays, longitudinally striated; slightly wrinkled transversely; smaller auricle oblique. American ocean. Chem. vii. t. 65. f. 619. and 620.

sulcata. 38. White, with flesh-coloured spots; rays glabrous, 32 on the lower valve, 35 on the upper; $1\frac{1}{2}$ inch long. Malabar. Chem. vii. t. 63. f. 603. and 604.

cinnabarina. * 39. Orbicular, with purple circles, and about 100 rays; $3\frac{1}{2}$ inches long, $3\frac{1}{4}$ broad. Mediterranean, Britain. The fish of this species is employed as food. Lister, t. 1057. f. 4.

triradiata. 40. Equivalve, glabrous, immaculate, with minute striæ; upper valve with 3 rays. Norway seas. Chem. xi. t. 207. f. 2043.

fuci. 41. Nearly equivalve, striated, spotted, rough towards the margin. Found on the fucus saccharinus in the North sea. Chem. xi. t. 207. f. 2039.

tigrina. 42. Nearly equivalve, striated, glabrous, red, with whitish spots. On fuci in the North seas. Chem. vii. t. 207. f. 2031.

turgida. 43. Equally convex, both sides with 20 glabrous rays; interstices with transverse, crowded wrinkles; margin with plaited teeth. Indian and American seas. Lister, t. 169. f. 6.

porphyria. 44. Convex, purple; within, white or red, with 25 thick, rounded, scaly rays; $2\frac{1}{4}$ inches long. Red sea. Chem. vii. t. 66. f. 632.

vitrea. 45. Hyaline, with an acute margin, very slender rays, and concentric scaly curves. North seas. Chem. vii. t. 67. f. 637. a.

pyxidata. 46. Suborbicular, with about 30 smooth ribs; upper valve flattish; margin plaited. Malabar. Chem. vii. t. 63. f. 603. and 4.

sauciata. 47. White, with purple spots, and numerous unequal rays; margin crenated. Red sea. Chem. vii. t. 69. f. H.

citrina. 48. Orange, with 22 rounded rays, and plaited margin; lower valve flatter. India. Chem. vii. t. 65. f. 618.

**** Valves more gibbous on one side than on the other.*

flavicans. 49. Nearly equivalve, with 8 striated rays; margin rounded on one side. South sea.

fasciata. 50. Equivalve, with 20 rough rays; interstices striated; ears equal, small. Atlantic seas. Chem. vii. t. 68. f. 649. a.

bullata. 51. Convex on each side; closed, oblong, pellucid; 32 rays; twice as long as it is broad. A rare shell. Chem. vii. t. 68. f. 649. b.

fragilis. 52. Equivalve, with 25 rays; margin very entire; ears acute; $1\frac{1}{4}$ inch long. Nicobar islands. Chem. vii. t. 68. f. 650.

lima. 53. Equivalve, with 22 imbricated scaly rays, rounded at one margin; ears obliterated; 3 inches long, $2\frac{1}{2}$ broad. Mediterranean and Indian seas. Chem. vii. t. 68. f. 657.

glacialis. 54. With 50 imbricated, interrupted rays; ears equal; one of them unequally plaited. American ocean. Chem. vii. t. 68. f. 652.

hians. 55. Whitish, thin, gaping on each side, and oblique, with obsolete, undulated rays, and transverse, rounded, semilunar striæ; $1\frac{1}{2}$ inch long, $\frac{3}{4}$ broad. Norway. Schroeter, iii. t. 9. f. 4.

scabra. 56. Ovate, compressed, with about 50 narrow scaly ribs, and the scales vaulted and imbricated; hinge slightly oblique; margin crenated. W. Indies. Lister, t. 176. f. 13.

excavata. 57. Dirty white, with longitudinal, undulated striæ, and a few transverse rings; one ear obsolete; margin entire;

raw and pickled. The shells calcined are employed in medicine as an absorbent, and in common with other shells, prove an excellent manure.

Stews or layers of oysters are formed in places which nature never allotted as habitations for them. Those near Colchester have been long famous; at present there are others that at least rival the former, near the mouth of the Thames. The oysters, or their spats, are brought to convenient places, where they improve in taste and size. It is an error to suppose, that the fine green observed in oysters taken from artificial beds, is owing to copper; this substance, or the solution of it, is destructive to all fish. The following is the account of the whole treatment of oysters, from Bishop Sprat's History of the Royal Society, from p. 307 to 309.

"In the month of May the oysters cast their spawn, (which the dredgers call their *spats*): it is like to a drop of candle, and about the bigness of a halfpenny. The spat cleaves to stones, old oyster-shells, pieces of wood, and such like things, at the bottom of the sea, which they call *cultch*. It is probably conjectured, that the spat in 24 hours begins to have a shell. In the month of May, the dredgers (by the law of the admiralty court), have liberty to catch all manner of oysters, of what size soever. When they have taken them, with a knife they gently raise the small brood from the cultch, and then they throw the cultch in again, to preserve the ground for the future, unless they be so newly spat, that they cannot be safely severed from the cultch; in that case they are permitted to take the stone or shell, &c. that the spat is upon, one shell having many times twenty spats. After the month of May, it is felony to carry away the cultch, and punishable to take any other oysters, unless it be those of size, (that is to say) about the bigness of a half-crown piece, or when, the two shells being shut, a fair shilling will rattle between them.

"The places where these oysters are chiefly catched, are called the *Pent-Burnham*, *Malden*, and *Colne-waters*; the latter taking its name from the river of Colne, which passeth by Colchester, gives name to that town, and runs into a creek of the sea, at a place called the *Hythe*, being the suburbs of the town. This brood and other oysters they carry to the creeks of the sea, at Bricklesea, Mersy, Langno, Fingrego, Wivenho, Tolesbury, and Saltcoase, and there throw them into the channel, which they call their *beds* or *layers*, where they grow and fatten; and in two or three years the smallest brood will be oysters of the size aforesaid. Those oysters which they would have green, they put into pits about three feet deep in the salt marshes, which are overflowed only at spring-tides, to which they have sluices, and let out the salt water until it is about a foot and a half deep. These pits, from some quality in the soil co-operating with the heat of the sun, will become green, and communicate their colour to the oysters that are put into them in four or five days, though they commonly let them continue there six weeks or two months, in which time they will be of a dark green. To prove that the sun operates in the greening, Tolesbury pits will green only in summer; but that the earth hath the greater power, Bricklesea pits green both winter and summer: and for a further proof, a pit within a foot of a greening pit will not green; and those that did green very well, will in time lose their quality. The oysters, when the tide comes in, lie with their hollow shell downwards; and when it goes out, they turn on the other side; they remove not far from their place, unless in cold weather, to cover themselves in the oose. The reason of the scarcity of oysters, and consequently of their dearness, is, because they are of late years bought up by the Dutch.

"There are great penalties by the admiralty court laid upon those that fish out of those grounds which the court appoints, or that destroy the cultch, or that take any oysters that are not of size, or that do not tread under their feet, or throw upon the shore, a fish which they call a *five-finger*, resembling a spur-rowl, because that fish gets into the oysters when they gape, and sucks them out.

"The reason that such a penalty is set upon any that shall destroy the cultch is, because they find that if that be taken away, the oose will increase, and the muscles and cockles will breed there, and destroy the oysters, they having not whereon to stick their spat.

"The oysters are sick after they have spat; but in June and July they begin to mend, and in August they are perfectly well; the male oyster is black-sick, having a black substance in the fin; the female white-sick (as they term it), having a milky substance in the fin. They are salt in the pits, salt in the layers, but saltest at sea."

42
Liquid about the oyster seen with the microscope.

The oyster affords the curious in microscopic observations a very pleasing entertainment. In the clear liquor many little round living animalcules have been found, whose bodies being conjoined, form spherical figures, with tails, not changing their place otherwise than by sinking to the bottom, as being heavier than the fluid; these have been seen frequently separating, and then coming together again. In other oysters, animalcules of the same kind were found, not conjoined, but swimming by one another, whence they seemed in a more perfect state, and were judged by Mr Leeuwenhoek to be the animalcules in the roe or semen of the oyster.

A female oyster being opened, incredible multitudes of small embryo oysters were seen, covered with little shells, perfectly transparent, and swimming along slowly in the liquor; and in another female, the young ones were found of a browner colour, and without any appearance of life or motion.

Monsieur Joblot also kept the water running from oysters three days, and it appeared full of young oysters swimming about nimbly in it; these increased in size daily; but a mixture of wine, or the vapour of vinegar, killed them.

In the month of August oysters are supposed to breed, because young ones are then found in them. Mr Leeuwenhoek, on the 4th of August, opened an oyster, and took out of it a prodigious number of minute oysters, all alive, and swimming nimbly about in the liquor, by means of certain exceeding small organs, extending a little way beyond their shells; and these he calls their beards. In these little oysters, he could discover the joinings of the shells; and perceived that there were

were some dead ones, with their shells gaping. These, though so extremely minute, are seen to be as like the large oysters in form as one egg is to another.

As to the size of them, he computes, that 120 of them in a row would extend an inch; and consequently, that a globular body, whose diameter is an inch, would, if they were also round, be equal to 1,728,000 of them. He reckons 3000 or 4000 are in one oyster, and found many of the embryo oysters among the bairds; some fastened thereto by slender filaments, and others lying loose: he likewise found animalcules in the liquor 500 times less than the embryo oysters.

It is not uncommon to see on oyster-shells, when in a dark place, a shining matter or bluish light, which sticks to the fingers when touched, and continues shining and giving light for a considerable time, though without any sensible heat. This shining matter being examined with a microscope, is said to consist of three sorts of animalcules; but it is more probable that it is the phosphorescent light which separates from animal matters, particularly fish, in the incipient stage of the putrefactive process.

orientalis. 65. Parasitical, ovate, yellowish brown, with black rays, and one valve much flatter than the other. East Indies. Chem. viii. t. 71. f. 660.

fornicata. 66. Rough, oblong, linear, with divergent hinges; internally vaulted. Red sea. Chem. viii. t. 71. f. 667.

orbicularis. 67. Orbicular, flattish, parasitical, longitudinally plaited, and transversely wrinkled towards the margin; margin obtuse, and somewhat toothed at the hinge.

denticulata. 68. Suborbicular, with strong, transverse, imbricated wrinkles, and somewhat truncated at the hinge, on both sides of which the margin is toothed. Cape of Good Hope. Lister, t. 193 and 194.

spondyloidea. 69. Equivalve, pellucid, flattened, oval, with perpendicular, undulated striæ on the upper valve; three inches long, 2½ broad. India. Chem. viii. t. 72. f. 669.

forskalli. 70. Plaited, and terminating in a long, incurved, hollow beak; middle ribs with imbricated, spinous wrinkles; 2 inches long, and 1 broad. Red sea. Chem. viii. t. 72. f. 671.

plicata. 71. With longitudinal, wrinkled plaits; lower valve smaller and flatter; varies much in shape and size. American and Mediterranean seas. Chem. viii. t. 73. f. 674.

rostrata. 72. Oblong, rugged; upper valve lamellated, with a denticulated margin; the lower excavated, and longitudinally grooved. Mediterranean. Chem. viii. t. 75. f. 676.

virginica. 73. Nearly equivalve, thick, rough, lamellous; one valve with a prominent beak; 9 inches long, and 4 broad. American and Indian oceans. Lister, t. 200. f. 34.

cucullata. 74. Upper valve flat, lower one hollow and striated; rough with scales, wrinkles and plaits, and terminating in an elongated beak. Indian and African oceans. Chem. viii. t. 74. f. 679.

arborea. 75. Thin; lower valve convex and thicker; the other flat. Atlantic and Indian seas.—This species, like the common oyster, fixes itself to the roots and branches of trees, particularly the mangrove, which grow out of the water. It varies in form and size, and is often as large as the palm of the hand, Chem. viii. t. 74. f. 681.

76. Rugged, with imbricated lamellæ; margin with obtusely plaited teeth; 1 inch long. Schroeter, iii. t. 9. f. 7. *cristata.*

77. Equivalve, roundish, smooth, flat; 2 inches diameter. Shores of Senegal. Adanson, t. 14. f. 5. *senegalensis.*

78. Oval, thin, terminating in a short, acute, lateral, channelled beak; striæ perpendicular, unequal, obsolete; 1 inch long. Schroeter, iii. t. 9. f. 8. *ovalis.*

**** *With the hinge composed of transverse furrows, in a straight line.*

79. Oval, slightly eared, smooth, with an oblique base; 1½ inch long, and 1½ broad. Mediterranean. Schroeter, iii. t. 9. f. 6. *semiaurita*

80. Equivalve, obovate, unequal, rounder at one end; 2½ inches long; has some resemblance to a gammon of bacon. Indian and American seas. Lister, t. 199. f. 33. *perna.*

81. Equivalve, with a larger lobe, forming a right angle with the hinge; from 5 to 7 inches long, and 1½ broad in the middle; shell blackish, violet without, pearly within. Indian ocean and South seas. Is a rare shell. Chem. vii. t. 59. f. 584. *isogonum.*

82. Equivalve, thin, pellucid, and pointed at the hinge; the other end dilated; margin acute; 2 inches long, more than an inch broad. Red sea. Chem. vii. t. 51. f. 575. *picta.*

83. Flat, hoary, thin, pellucid, lamellated; interstices of the grooves black; 2 inches long, 4 lines broad. Nicobar islands. Chem. vii. t. 59. f. 578. *legumen.*

84. Equivalve, orbicular, compressed, membranaceous; 5 inches long, 5½ broad. Indian ocean and Cape of Good Hope. Very rare. Chem. vii. t. 58. f. 576. *ephippium*

85. Flat, brittle, pellucid; dilated towards the margin; hinge oblique. W. Indies. Chem. vii. t. 58. f. 575. *alata.*

Gen. 15. ANOMIA. 43 Anomia.

Gen. Char.—The animal is a ligula or strap-shaped body, emarginated and ciliated; the bristles being fixed to the upper valve. There are two linear arms, longer than the body, open, stretched out, alternate on the valve, ciliated on both sides; the hairs are fixed to both valves. The shell is inequivalve; one valve being rather flat, the other more gibbous at the base, with a produced beak, generally curved over the hinge; one of the valves is often perforated at the base; the hinge is without teeth. A small linear scar appears prominent, with a lateral tooth placed within; but on the very margin of the flat valve. There are two bony rays for the base of the animal.

SPECIES.

1. Orbicular; the gibbous valve conico-convex; flat valve with three hollows at the base; 1 inch long, ½ broad. Mediterranean seas and Philippine islands. It is sometimes found fossil. Chem. viii. t. 76. f. 688. *craniolaris.*

2. Oblong, with branched grooves; the gibbous *pectinata.*

valve

** *Flat, or compressed into a flattened form, and slightly eared.*

margaritiferus. 4. *Pearl-bearing mussel.* Flattened, nearly orbicular, with a transverse base, imbricated with toothed tunics. American and Indian seas. Lister, t. 221. f. 56.—This species is about 8 inches long, and somewhat broader; the inside is finely polished, and produces the true mother-of-pearl; and frequently also it affords the most valuable pearls. When the outer coat of the shell, which is sometimes sea-green, or chesnut with white rays, or whitish with green rays, is removed, it exhibits the same pearly lustre as the inside; the younger shells have ears as long as the shell, and resemble scallops.

radiatus. 5. Roundish, with transverse membranaceous scales, forming spinous processes arranged in longitudinal lines. Tranquebar. Chem. viii. t. 80. f. 719.

unguis. 6. Roundish; longitudinally striated, pellucid, and slightly eared. Mediterranean.

*** *Somewhat ventricose or convex.*

lithophagus. 7. Cylindrical; rounded at both ends. European, American, and Indian seas. It is about an inch broad, and 3 long.—It perforates and eats away coral rocks, and even the hardest marbles. Those which are found in Europe have a thin brittle shell: the shell of those found in India is soft, and nearly coriaceous. Chem. viii. t. 82. f. 731.

aristatus. 8. Subcylindrical, rounded at the hinge, and armed at the opposite extremity with two beak-like processes which cross each other. Senegal. Linn. Tr. viii. t. 6. f. 2.

ambiguus. * 9. Oblong, smooth, rounded at both ends, and gaping on one side. Weymouth and Devonshire. Wood, t. 25. f. 2. and 3.

rugosus. * 10. Rhombic, oval, brittle, rugged, antiquated, and rounded at the ends. Seas and lakes, north of Europe. Britain. Don. t. 101.—It is usually found lodged in limestone; each individual in a separate apartment, with apertures too small for the shell to pass through.

præcisus. * 11. Oblong, distorted, with the valves unequal, and strongly wrinkled transversely; hinge terminal. Britain, adhering to roots of algæ, or burrowed in limestone. Montagu, t. 4. f. 2.

arborescens. 12. Subcylindrical, smooth, compressed at the margin, and marked over one half with minute branching lines. China. Chem. xi. t. 198. f. 2016.

bilocularis 13. Striated, with vaulted knobs, and a white partition. Nicobar islands. Chem. viii. t. 82. f. 736.

crustus. 14. Convex; one of the margins angular; the anterior extremity crenated; 1½ inch long. American ocean and Red sea. Lister, t. 366. f. 206.

striatulus. 15. Very finely striated longitudinally, with the anterior side slightly angulated, and the other incurved; striæ slightly crenated. Northern ocean. Schroeter, iii. t. 9. f. 16.

edulis. * 16. *Eatable* or *common mussel.* Smooth, violet; valves slightly recurved on the obtuse side, and somewhat angular on the acute side; beaks pointed; from 2 to 3 inches long. European and Indian seas. Lister, t. 362. f. 200.—This species is observed to be larger within the tropics, and to diminish gradually towards the north. It is found in large beds, and generally attaches itself to other bodies by means of its long silky beard. The fish is employed as food in many parts of the world, and is esteemed rich and nutritious.

incurvatus. * 17. Very crooked on one side near the beaks, then generally dilated; within with a violet tinge. Coast of Anglesea. Linn. Trans. viii. t. 3. f. 7.

pellucidus. * 18. Oval, transparent, and elegantly radiated lengthwise with purple and blue; 2 inches long. Anglesea, in oyster beds. Chem. t. 84. f. 755.

ungulatus. 19. Smooth, slightly curved; hind margin inflected; hinge terminal, two-toothed. Mediterranean, Cape of Good Hope, and New Zealand. Found at the latter place resembling *M. edulis;* but is 5 inches long, and 2⅐ broad. Lister, t. 360. f. 199.

latus. 20. Ovate, with the posterior side rather convex, and the apices distant and slightly curved; hinge channelled with a tooth in one valve. N. Holland. Lister, t. 362. f. 201.

perna. 21. Oblong, smooth, with the sides nearly straight, and the apices acute; hinge with a tooth in each valve, and channelled. Straits of Magellan. Chem. viii. t. 83. f. 738.

smaragdinus. 22. Subtriangular and compressed; hinge with two teeth in one valve, and one in the other. Tranquebar. Chem. viii. t. 83. f. 746.

demissus. 23. Oblong, longitudinally striated, except on the anterior side next the hinge; summits rounded and approximated. Virginia. Lister, t. 358. f. 196.

modiolus. * 24. Smooth, blackish, obtuse at the smaller end, and rounded at the other; one side angular, near the beaks; from 6 to 7 inches long, 3 broad. European, American, and Indian seas, Devonshire, Weymouth. Don. t. 23. A variety, with a deep umbilicus under the summit, is not unfrequent on our coasts. Don. t. 40.

cygneus. * 25. Ovate, very brittle, transversely wrinkled; anterior end compressed, the other rounded; hinge lateral; from 2 to 5 inches broad, and 3 long. Frequent in the lakes and rivers of Europe, Britain.—It is the largest of British fresh-water shells. It arrives at the greatest size in ponds and stagnant waters. Lister, t. 156. f. 11.—With a suboval shell, of an olivaceous brown colour, with concentric wrinkles; size of the M. *anatinus*, but broader in proportion to its length. The posterior side generally more obtuse and rounded. River Avon in Wiltshire. Montagu, Test. Brit. 172. *Mytilus avonensis.*

fluviatilis. 26. Transversely oval, rounded on both sides, and smooth; umbones large and rounded; summits reflected. N. America. About 2 inches long, and 3 broad. Lister, t. 157. f. 12.

stagnalis. 27. Oval, flattish, and transversely ribbed; 8 inches broad, 4⅐ long. In fresh waters. Sowerby, Brit, Misc. t. 16.

anatinus. * 28. Oval, a little compressed; brittle and semi-transparent, with a membranaceous margin. Fresh waters of Europe.—It resembles the last, but is longer and narrower. Ducks and crows, it is said, are extremely fond of both this and the last species. Don. t. 113.

dubius. 29. Transversely wrinkled; obtuse at each end; fulvous,

fulvous, within pearly; beaks obsolete; hinge without teeth; 5 inches broad, 2 long. Fresh waters of Senegal. Adanson, t. 17. f. 21.

ruber. 30. Wrinkled; valves oblique and anteriorly dilated. Southern ocean.

discrepens * 31. Transversely ovate, compressed, with the two sides longitudinally ribbed, and plain in the middle. Baltic, and Newhaven near Edinburgh. Montagu, t. 26. f. 4.

discors. * 32. Oval, horny, subdiaphanous; extremities longitudinally striated; middle transversely. European and southern seas, Cornwall and Devonshire. From the South seas it is $1\frac{1}{8}$ inch broad; in Britain rarely exceeds $\frac{1}{2}$ inch. Don. t. 25.

impactus. 33. Transversely oval, somewhat four-sided, very convex, with the two sides longitudinally ribbed, and the middle transversely wrinkled; inside iridescent. New Zealand. Chem. viii. t. 86. f. 768.

hirundo. 34. Smooth; valves 2-lobed; lobe at the hinge longer and thinner. American, Mediterranean, and Indian seas. Chem. viii. t. 81. f. 722.

morio. 35. Transversely striated, with two lateral lobes, and the epidermis longitudinally undulated, and forming rays from the umbo. Red sea. Chem. xi. t. 205. f. 2018.

ala-corva. 36. With two rather obsolete lobes, and marked with minute white dots, forming longitudinal rays. South sea islands. Chem. viii. t. 81. f. 727.

vulgaris. 37. Flattened on one side and inflected; beaks incurved, convergent; hinge 1-toothed. American ocean. Chem. viii. t. 82. f. 732.

plicatus. 38. Rhombic, inequilateral; transversely striated and wrinkled; beaks incurved. Nicobar islands. Chem. viii. t. 92. f. 733.

niveus. 39. Ovate, subdiaphanous; finely striated longitudinally; margin acute; hinge 2-toothed; shell snowy and polished within. Nicobar islands. Very rare. Chem. viii. t. 82. f. 734.

corallophagus. 40. Carinated in the middle, and crenated at the margin, with an obtuse knob; $\frac{3}{4}$ inch long. Indian and American oceans. Perforates rocks like a pholas. Chem. viii. t. 84. f. 752.

lineatus. 41. Triangular and dilated outwards, with angular, decussated, and confluent lines; hinge 2-toothed. A minute shell. Chem. viii. t. 84. f. 753.

fuscus. 42. Oblong, narrow, finely striated transversely; one side emarginated, the other rounded; beaks prominent, curved. A minute brown shell. E. Indies. Lister, t. 359. f. 197.

puniceus. 43. Gibbous, pointed, with 15 grooves; margin toothed; 14 lines long, and half as broad; hinge with 4 minute teeth. Africa. Adanson, t. 15. f. 2.

niger. 44. Flat, thin, with minute grooves, covered with a black skin, under which it is milky, and finely polished; $1\frac{1}{2}$ inch long; grooves about 100. Africa. Adanson, t. 15. f. 3.

dubius. 45. Transversely wrinkled; obtuse at each end; fulvous, within pearly; beaks obsolete; hinge without teeth; 5 inches broad, 2 long. Fresh waters of Senegal. Adanson, t. 17. f. 21.

lingua. 46. Somewhat tongue-shaped, compressed, very brittle, and the umbones keeled; summits acuminated, and both ends gaping. Amboyna. Chem. x. t. 172. f. 1675. and 1676.

camelli. 47. Oblong, thin, truncated; beak sharp and carinated; valves completely closed. Japan.

bidens. 48. Striated, slightly curved; hind margin inflected; hinge terminal, 2-toothed; scarcely an inch long. Mediterranean and Atlantic seas. Lister, t. 356. f. 193.

45 *Pinna.*

Gen. 17. Pinna, *Sea-Wing*.

Gen. Char.—The animal a limax; the shell bivalve, fragile, upright, gaping at one end, and furnished with a byssus or beard. Hinge without teeth; the valves united into one.

Species.

rudis. 1. Vaulted with arched scales, arranged in rows; from 12 to 16 inches long, and from 4 to 8 broad; red; from 6 to 8 grooves. Atlantic, Indian, and Red seas. Lister, t. 373. f. 214.

nigra. 2. Ovate, ventricose, with the margin rounded on both sides, and striated longitudinally. Amboyna and Red sea. Chem. viii. t. 88. f. 774.

ingens. * 3. Subtriangular, ovate, slightly incurved towards the summit, with irregularly scaly wrinkles, and interrupted longitudinal striæ. Scotland, and Devonshire. Don. t. 152.

pectinata. 4. Longitudinally striated half way; one side slightly wrinkled transversely; 3 inches long, 4 broad. Indian ocean. Chem. viii. t. 87. f. 770.

inflata. 5. Subtriangular, ovate, and slightly keeled longitudinally, with abbreviated ribs on one side, and reticulated wrinkles on the other. Nicobar islands. Chem. viii. t. 87. f. 771.

carnea. * 6. Thin, flesh-coloured, subtriangular; pellucid, with 8 or 10 longitudinal ribs beset sparingly with vaulted spines at the broader end. West Indies, and Dorsetshire. Montagu, t. 5. f. 3.

rigida. 7. Subtriangular, ovate, with about 13 spinous ribs on one side, and the other transversely wrinkled; spines tubular. Curaçoa. Chem. viii. t. 89. f. 775.

nobilis. 8. Striated, with channelled, tubular, subimbricated scales; $7\frac{1}{2}$ inches long, $3\frac{1}{2}$ broad. Mediterranean, Adriatic, and American seas. Chem. viii. t. 89. f. 776.

muricata. 9. Striated with concave, ovate, acute scales; from 3 to 9 inches long, and 1 to 3 broad. European and Indian oceans. Lister, t. 370. f. 10.

rotundata. 10. With obsolete scales, margin rounded; sometimes 2 feet long. Mediterranean. Chem. viii. t. 93. f. 787.

squamosa. 11. With fine undulated scales, and flexuous broad wrinkles; smaller end pointed and naked; 13 inches long, $6\frac{1}{2}$ broad. Mediterranean. Chem. viii. t. 92. f. 784.

saccata. 12. Smooth, satchel-shaped; a little erect, and slightly fastigiated; $3\frac{1}{4}$ inches long, $2\frac{1}{4}$ broad. Mediterranean and Indian seas. Lister, t. 371. f. 212.

digitiformis. 13. Smooth, tubular, finger-shaped, incurved; extreme margin membranaceous; pellucid.

lobata. 14. Naked, lobed, straw-coloured, with purple striæ.

vitrea. 15. Hyaline, with longitudinal waved striæ; the striæ with a few scales, and crossed by other transverse striæ at the margin. Indian ocean. Very rare. Chem. viii. t. 87. f. 772.

incurva. 16. Narrow, long, naked, carinated, with transverse, aperture oval. It is a very rare species. Amboyna. Martini, t. 18. f. 163.

cymbium. 4. Keel of the shell wrinkled, and without teeth; depressed, thin, wrinkled, with fine longitudinal striæ crossing the wrinkles. Mediterranean. Martini, i. t. 18. f. 161. and 162.

cornu. 5. Keel with 4 smooth elevated rings; 1 line high, 5 broad. Cape of Good Hope. Chem. x. t. 137. f. 1271.

arctica. 6. Shell perforated, with an entire keel; 3½ lines diameter. Greenland seas, where it is frequently seen floating in spring and autumn.

hians. 7. With the keel dilating outwards; lateral ridges distant, alternately shorter; aperture dilated. Mexico. Martini, i. t. 17. f. 158. and 159.

gondola. 8. With the keel edged, with compressed teeth; lateral ribs numerous and branched; aperture broad, ovate.

haustrum. 9. With the keel edged, with compressed teeth; lateral ridges smooth and simple; aperture subtriangular. E. Indies. Martini, i. p. 221. f. 2.

Some species of the argonauta are met with in all climates, from the Indian ocean to the shores of Greenland.

47 Nautilus.

Gen. 19. Nautilus.

Gen. Char.—The nature of the animal which inhabits this shell is not well known. The shell is univalve, divided into several compartments, communicating by an aperture with each other.

Species.

* *Spiral, rounded, with contiguous whorls.*

pompilius. 1. Aperture of the shell heart-shaped; whorls obtuse; smooth; spire involuted and concealed. Indian and African ocean. Lister, t. 550. f. 1. and 3.—This species is often very large, and it is finely variegated with brown flexuous streaks, spots, and marks, under the epidermis, which is white; within it exhibits a beautiful pearly gloss. It is employed for drinking cups by the inhabitants of the east.

suborbiculatus. 2. Aperture heart-shaped; whorls obtuse; slightly, obsoletely, striated transversely; spire with an umbilicus, involute, and concealed: very like the preceding species, but may at once be distinguished by the umbilicus. New Guinea. Lister, t. 552. f. 4.

calcar. * 3. Aperture of the shell linear; whorls with elevated joints; minute, white, opaque. Sheppey island. Martini, i. t. 19. f. 169.

rotatus. * 4. Spiral, smooth, keeled; joints six, with the partitions elevated and flexuous; keel entire; aperture semicordate. Rimini and England. Montagu, t. 15. f. 4.

lævigatus. * 5. Spiral, smooth; joints 10, with the partitions slightly elevated; aperture triangular. Kent. Montagu, t. 18. f. 7. and 8.

crispus. * 6. With lateral spires, with about 20 flexuous, crenated joints in the exterior whorl; marked by elevated striæ; aperture semicordate; syphon central; very minute. Mediterranean, Sheppey island, and Sandwich. Montagu, t. 18. f. 5.

beccarii. * 7. Aperture obovate; 4 or 5 volutions, with deep sulcated joints; 10 in the first spire, frequent on most shores; minute. Adriatic, Britain. Montagu, t. 18. f. 6.

perversus. * 8. Similar to the preceding species, but with the spires reversed. Shores of Britain, frequent. Mont. t. 18. f. 6.

depressulus. * 9. Spiral, slightly umbilicated on each side, with many depressed joints. Reculver, England. Very minute, and rare. Montagu, t. 18. f. 9.

umbilicatus. * 10. Spiral, umbilicated, with furrowed joints; colour opaque, white. Sandwich. Minute, not common. Montague, t. 18. f. 1.

crassulus. * 11. Thick, spiral, doubly umbilicated, with fine joints; opaque, white. Reculver, England. Minute, rare. Montague, t. 18. f. 2.

lobatulus. * 12. Spiral, lobate; spires rounded on one side, depressed on the other. Whitstable. Walker, t. 3. f. 71.

balthicus. 13. White, convex; aperture linear; first spire largest. Baltic. Schroeter, i. t. 1. and 2.

rugosus. 14. Aperture linear; spires compressed, with thickened margins. Southern ocean. Very small.

umbilicatus. 15. Aperture compressed, linear; spires compressed; umbilicus concave; minute. Croatia, Column. Phytol. ii. t. 38. f. E.

** *Spiral, rounded, with detached whirls.*

spirula. 16. Aperture orbicular; whirls cylindrical and detached; one inch in diameter. American and Indian oceans. Lister, t. 550. f. 2.

spengleri. 17. Smooth, with 4 conic tubercles; very minute. India. Spengler, i. t. 2. f. 9. b. and c.

unguiculatus. 18. Diaphanous, middle partitions protuberant outwards; surface with six conic tubercles; minute. India. Spengler, i. t. 2. f. 9. d.

*** *Elongated, and nearly straight.*

semilituus. * 19. Incurved, spiral at the tip; whirls contiguous; minute, convex; the partitions appearing outwardly. Croatia, Sandwich. Rare. Montagu, t. 19. f. 1.

lituus. 20. Subconic; globular divisions growing gradually less; tip incurved, spiral. Red sea. Frequently found fossil. Spengler, i. t. 2. f. 10. d. to g.

carinatulus. * 21. Oblong, carinated; aperture oval, narrow. Sandwich. Minute, rare. Walker, t. 3. f. 72.

obliquus. * 22. With a slight curvature; divisions obliquely striated; syphon central. Mediterranean and Adriatic seas, Britain. Montagu, t. 14. f. 4.

raphanistrum. 23. Subcylindrical, with thick divisions, marked with 12 elevated striæ; syphon central. Adriatic and Mediterranean seas. Ledermuller, t. 4. f. x. lower figure.

raphanus. 24. Jointed divisions thick, with 17 elevated striæ; syphon sublateral, oblique. Adriatic and Mediterranean. Martini, i. vig. at p. 1. f. A. B.

granum. 25. Ovate, oblong, with thick divisions, marked with 8 interrupted elevated striæ: syphon oblique; minute. Mediterranean.

radicula. 26. Oblong, ovate, with 8 or 9 subglobose articulations; aperture a small syphon. Adriatic, Sandwich. Montagu, t. 6. f. 4.

spinulosus. * 27. Straight, ovate-oblong, with swollen spinous joints. Britain. Montagu, t. 19. f. 5.

subarcuatus. * 28. A little bending, with raised joints; length one-tenth of an inch. Sandwich. Very rare. Montagu, t. 6. f. 5.

29. Arcuated

bicarinatus. 29. Arcuated, with two opposite longitudinal keels; joints globose. Sandwich.

fascia. 30. Divisions striated; joints smooth, elevated: obtuse at the tip; denticulated at the margin; syphon central. Adriatic. Very small. Gualteri, t. 19. f. O.

inæqualis. 31. Cylindrical, with 8 divisions; aperture margined; very minute. Red sea. Spengler, i. t. 2. f. 10. a. b. and c.

siphunculus. 32. Smooth, with cylindrical, remote divisions; joints tapering, cylindrical. Seas of Sicily. Gualteri, t. 19. f. R. S.

legumen. * 33. Compressed, jointed, margined at one end; syphon lateral. Adriatic, Sandwich. Very rare. Montagu, t. 19. f. 6.

costatus. * 34. Straight, subcylindrical, tapering; joints 12, raised, with 4 equidistant, strong, longitudinal ribs the whole length; $\frac{1}{4}$ inch long. Coast of Kent. A variety of this has been discovered with only 6 joints. Montagu, t. 14. f. 5.

linearis. 35. Straight, compressed; narrow jointed and ribbed at the smaller end. Dunbar. Montagu, t. 30. f. 9.

rectus. 36. Nearly straight, with smooth depressed joints. Sandwich. Montagu, t. 19. f. 4. and 7.

orthocera. 37. Whirls of the shell with carinated striæ. The ocean. Frequently found fossil.

48 Conus.

Gen. 20. Conus, *Cone-shell.*

Gen. Char.—The animal is a limax. The shell univalve, convolute, turbinate; aperture effuse, longitudinal, linear, without teeth, entire at the base; pillar smooth.

Species.

* *Spire somewhat truncated.*

marmoreus. 1. Brown, with ovate, subangular, white spots; whirls of the spire channelled. American ocean. Lister, t. 787. f. 39.

nocturnus 2. Granulated at the base; blackish, with bands of white; somewhat heart-shaped, confluent spots; spire coronated and channelled. Amboyna. Rare. Martini, ii. t. 62. f. 687.

nicobaricus. 3. Mottled, with black and somewhat heart-shaped white spots, and marked with two darker transverse bands; spire coronated; throat yellow. Chem. x. t. 139. f. 1292.

arachnoides. 4. Reticulated with chesnut, with two or three darker bands; spire crowned and acute. A very rare species. Coromandel. Chem. x. t. 144. A. f. c. and d.

zonatus. 5. With alternate articulated belts and tesselated spots; spire crowned with tubercles; shell often minute, and with a white band. Asiatic ocean. Martini, ii. t. 63. f. 783. to. 785.

imperialis 6. Whitish, with longitudinal livid bands, and divided brown and white linear belts: spire flat, painted with brown undulated stripes, often emarginated. A rare shell. Lister, t. 766. f. 15.

fuscatus. 7. Brownish-green, with longitudinal confluent white streaks, and darker transverse interrupted lines; spire coronated. New Zealand. Martini, ii. t. 62. f. 692. and 693.

literatus. 8. White, with brown dots; spire marked with brown stripes. Asiatic ocean. Lister, t. 770. f. 176.

eburneus. 9. White, with transverse rows of dark quadrangular spots, and the base transversely grooved; whirls of the spire longitudinally striated. East Indies. Martini, ii. t. 61. f. 674.

tesselatus. 10. White, with transverse rows of red spots; base violet, and slightly grooved transversely. Java. Lister, t. 767. f. 17.

generalis. 11. Polished, with a pointed, muricated spire; whirls channelled. India. Lister, t. 786. f. 35.

monile. 12. Smooth, reddish, with darker transverse dotted lines, and paler bands; spire flattish, mucronated, and the whirls channelled. Nicobar islands. Chem. x. t. 140. f. 1301. to 3.

canaliculatus. 13. White, with reddish-brown interrupted transverse bands and lines; spire mucronated, and the whirls marginated. Ceylon. Chem. xi. t. 181. f. 1748.

virgo. 14. Yellowish with a violet base; spire slightly convex and obtuse. Java. Lister, t. 754. f. 2.

candidus. 15. Conic, snowy; spire prominent, and crowned with tubercles; aperture large. Born, t. 7. f. 9.

capitaneus 16. Glabrous, with a brown base; spire a little convex, sometimes flat, and generally striped. Asia. Lister, t. 780. f. 27.

chemnitzii. 17. Greenish-brown, with two white spotted transverse bands, and numerous scattered white dots; base and throat blue. Ceylon. Chem. xi. t. 182. f. 1764. and 1765.

mustelinus. 18. Greenish, with white transverse bands spotted with brown; base with granulated lines; spire subconical and striated. Batavia. Chem. x. t. 138. f. 1280.

leopardus. 19. Brownish-yellow, with dark, longitudinal confluent stripes, and two white transverse bands; spire convex and striated.

hyæna. 20. With longitudinal dark red stripes, and transverse rows of dots; spire mucronated. New Zealand. Chem. xi. t. 181. f. 1750.

centurio. 21. White, with three yellowish bands; spotted with chesnut: spire convex; base transversely striated. St Domingo. Martini, ii. t. 59. f. 655.

miles. 22. Conic, rough with a brown and striated base: spire convex. India. Lister, t. 786. f. 34.

spurius. 23. White, with irregularly alternate rows of broad and smaller spots; spire depressed, mucronated. St Domingo. Martini, ii. t. 56. f. 626. to 628.

leonius. 24. White, with brown contiguous spots forming indistinct bands; spire flattish. Amboyna. Martini, ii. t. 57. f. 640.

characteristicus. 25. Transversely grooved at the base; white, with numerous character-like spots; spire truncated and spotted with brown. West Indies. Chem. xi. t. 182. f. 1760. and 1761.

cærulescens. 26. Transversely striated, granulated, glaucous, with irregular brown spots. West Indies. Chem. t. 182. f. 1762.

radiatus. 27. With white rays and bands, transversely grooved at the base. Favanne, ii. t. 15. f. O.

** *Pyriform with a rounded base; body half as long again as the spire.*

princeps. 28. Yellow, with purplish brown, longitudinal branched lines, marked with two white bands, which have a few brown spots; spire obtuse and finely striated transversely; $2\frac{1}{2}$ inches long. Indies. Chem. x. t. 138. f. 1276.

janus. 29. Oblong, conical, grooved at the base; white, undulated longitudinally, with yellowish brown; whirls of of spires striated and channelled. Asiatic ocean. Lister, t. 782. f. 29.

guinaicus. 30. Subconical, reddish, with obsolete brown and white variegated bands; spire obtuse, spotted and striated. Guinea. Ency. Method. t. 337. f. 6.

fulmineus. 31. With chesnut stripes the whole length: spire acute, and with the pillar lip spotted with chesnut; the base acute and obliquely striated. Africa.

lorenzinus 32. Subconical, yellow, with interrupted longitudinal reddish stripes; base dotted with red; spire concave and acute. East Indies. Chem. xi. t. 181. f. 1754.

amadis. 33. Pale brown, with a broad band, and articulated belts above and beneath: spire acute, crowned with tubercles, and finely striated transversely. Java. Chem. x. t. 142. f. 1322. and 1323.

acuminatus. 34. Striated at the base, white, reticulated with brown; whirls concave. Red sea. Martini, ii. t. 57. f. 638. and 639.

ammiralis 35. With rough punctures at the base.—This species is divided into the following varieties. 1. Without bands. 2. With irregular bands. 3. With one regular band. 4. With two regular bands. 5. With three regular bands. 6. With four regular bands. 7. With five or more regular bonds. 8. With punctuated, reticulated belts. To this last division belongs the *cedo nulli*, or celebrated admiral shell, which has been esteemed the rarest and most precious of testaceous productions. Some specimens of the *cedo nulli* have brought the extravagant price of 100 guineas. The endless varieties of this species are found in the seas of South America. Martini, ii. t. 57. f. 634.

thomæ. 36. Smooth, white, with bay characters and rows of dots, with three white belts and spots; the tip reddish; spire conic, with grooved whirls. Indian ocean. Chem. x. t. 143. f. 1331.

archithalassus. 37. Granulated and brownish yellow, with three transverse bands; spire conical, and the whirls slightly concave. Amboyna. Martini, ii. vig. 26. f. 1.

cedonulli. 38. Granulated, and marked with dotted lines and bands, and confluent or detached spots; spire conical and coronated. South America. Martini, ii. t. 57. f. 633.

aurantius. 39. Conical, granulated, of an orange colour; spire conical and coronated. Philippine islands. Lister, t. 775. f. 21.

leucosticus 40. Subgranulated, white, marbled with brown or yellow; spire acute, coronated, and nodulous at its base. St Domingo. Lister, t. 759. f. 4.

vitulinus. 41. White, marbled with orange, and granulated at the base; spire with dotted striæ.

planorbis. 42. Yellow, more or less granulated; spire depressed, obtuse, and the whirls concave and striated; throat violet. Guinea. Ency. Method. t. 326. f. 8.

senator. 43. Conic, smooth, glabrous; with obtuse, sculptured whirls; yellow spotted with white. Guinea. Martini, ii. t. 59. f. 659.

latus. 44. Subovate, more or less granulated, marbled with brown and yellow, and marked with convex spotted striæ; spire obtuse and striated. St Domingo. Martini, ii. t. 55. f. 609. and 610.

nobilis. 45. Subcylindrical, smooth, glabrous; finely polished; yellow or brown, spotted with white. Amboyna. Chem. x. t. 141. f. 1313. and 1314.

siamensis. 46. Yellowish, with white bands, and numerous spotted narrow belts. China. Rumph. t. 34. f. E.

papilionaceus. 47. White, with transverse rows of yellow spots and dots; whirl slightly channelled. Guinea. Lister, t. 773. f. 19.

fluctifer. 48. Conical-oblong, white, with transverse bands of short ferruginous undulated stripes; spire conical, concave, and acuminated. Java. Lister, t. 771. f. 17. &c.

musicus. 49. Striated at the base, white, with a blue band, and transverse rows of spotted lines; spire obtuse and coronated. China. Ency. Method. t. 322. f. 4.

miliaris. 50. Flesh-coloured, with two white bands, and crowded transverse dotted lines; spire obtuse and coronated. China. Ency. Meth. t. 319. f. 6.

genuanus. 51. With linear belts, articulated with white and brown: red, with bands alternately tesselated with brown and red. Guinea. Martini, ii. t. 56. t. 623.

glaucus. 52. Emarginated at the base, striated; spire unarmed, with contiguous whirls. India and Africa. Chem. x. t. 138. f. 1277. and 1278.

suratensis 53. Striated and emarginated at the base; yellow, with transverse rows of brown linear spots; spire convex and mucronated; spotted with brown. E. Indies. Chem. xi. t. 181. f. 1752 and 1753.

monachus 54. Gibbous, clouded with bluish brown; acute, striated at the base; sometimes dotted in rows. Mediterranean. Martini, ii. t. 55. f. 614.

ranunculus. 55. White, clouded with red and yellow, or olive, with elevated dotted striæ; spire obtuse, whirls striated. American ocean. Ency. Meth. t. 331. f. 1.

anemone. 56. White, grey, or cinnamon colour, spotted, and finely striated transversely; spire obtuse and striated. New Holland.

achatinus. 57. Scabrous at the base, of a dark colour, with bluish white spots and interrupted dotted lines; spire acute.

luzonicus. 58. Whitish, with brown spotted bands, and transverse milk-white interrupted lines; spire convex, and somewhat coronated. Philippine islands. Ency. Meth. t. 338. f. 6.

rusticus. 59. Ovate, rugged, and muricated at the base; spire conico-convex. Var. 1. Without band. 2. With a band, clouded, whitish. Africa. Lister, t. 765. f. 14.

nisus. 60. Grooved towards the base, cinereous, clouded with white, and marked with transverse rows of brownish spots; spire convex. East Indies. Chem. xi. t. 183. f. 1784. and 1785.

lividus. 61. With transverse granulated striæ at the base, and livid, and one or two white bands; spire coronated and obtuse; inside violet. Cape of Good Hope. Ency. Meth. t. 321. f. 5.

mus. 62. Ash-coloured, with elevated transverse striæ, one white band, and obsolete longitudinal yellowish brown stripes; spire acute and coronated. American ocean. Lister, 784. f. 31.

distans. 63. Somewhat elongated, with distant striæ; base and throat violet; spire convex and coronated. New Zealand. Chem. x. t. 138. f. 1281.

caledonicus. 64. Orange coloured, with crowded transverse parallel red striæ; spire acute, coronated. New Caledonia. Ency. Meth. t. 321. f. 10.

vittatus. 65. Pyriform, yellowish, with two marbled transverse bands, and obsolete interrupted lines. Asiatic ocean. Ency. Meth. t. 335. f. 3.

classiarus. 66. Ferruginous, with two white varigated bands; base white. Asiatic ocean. Ency. Meth. t. 335. f. 7.

67. Ovate,

mercator. 67. Ovate, white, with reticulated yellow bands. Africa. Lister, t. 788. f. 41.

betulinus. 68. Slightly emarginated at the base and wrinkled; spire flattish, mucronate. India. A large shell. Lister, t. 762. f. 11.

figulinus. 69. Slightly emarginated at the base, and wrinkled; spire acuminated, with flattish whirls: three inches long. India. Lister, t. 785. f. 32.

quercinus 70. Yellow, with numerous pale chesnut transverse lines; spire conical, depressed; whirls longitudinally striated. Madagascar. Martini, ii. t. 69. f. 657.

lineatus. 71. Granulated at the base, white, variegated with brown, and marked with crowded interrupted lines; spire obtuse. Isle of France. Ency. Meth. t. 326. f. 2.

eques. 72. Somewhat ventricose, whitish, with a transverse yellow band, and two rows of distant large brown spots; spire convex. New Zealand. Ency. Meth. t. 335. f. 9.

ermineus. 73. Reddish-yellow, with two mottled bands, and blackish granulations at the base; spire conical, and the whirls flat. Isle of France. Ency. Meth. t. 338. t. 8.

vexillum. 74. Yellowish-brown, with two mottled bands, and irregular longitudinal streaks; base blackish; spire spotted with brown and tipped with yellow. Batavia. Chem. xi. t. 182. f. 1758.

testudi-
narius. 75. Whitish, clouded with dark grey, and marked with two dark bands, spotted with white; spire obtuse. Surinam. Ency. Meth. t. 335. f. 6.

venulatus. 76. Striated at the base; white, with somewhat reticulated yellowish stripes; spire convex. Manilla. Ency. Meth. t. 337. f. 9.

namoca-
nus. 77. Yellowish, with numerous transverse darker bands, and intermediate lines; spire obtuse and striated. South sea. Ency. Meth. t. 338. f. 5.

ebraeus. 78. Ovate, white, with a black band, composed of transverse spots: a small shell. E. Indies. Lister, t. 779. f. 25.

arenatus. 79. Emarginated at the base, white, with transverse rows of black dots; spire coronated. Batavia. Lister, t. 761. f. 10.

pulicarius 80. Emarginated at the base; white, with small brown ovate spots; spire mucronated and coronated. New Guinea. Lister, t. 774. f. 20.

obesus. 81. Emarginated at the base; white, tinged with chesnut colour, and marked with dark-clustered dots; spire depressed, coronated, with a double groove. Madagascar. Ency. Meth. t. 320. f. 8.

piperatus. 82. Emarginated at the base, fawn-coloured, with two white belts, and numerous slightly elevated dotted striæ; spire coronated, and spotted with brown. E. Indies. Ency. Meth. t. 319. f. 8.

cancella-
tus. 83. White, cancellated with transverse grooves and longitudinal striæ; spire acuminated. Owhyhee, in the South sea. Ency. Meth. t. 338. f. 1.

stercus-
muscarum 84. Emarginated at the base, and striated; whirls of the spire channelled. Asia. Lister, t. 757. f. 9.

varius. 85. Elongated, muricated: the spire crowned acute, and striated longitudinally. Indian ocean. Enc. Meth. t. 321. f. 3.

portori-
canus. 86. Granulated, white, with brownish yellow spots; spire convex and mucronated. America. Enc. Meth. t. 338. f. 4.

tinianus. 87. Red, clouded with pale bluish spots, and scattered yellowish dots; spire convex. Ency. Meth. t. 338. f. 2.

88. Slightly grooved transversely, and granulated *barbaden-*
at the base, reddish, with two white bands; spire ob- *sis.*
tuse, and coronated. St Domingo. Ency. Meth. t. 322. f. 8.

89. Transversely grooved, and of a rose-colour, with *roseus.*
one white band; spire obtuse and coronated. Martini, ii. t. 63. f. 707.

90. Transversely striated, and granulated; scarlet, *coccineus.*
with a white mottled band; spire convex, and coronated. Martini, ii. t. 61. f. 680.

91. Gibbous, with the base transversely striated *sponsalis.*
and granulated; white, with one or two rows of large remote spots; spire coronated. S. seas. Ency. Meth. t. 322. f. 1.

92. Transversely striated, of a blackish, violet co- *taitensis.*
lour, with a few white spots and dots; spire obtuse, striated. Otaheite. Ency. Meth. t. 336. f. 9.

93. White, with transverse elevated roughish striæ, *scabrius-*
and five transverse rows of reddish spots; spire obtuse. *culus.*
Guinea. Chem. xi. t. 182. f. 1768. and 9.

94. With transverse punctured grooves, livid, and *punctura-*
and marked with two white zones; spire coronated, *tus.*
obtuse, tip rosy. Botany Bay. Ency. Meth. t. 322. f. 9.

95. Granulated at the base, yellowish, with two *ceylonen-*
white spotted bands, and intermediate, zig-zag stripes; *sis.*
spire coronated and obtuse. Ceylon. Ency. Meth. t. 322. f. 6.

96. White, with brown longitudinal spots, and di- *exiguus.*
stant transverse striæ; spire convex, acute, and coronated. Asiatic seas.

97. White, with longitudinal reddish stripes, and *pusillus.*
transverse rows of dots; spire conical, depressed, and slightly coronated. Guinea. Chem. xi. 183. f. 1788. and 9.

98. Slightly grooved, and the base granulated; *lamellosus*
white, spotted with rose colour; spire coronated and lamellated. Ceylon. Ency. Meth. t. 322. f. 5.

99. Greyish violet, with a white band, and scatter- *rattus.*
ed distant spots; spire obtuse. American coasts. Ency. Meth. t. 338. f. 9.

100. Slightly gibbous, olive, with transverse rows of *jamaicen-*
dots, and white bands marbled with brown; spire con- *sis.*
vex and acute. Jamaica. Ency. Meth. t. 335. f. 3.

101. Dull olive, clouded with two obsolete white *mediter-*
bands, and transverse brown lines and dots; spire a- *raneus.*
cute and striated. Algiers and Naples. Ency. Meth. t. 330. f. 4.

102. Slightly grooved at the base, white, with trans- *puncticul-*
verse rows of dots; spire obtuse, and whirls channel- *latus.*
led. St Domingo. Ency. Meth. t. 331. f. 2.

103. White, with pale brownish yellow spots, and *mauriti-*
transverse rows of brown crescent-shaped dots; spire *anus.*
obtuse, base grooved. Africa. Ency. Meth. t. 330. f. 9.

104. White, and transversely grooved; spire coro- *sulcatus.*
nated, obtuse. W. Indies. Ency. Meth. t. 321. f. 6.

105. Striated, and granulated; spire conical, with *verruco-*
the lower whirls concave and crenated on the edge. *sus.*
Africa. Lister, t. 756. f. 8.

106. Rose-cloured; base striated; spire acute. Isle *columba.*
of France. Ency. Meth. t. 331. f. 3.

107. Greenish, with three or four bands, clouded *maduren-*
with *sis.*

with white and yellow, with transverse brown and white dotted lines; spire acuminated. Asiatic ocean. Ency. Meth. t. 333. f. 3.

radiatus. 108. With white rays and bands, transversely grooved at the base. Favanne, ii. t. 15. f. O.

jaspideus. 109. Light olive, with multifarious white dots, and an oblique band; oblong. Small. St. Domingo. Enc. Meth. 334. f. 4.

coffeæ. 110. Short, brown, with two white bands: that nearest the spire spotted with brown. American seas. Ency. Meth. t. 336. f. 7.

mindanus. 111. White, variegated with scarlet, and white dotted transverse lines; aperture acuminated. Philippine islands. Ency. Meth. t. 330. f. 7.

festivus. 112. Scarlet, with two transverse rows of large white spots, and numerous dotted brown lines; spire conic; whirls convex. Molucca islands. Chem. xi. t. 182. f. 1770. and 71.

fulmineus. 113. With chesnut stripes the whole length; spire acute, and with the pillar lip spotted with chesnut; the base acute and obliquely striated. Africa. Enc. Meth. t. 337. f. 3.

arachnoides. 114. Reticulated with chesnut, with two or three darker bands; spire crowned and acute. A very rare species. Coromandel. Chem. x. t. 144 A. f. c. and d.

costatus. 115. Brown, with a white band, undulated with reddish; thick, and broad striæ; spire nodulous, with a granulated band. South sea. Chem. ii. t. 181. f. 1745.

citrinus. 116. Citron, with black lines, interrupted beneath; spire crowned with tubercles, with the base white. Curaçoa. Ency. Meth. t. 322. f. 3.

coronatus. 117. With alternate articulated belts and tesselated spots; spire crowned with tubercles; shell often minute, and with a white band. Asiatic ocean. Martini, ii. t. 63. f. 713. to 15.

*** *Elongated and rounded at the base; body as long again as the spire.*

clavus. 118. With convex smooth striæ; the base bluish. Indian ocean. Very rare. Lister, t. 774. f. 34.

aureus. 119. Transversely striated; yellow, with orange longitudinal stripes, and white triangular spots; spire acute.

terebellum 120. White, shaded with blue; subcylindrical, with annular striæ and yellow bands. Isle of France. Lister, t. 745. f. 6.

australis. 121. Transversely grooved, yellowish, with transverse rows of brown spots, and irregular longitudinal stripes; spire acuminated. New South Wales. Chem. xi. t. 183. f. 1774. and 5.

laevis. 122. Transversely striated, of a pale yellowish red, with brown and white spots, and variegated with yellow; spire smooth.

strigatus. 123. Transversely striated, of a pale violet colour, with yellowish spots and dots; spire convex. E. Indies. Ency. Meth. t. 342. f. 1.

mitratus. 124. With transverse granulated striæ; white, with brownish-yellow bands; spire pyramidal. Indian ocean. Ency. Meth. t. 342. f. 3.

glans. 125. Transversely striated, brown, with an obsolete white band; spire longitudinally striated, and convex. Isle of France. Chem. x. t. 143. f. 1331.

tenellus. 126. Transversely striated and dotted; white, with interrupted yellow bands; spire depressed; whirls channelled. Moluccas. Chem. xi. t. 183. f. 1782 and 3.

nausatella 127. Transversely striated; white, clouded with yellow, and marked with transverse rows of dark dots; spire conical. Amboyna. Lister, t. 744. f. 35.

fusus. 128. Elongated, transversely ribbed, dull yellowish white; spire conical, striated; whirls convex and channelled at the sutures.

ochroleucos. 129. Subcylindrical, yellow; the base obliquely striated, with a white band near it; spire pointed with striped spots. America. Ency. Meth. t. 343. f. 6.

affinis. 130. Bluish white, with four fulvous linear bands, and intermediate dull purple dots. E. Indies. Ency. Meth. t. 342. f. 4. and 5.

granulatus. 131. Rough, unarmed, with smooth, grooved striæ. African ocean. Shell red, with white bands, and purple linear dots. Lister, t. 760. f. 5.

aurantiacus. 132. *Orange flag*, smooth, with whitish bands; whirls grooved at the tips. India. Ency. Meth. t. 339. f. 4.

terebra. 133. Elongated with distant ribs; spire conical, obtuse, and the whirls flattish. Batavia. Ency. Meth. t. 339. f. 2.

raphanus. 134. Elongated, transversely ribbed; white, with brownish yellow dotted bands; spire obtuse; apex rosy. Asiatic ocean. Ency. Meth. t. 341. f. 1. and 2.

adansoni. 135. Grayish yellow, with a white interrupted band, and numerous rows of brown dots; spire convex, acute, striated and spotted. Senegal. Ency. Meth. t. 343. f. 7.

augur. 136. White, grooved at the base, with numerous transverse rows of reddish dots, and two oblong brown streaks. Ceylon. Lister, t. 755. f. 7.

magus. 137. Subcylindrical, with longitudinal bands, dotted with white. India, Isle of France. Chem. xi. t. 183. f. 1778. and 9.

striatus. 138. Ovate, oblong, gibbous, clouded with fine parallel brown striæ; 4 inches long. Africa. Ency. Meth. t. 340. f. 1, 2, and 3.

gubernator. 139. Reddish white, grooved at the base, with irregular, longitudinal undulated stripes, and two transverse brown bands; spire mucronated. Asiatic ocean. Ency. Meth. t. 340. f. 4, 5, and 6.

gloria-maria. 140. Subcylindrical, elongated, white, with minute brown reticulations, and transverse orange bands; spire acuminated; upper whirls nodulous. Indian ocean. Ency. Meth. t. 47. f. 7.

pyramidalis. 141. Yellowish, with numerous longitudinal zig-zag brown lines, and irregular white spots; spire elevated, acuminated; upper valve nodulous. Torrid zone. Ency. Meth. t. 347. f. 5.

textile. 142. With zig-zag yellow veins, and yellow and brown spots. Asia, Isle of France. Lister, t. 788. f. 40.

abbas. 143. Orange, striped with brown, and marked with a few white spots, and three or four transverse bands. Isle of France. Ency. Meth. t. 345. f. 3.

archipiscopus. 144. Ventricose, yellowish, with cancellated brown lines, and four bands of blue violet and white reticulations; spire acuminated. E. Indies. Ency. Meth. t. 345. f. 5.

canonicus. 145. Brown, reticulated with crowded very unequal

equal white angular spots; spire acuminated; upper whirls acuminated. E. Indies. Ency. Meth. t. 345. f. 1.

episcopus. 146. Dark brown, with triangular white spots, and transverse dotted lines; spire obtuse. E. Indies. Lister, t. 790. f. 43.

prælatus. 147. Yellow, with transverse dotted lines, and two bands, variegated with brown, white, gray, and flesh-coloured; spire acute. E. Indies. Ency. Meth. t. 345. f. 4.

pennaceus. 148. Orange brown, with transverse dotted lines, and heart-shaped white spots; spire obtuse. Amboyna. Ency. Meth. t. 344. f. 4.

rubiginosus. 149. Orange brown, with irregular large oblong white spots; spire convex, obtuse. Amboyna. Ency. Meth. t. 344. f. 2.

omaria. 150. Yellowish brown, with large, three-sided white spots, and transverse dotted lines; spire obtuse; lip rosy. New Guinea. Ency. Meth. t. 344. f. 3.

aulicus. 151. White, with brown reticular veins, and interrupted logitudinal bands. Asia. It varies much in its colours. Amboyna. Ency. Meth. t. 343. f. 4.

elongatus. 152. Striated at the base, yellowish brown, with transverse bands, of brown and white spots and dots; spire acute.

**** *Ventricose, with a wide aperture.*

spectrum. 153. Bluish, with yellow clouds and yellowish thick dots and striæ; spire rather acute. Asiatic seas. Ency. Meth. t. 341. f. 9.

informis. 154. Striated at the base, often deformed, white, with brown and bluish spots; spire convex, acute. N. Zealand. Ency. Meth. t. 337. f. 8.

timorensis. 155. Flesh-coloured, mottled with white, and marked with a dotted transverse zone; spire acuminated, channelled; aperture effuse. E. Indies. Ency. Meth. t. 341. f. 3.

nimbosus. 156. Transversely grooved, whitish, with transverse brown lines and dots, and rose-coloured bands; spire depressed and striated. E. Indies. Ency. Meth. t. 341. f. 5.

bullatus. 157. Yellow clouded with white; aperture large and bluish; spire sometimes flat, sometimes acute. Molucca. Ency. Meth. t. 389. f. 6.

rosaceus. 158. Subventricose, rose-coloured, with two narrow whitish bands; spire conical; aperture effuse. East Indies. Chem. xi. t. 181. f. 1756 and 1757.

tulipa. 159. Oblong, gibbous, smooth; aperture gaping. India, South America. Lister, t. 764. f. 12.

geographicus. 160. Oblong, gibbous, crowned; aperture gaping; wrinkled at the base, and a little narrower; aperture white; spire sometimes rosy. Indian and African seas. Lister, t. 747. f. 41.

ventricosus. 161. Brown, barred with white, beneath narrower, shaded with bluish, and smooth; spire conic, exserted. African ocean. Ency. Meth. t. 337. f. 5.

49
Cypræa.

Gen. 21. CYPRÆA, *Cowrie.*

Gen. Char.—The animal is a slug; shell univalve, involute, subovate, smooth, obtuse at each end; aperture effuse at each end; linear, extending the whole length of the shell, and toothed on each end.

Species.

* *Spire not quite concealed.*

1. Slightly turbinated, ferruginous, with whitish round spots and eyes; line down the back a little branched. American and Atlantic seas. Lister, t. 669. f. 15. *exanthema.*

2. Slightly turbinated, and marked with irregular characters; line down the back branched. Indian and African seas, and Amboyna. Ency. Meth. t. 352. f. 4. *mappa.*

3. Slightly turbinated with irregular characters; stripe down the back simple. India. Lister, t. 658. f. 3. *arabica.*

4. With the character like markings confluent, and inclosing paler spots. Amboyna. Lister, t. 659. f. 3. A. *histrio.*

5. Slightly turbinated, subcylindrical, sprinkled with eyes; beneath 4 brown spots; about 4 inches long. Indian and Atlantic seas. Lister, t. 705. f. 54. *argus.*

6. Obtuse, subcylindrical; extremities depressed. Persian gulf and Indian ocean. This is the largest shell of this genus. Lister, t. 689. f. 36. *testudinaria.*

7. Slightly turbinated, gibbous, with livid and testaceous spots; emarginate on each side, and flat beneath. Guinea. Lister, t. 587. f. 34. *stercoraria.*

8. Ventricose, orange, with a white unspotted margin and base; teeth orange. This rare and beautiful shell is a native of Otaheite, is about 4 inches long, and about $2\frac{1}{2}$ broad. It is exceedingly valuable; and not unfrequently sells for 50l. or 60l. *aurora.*

9. Slightly turbinated, pale, with flesh-coloured bands; mouth violet; $2\frac{1}{2}$ inches long. Asiatic ocean. Lister, t. 664. f. 8. *carniola.*

10. Slightly turbinated, subcylindrical, with pale bands; beneath thickened and brown; 3 inches long. India. Lister, t. 668. f. 14. *talpa.*

11. Slightly turbinated, lurid and slightly barred; extremities pale yellow, with 2 black spots. Mediterranean and Atlantic seas. Lister, t. 671. f. 17. *lurida.*

12. Slightly turbinated, spotted, and marked with yellowish dots; extremities spotted with brown; throat rufous. Barbadoes. Lister, 684. f. 31. *vanella.*

13. Slightly turbinated, white, with subulate denticles. Sicily. Martini, i. t. 30. f. 322. *lota.*

14. Thin, gibbous, fulvous, dotted with white, with a horizontal line in the middle; beneath white with yellow teeth. Lister, t. 676. f. 23. *guttata.*

15. Thin, oblong, barred with brown, and dotted with red at the sides. Ency. Meth. t. 356. f. 12. *sanguinolenta.*

16. Cylindrical, milk-white; one side bordered and varied with a few pale yellow, narrow marks, back with three brownish waved bands. Schroeter, i. t. 1. f. 7. *teres.*

17. Turbinated, undulated with brownish, clouded with pale ochre, and deeper bands. Mauritia islands. Chem. x. t. 144. f. 1337. *undata.*

** *Obtuse, spire quite concealed.*

18. With the sides dark brown, and thickly coated with enamel; aperture wide. Otaheite. Martyn Univ. Conch. i. t. 14. *achatina.*

19. Triangularly gibbous; behind depressed, acute; beneath *mauritiana.*

beneath black; a large shell, spotted with brown. Java, Mauritius, and Nussatella. Lister, t. 703. f. 52.

caput-serpentis. 20. Triangularly gibbous, and rather obtuse behind; brown, spotted and white; beneath white; 1½ inch long. Mauritius and Nussatella islands. Lister, t. 702. f. 50.

vitellus. 21. Livid, with small white spots; 2 inches long. Indian ocean. Lister, t. 693. f. 40.

mus. 22. Retuse, gibbous, cinereous, with a longitudinal brown band; teeth of the aperture blackish. American and Mediterranean seas. Ency. Meth. t. 354. f. 1.

tigris. 23. Ovate, obtuse behind, and rounded before; ferruginous, with deep brown spots, and a yellow longitudinal, dorsal line; 4½ inches long. Indian ocean. Lister, t. 748. f. 42.

pantherina. 24. Reddish, with small dark spots; base white, and the dorsal line undulated. Red sea. Lister, t. 681. f. 28.

lynx. 25. Oblong, ovate, with brown dots, and a yellowish line; hind part a little acute, with a rufous mouth; 2 inches long. Madagascar. Lister, t. 683. f. 30.

cinerea. 26. Thin, ventricose, reddish gray, with paler bands. Barbadoes. Lister, t. 667. f. 11.

cylindrica. 27. Cylindrical, above; pale violet, and spotted with brown at the sides, with two brown spots at each end. Born, t. 8. f. 10.

felina. 28. Oblong, narrow, plumbeous, with ferruginous dots and spots, and paler bands; marked at each extremity with 2 brown spots. Maldives. Lister, t. 680. f. 7.

isabella. 29. Subcylindrical, with pale yellow extremities; 1½ inch long. Mauritius. Lister, t. 660. f. 4.

scurra. 30. Ovate, oblong; beneath flat; yellowish, with greenish and livid confluent drops; sides varied with scattered brown dots. India. Ency. Meth. t. 352. f. 2.

**** Umbilicated.*

onyx. 31. Beneath brown, above whitish; small. Asia. Lister, t. 657. f. 2.

clandestina. 32. With fine transverse lines here and there meeting together. India.

succincta. 33. Interior lip rounded at each extremity. Chem. xi. t. 180. f. 1741 and 1742.

zic-zac. 34. Pale yellow, with brown dots; the extremities with 2 brown spots. E. Indian ocean. Lister, t. 661. f. 5.

zonata. 35. Bluish, with 4 transverse zones, marked with brown moon-shaped spots. Guinea. Chem. x. t. 145. f. 1342.

hirundo. 36. Above bluish; extremities marked with two brown spots. Maldivia islands. Lister, t. 674. f. 20.

asellus. 37. White, with 3 brown bands; oblong; minute. Madeira islands. Lister, t. 666. f. 10.

errones. 38. With an equal testaceous spot. E. Indies. Martini, i. t. 27. f. 278 and 279.

ursellus. 39. Oblong, white; above smooth, varied with brown, and marked with 2 brown dots at the umbilicus or perforation. Martini, i. t. 24 f. 241.

pyrum. 40. Pale brown, with paler bands and ochraceous spots; beneath and at the sides fulvous; within blue. Sicily. Martini, t. 26. f. 267 and 268.

felina. 41. Oblong, narrow, plumbeous, with ferruginous dots and spots, and paler bands; marked at each extremity with 2 brown spots. Maldives. Lister, t. 680. f. 7.

42. Oblong, snowy, dotted with brown; each end marked with 2 dusky dots; ½ inch long. Ency. Meth. t. 255. f. 10. *atomaria.*

43. Oblong, gibbous, smooth, yellowish. Gualteri, t. 13. f. D. *subflava.*

44. Brownish, with two white bands; beneath pale yellow, dotted with brown. Gronovius, t. 19. f. 17. *lutea.*

45. Ovate, white, with ferruginous dots. Ency. Meth. t. 355. f. 10. *punctata.*

***** With the margin thickened.*

46. Umbilicated, pale yellow, with white round spots. China. Lister, t. 695. f. 42. *cribraria.*

47. Whitish, with a knotty margin. Mediterranean, Atlantic, Ethiopic, and Indian seas.—This species is collected in great quantities, and transported to Bengal, Siam, and other parts of India, where it is employed by the natives as the medium of commerce. Lister, t. 709. f. 59. *moneta.*

48. Surrounded on the back with a yellow ring. Amboyna and Alexandria. Ency. Meth. t. 356. f. 7. *annulus.*

49. Gibbous, unequal, whitish; margin dotted with brown; back marked with testaceous clouds. Indian ocean. Lister, t. 677. f. 24. *caurica.*

50. Pale glaucous, specked with ferruginous; margin slightly tumid, with bright red spots. Amboyna. Ency. Meth. i. t. 29. f. 303. *cruenta.*

51. With a jagged margin; yellow, dotted with white; sides with a brownish spot. Mauritius and Ascension islands. Lister, t. 692. f. 39. *erosa.*

52. With a jagged margin, flesh-colour, with a greenish back, marked with fulvous dots; sides dotted with brown. Mediterranean. Ency. Meth. t. 356. f. 10. *dracæna.*

53. With a jagged margin; yellow, dotted with white; sides marked with obsolete scattered brown dots. *flaveola.*

54. Slightly margined, yellowish, with deeper specks; sides dotted with brown. Mediterranean. Martini, i. t. 31. f. 335. *spurca.*

55. Cinereous, variegated with testaceous; white beneath, and at the sides; 1½ inch long. Amboyna. Martini, i. t. 29. f. 305. *stolida.*

56. Glaucous, with somewhat tesselated bands, and sprinkled with ferruginous dots; margin thickened on one side. Lister, t. 678. f. 25. *tabescens.*

57. Triangularly gibbous, dotted with white, jagged behind; beneath yellow, immaculate. Indian ocean. Lister, t. 691. f. 38. *helvola.*

58. Slightly margined, pale yellow with black eyes; margin white, dotted with brown; 1½ inch long. Indian ocean. Lister, t. 696. f. 43. *ocellata.*

59. Pale violet, dotted with white; a very small shell. Jamaica. Lister, t. 694. f. 41. *poraria.*

60. Bluish, with scattered white and ferruginous spots, and two brown spots at each extremity. China. Martini, i. t. 26. f. 261 and 262. *gangrenosa.*

61. Ventricose, transversely ribbed, with a broad dorsal groove, and the ribs thickened at its edge; aperture broad. Adriatic sea. Lister, t. 706. f. 55. *oniscus.*

62. With numerous transverse furrows, some of which are forked; a small shell, and ovate, with various tints of red or white; marked with a longitudinal groove, *sulcata.*

virginea. 29. With party-coloured double bands, and purple truncated pillar; aperture semilunar. Rivers of Asia. Lister, t. 15. f. 10.

ventricosa 30. Ovate-ventricose, and of a yellowish orange-colour; aperture effuse, with a white, smooth, oblique enlargement on the pillar. Lister, t. 746. f. 40.

fasciata. 31. Conic, pointed with transverse bands and undulated spots; aperture white. South America, India. Lister, t. 12. f. 7.

strigata. 32. Conic, pointed, glabrous, with undulated fulvous streaks; 2 inches long; 8 whirls in the spire.

striatula. 33. Conic, white, striated; pillar straight and reflected.

exarata. 34. Oblong, pointed, white, grooved; spire with 6 or 7 whirls. Chem. ix. p. 2. t. 120. f. 1031. and 1032.

zebra. 35. Ovate, pointed, with longitudinal brown bands; pillar inflected, entire. Tranquebar. A land species. Lister, t. 11. f. 6.

achatina. 36. Ovate, pointed, with a wide crimson mouth and lip; pillar truncated; 8 inches long. American ocean. Lister, t. 579. f. 34.

pectinata. 37. Ovate, rough, with the aperture pectinated at its base; apex truncated. Denmark. Muller, ii. t. 71. f. 10. to 12.

soluta. 38. Subcylindrical, transversely striated, with the outer whirl detached; apex truncated and channelled. Ceylon. Chem. x. t. 146. f. 1359. to 1361.

nitidula. 39. Oval, white, with straight, transverse, and waved longitudinal red lines; spire convex. W. Indies. Lister, t. 715. f. 74.

amplustre. 40. Roundish; spire elevated, obtuse, with flesh-coloured bands; shell white. Asia. Ency. Meth. t. 359. f. 2.

velum. 41. Thin, umbilicated on each side; white, with capillary brown lines, and a snowy band, edged with brown on each side; 1 inch long. Tranquebar. Chem. x. t. 146. f. 1348.

pyrum. 42. Pear-shaped, thick, and faintly striated transversely; beak produced; aperture spreading. Lister, t. 877. f. 1.

crassula. 43. Ovate, ventricose, rather thick; whirls reversed; spire prominent. Virginia. Lister, t. 135. f. 35.

ampla. 44. Elongated, semicylindrical, white; spire very small; aperture effuse, with a striated oblique enlargement on the pillar. Martini, ii. t. 65. f. 722.

truncata. 45. Oblong, turreted, white, striated longitudinally; sutures crenulated; pillar truncated and inflected. Chem. ix. t. 120. f. 1028. to 1030.

priamus. 46. Ovate, ventricose, with transverse rows of distant spots; pillar sinuated; outer lip acute. Guinea. Chem. ix. t. 120. f. 1026. and 1027.

bicarinata 47. Ovate, obtuse, ventricose, with the whirls reversed and bicarinated; pillar truncated. Lister, t. 37. f. 36.

cylindrica. 48. Cylindrical, involuted, umbilicated at the apex, and striated at the two extremities. E. Indies. Chem. x. t. 146. f. 1356. and 1357.

cylindracea. * 49. Cylindrical, smooth, white, thin, slightly umbilicated; twice as large as a grain of wheat. Europe, Britain.

umbilicata * 50. Oblong, oval, smooth, white, apex rounded, umbilicated; aperture very narrow; 1/8 inch long. Falmouth. Montagu, t. 7. f. 4.

retusa. * 51. Subcylindrical, opaque, white; upper part longitudinally striated, lower plain; apex truncated, and largely umbilicated. Falmouth. Montagu, t. 7. f. 5.

obtusa. * 52. Cylindrical, involuted, with the spire somewhat prominent. Britain. Montagu, t. 7. f. 3.

voluta. 53. Smooth, cylindrical, olive; aperture effuse; pillar inflated, truncated; 7 whirls in the spire. Chem. xi. t. 117. f. 1009.

dominichensis. 54. Subcylindrical, spiral, reddish, with longitudinal striæ, and spotted; sutures crenulated; pillars sinuated and truncated. St Domingo. Chem. ix. t. 117. f. 1011.

purpurea. 55. Ventricose, rugged, and longitudinally streaked; aperture ovate, with a pointed lip, and deep black border within. Africa, in rice fields. Lister, t. 581. f. 35.

scabra. 56. Ovate, rough, slightly carinated on the back, and marked with decussated striæ; white with rosy lines; pillar scalloped, reflected. Java. Chem. x. t. 146. f. 352. and 353.

akera. * 57. Ovate, pellucid, with a truncated channelled crown; 6 lines long. Norway seas, Banff in Scotland, and near Portsmouth. Don. t. 79.

carnea. 58. Ovate, flesh-coloured, gibbous; lip arched, thickened and toothed within. Shores of Africa. Ency. Meth. t. 357. f. 2.

patula. * 59. Smooth, glossy, white, pellucid, oblong, involuted; aperture large, terminating in a short canal, most contracted at the top; length 1 inch. Weymouth. Don. t. 142.

haliotoidea. * 60. Suboval, thin, pellucid, white, resembling a haliotis; a little wrinkled; aperture oval; length 1/4 inch. Weymouth. Montagu, t. 7. f. 6.

plumula. * 61. Ovate, oblong, depressed, pellucid, thin; strongly wrinkled concentrically; length 1/2 inch. Milton sands, Devonshire. Montagu, t. 15. f. 9.

catena. * 62. Pellucid, white, finely striated transversely; the striæ, magnified, have the appearance of the links of a chain; one-tenth inch diameter. Devonshire. Montagu, t. 7. f. 7.

Gen. 23. Voluta, *Volute*. 51 Voluta.

Gen. Char.—The animal a limax; the shell is one-celled, spiral; aperture without a beak, and sometimes effuse; pillar twisted or plaited, generally without lips or perforation.

Species.

** With the aperture entire.*

auris-midæ. 1. Contracted, oval, oblong, with a rugged spire; pillar 2-toothed; 4 inches long. India. In marshy woods and swamps. Lister, t. 1058. f. 6.

auris-judæ. 2. Contracted, oblong; spires smooth; pillar 3-toothed. Fens of India. Lister, t. 32. f. 10.

australis. 3. Ovate-oblong, longitudinally wrinkled; aperture ear-shaped, contracted; pillar with one tooth. N. Holland. Chem. x. t. 149. f. 1395.

auris-malchi. 4. Fusiform, granulate, with an ovate aperture; pillar cut, spreading; 3 inches long. New Caledonia. Chem. ix. t. 121. f. 1037.

fasciata. 5. Ovate, banded transversely round the sutures; aperture ear-shaped; pillar with one tooth. Australasia. Chem. xi. t. 121. f. 1041.

6. Oval-

auris-virginis. 6. Oval-oblong, rose-coloured, with a white band at the suture; aperture ear-shaped; pillar toothless. E. Indies. Lister, t. 24. f. 22.

auris-vulpinæ. 7. Oval, with the whirls crenated and flattened at top; aperture ear-shaped; pillar without teeth. St Helena. Chem. xi. t. 210. f. 2086 and 2087.

auris-cati. 8. Oval, with the whirls longitudinally plaited; aperture contracted, with 3 folds on the pillar, and the lip reflected. Chem. xi. t. 177. f. 1711 and 1712.

flammea. 9. Oval, oblong, with a wide aperture; pillar 1-toothed. Lister, t. 814. f. 24.

flava. 10. Contracted on the upper part; yellow, with a crenulated lip; pillar with two plaits; 4½ lines long. E. Indies. Martini, ii. t. 43. f. 444.

minuta. 11. Oval, oblong, banded; outer lip crenulated; pillar with three plaits. Barbadoes. Lister, t. 834. f. 60.

pusilla. 12. Thin, brown; whirls of the spire cancellated; pillar 3-toothed; very minute. Martini, ii. t. 43. f. 446.

glabra. 13. Oval, oblong, glabrous, with a reflected grooved lip; pillar 1-toothed. Martini, ii. t. 43. f. 447 and 448.

auris-sileni. 14. Oval, gibbous, umbilicated; pillar with one thick, flexuous plait; 2 inches long. Chem. xi. t. 176. f. 1701 and 1702.

tornatilis. * 15. Oval, pointed at each end, and spirally striated; pillar with a single fold; ½ inch long. Europe, Wales. Don. t. 57. f.

denticulata. * 16. Ovate, glabrous; spire elevated, acute; outer lip denticulated; pillar toothed. Britain. Montagu, t. 20. f. 5.

triplicata. 17. Ovate, smooth, with the spire elevated; aperture narrow, contracted; pillar with 3 teeth. W. Indies. Don. t. 138.

pusilla. 18. Ovate, striated, with the spire elevated; pillar with 3 teeth. Martini, ii. t. 43. f. 446.

bidentata. * 19. Ovate, slightly wrinkled longitudinally; spire elevated, conical; pillar with 2 teeth. Scotland. Montagu, t. 30. f. 2.

alba. * 20. White, opaque, longitudinally striated. Very minute. Sandwich. Walker, f. 61.

pellucida. * 21. Conical, minute; body striated transversely at its base, and longitudinally ribbed above. Salcomb bay, Devonshire. Montagu, t. 12. f. 9.

unidentata. * 22. Conical, smooth, with 5 or 6 rather depressed whirls; pillar with a single tooth. Devonshire.

interstincta. * 23. Turreted, minute, with 5 flattish whirls, longitudinally ribbed; pillar with a small tooth. Devonshire. Montagu, t. 12. f. 10.

insculpta. * 24. Subconical, minute, with 5 or 6 transversely striated whirls; pillar with a small tooth. Devonshire.

plicatula. * 25. Acuminated, minute, smooth, with 6 flattish whirls; pillar with a tooth-like fold. Devonshire. Montagu, t. 21. f. 2.

ambigua. * 26. Acuminated, minute, smooth, with 6 or 7 flattish whirls; aperture suborbicular; pillar slightly folded. Devonshire. Montagu, t. 21. f. 4.

solidula. 27. Contracted, oblong, ovate, opaque, striated; spire elevated and a little pointed; pillar slightly plaited. Southern ocean. Martini, ii. t. 43. f. 440 and 441.

livida. 28. Contracted, ovate, cylindrical; spire a little elevated, obtuse; pillar with 5 plaits; 1 inch long. Africa. Gualteri, t. 25. f. 13.

** *Subcylindrical, and emarginated.*

29. Smooth; spire obliterated at the base; lip retuse in the middle; pillar obliquely striated; 5 inches long. Brazil and W. Indies. Martini, ii. t. 46. f. 485 and 486. *porphyrea*

30. Cylindrical; spire small, conical, with a projecting appendage over the upper angle of the aperture; throat orange-coloured. Martini, ii. t. 45. f. 476 and 477. *erythrostoma.*

31. Smooth; spire short, depressed, reflected at the base; pillar obliquely striated. Indian seas. Lister, t. 728. f. 15. There are 20 varieties of this species, distinctly made out; but the variety in the markings is almost endless. Lamarck has formed distinct species of almost all the above varieties. *oliva.*

32. Subovate, slightly gibbous; spire elevated, with a wide and deep suture; bulb simple. Amboyna. Lister, t. 720. f. 4 and 5. *cruenta.*

33. Smooth, white, with a keel shaped ring on the back; sometimes with reddish waves. Amboyna. Lister, t. 717. f. 1. *annulata.*

34. Suboval; spire depressed, with the whirls convex; pillar transversely ridged, with the upper ridge thickest. Mindanao and Molucca islands. Lister, t. 735. f. 25. *ventricosa*

35. Ovate, gibbous; spire rather depressed, with the whirls thickened at the base; outer lip somewhat angular, and very thick. Moluccas. Martini, ii. t. 47. f. 499 and 500. *incrassata*

36. Somewhat cone-shaped; spire short and depressed, with a vitreous mass concealing the whirls, and forming a callosity over the pillar lip; belt double. Brazil. Chem. x. t. 147. f. 1367. and 1368. *pinguis.*

37. Ovate, gibbous; spire elevated, with a vitreous mass extending over the base of the whirls, and forming a callosity over the pillar lip; belt double. Coromandel. Lister, t. 723. f. 10. *gibbosa.*

38. Cylindrical, with a prominent conic spire; and the base of each whirl coated with enamel; belt double. Isle of France. Lister, t. 722. f. 9. *ispidula.*

39. Elongated, smooth, with a prominent spire. Indian and Ethiopic seas. *utriculus,*

40. Thin, with a cinereous spotted back, callous beneath; aperture large; pillar toothed at the base. Shores of Spain. Lister, t. 729. f. 17. *hiatula.*

41. White, dotted with greenish brown, or violet; spire prominent; whirls with a band composed of spots at the base; an inch long. Shores of Spain. Lister, t. 725. f. 13. *jaspidea.*

42. Snowy, elongated, smooth, banded. Spanish seas. W. Indies. Martini, t. 50. f. 557. and 558. *nivea.*

43. Subcylindrical; spire short, depressed, covered with enamel; throat dark violet. Eastern ocean. Lister, t. 721. f. 6. *tigrina.*

44. Orange with blue bands; spire flattened; aperture white. Java and Isle of France. Martini, ii. t. 46. f. 495. *carniola.*

45. Suboblong; spire short, covered with enamel; pillar lip thickened; belt double. Moluccas and Philippines. Lister, t. 733. f. 22. *micans.*

46. Subovate; spire conical, prominent; pillar lip thickened; *nitidula.*

thickened; belt double. Philippines. Martini, ii. t. 50. f. 545 to 547.

oryza. 47. Ovate-conical, minute, white, without any spots; and the spire conoidal. Martini, ii. t. 50. f. 548.

**** Ovate, effuse, and emarginate.*

dactylus. 48. Smooth, with decussated striæ, obtuse; pillar with six plaits; $\frac{1}{2}$ inch long. India. Lister, t. 813. f. 23.

fenestrata. 49. Ovate, with strong decussated striæ, of which the longitudinal are more obtuse; pillar with 8 plaits. Indian seas. Ency. Meth. t. 372. f. 3.

crenulata. 50. Subcylindrical, with decussated striæ, and the whirls nodulous and crenulated at the suture; pillar with 8 plaits. E. Indies. Lister, t. 813. f. 23. A.

texturata. 51. Ovate-acute and granulated, with transverse grooves and longitudinal striæ; pillar with 4 plaits. Lister, t. 819. f. 36.

miliaria. 52. Slightly emarginated, white, with an obliterated pale yellow spire; pillar obliquely striated. Mediterranean. Martini, ii. t. 42. f. 428.

monilis. 53. Entire white, with an obliterated white spire; pillar obliquely striated; $1\frac{1}{2}$ inch long. China; where it is employed for making beads and necklaces. A variety is found in Africa only $2\frac{1}{2}$ lines long, with 8 or 10 thin plaits in the pillar. China. Martini, ii. t. 42. f. 426.

exilis. 54. Obovate, entire, yellowish, with two brown bands; spire prominent; pillar obliquely striated. Senegal. Martini, ii. t. 42. f. 427.

persicula. 55. Smooth, with a retuse umbilicated spire; pillar with seven plaits; lip with a crenated margin; 1 inch long. African sea. Lister, t. 803. f. 10.

cingulata. 56. Ovate, smooth, transversely striped, and the spire retuse and umbilicated; pillar with 6 plaits. Cape Verde. Lister, t. 803. f. 9.

guttata. 57. Ovate-oblong, reddish, spotted with white; spire concealed; pillar with 4 plaits. Jamaica. Martini, ii. t. 42. f. 417 and 418.

porcellana 58. Oval, white, with transverse rows of dark spots; spire obtuse, under lip gibbous and toothed; pillar with 5 plaits. Indian ocean. Ency. Meth. t. 337. f. 5.

pallida. 59. Shell entire, oblong-ovate, with an elevated spire; pillar with four plaits. African and European shores. Lister, t. 714. f. 70.

catenata. * 60. Ovate, glabrous, involuted at the apex; pillar with 4 plaits. Guernsey and W. of England. Montagu, t. 6. f. 2.

lævis. * 61. Ovate, very smooth, with an obtuse spire; pillar with two plaits; outer lip gibbous, and slightly denticulated. Devonshire. Don. t. 165.

faba. 62. Slightly emarginated, smooth, a little plaited; spire prominent; pillar with four plaits; lip with a crenulated margin; one inch long. African ocean. Lister, t. 812. f. 22.

chemnitzii. 63. Ovate, smooth, with the spire nodulous; pillar 4-plaited; outer lip with a thickened toothed margin. Guinea. Chem. x. t. 150. f. 1422.

glabella. 64. Very entire, smooth, with a levigated spire; pillar with four plaits; lip gibbous; margin toothed; from one to two inches long. African and American seas. Lister, t. 818. f. 29.

picta. 65. Ovate, smooth, body transversely angular; spire conical; pillar 4-plaited; outer lip margined. Brazil. Ency. Meth. t. 377. f. 2.

castanea. 66. Ovate, shining, slightly striated longitudinally; pillar 4 plaited; outer lip thickened, and toothed within. Brazil. Martini, ii. t. 42. f. 430.

strigata. 67. Ovate, smooth, obtuse; pillar five-plaited; outer lip marginated; thickened and toothed within. Guinea. Ency. Meth. t. 377. f. 7.

prunum. 68. Very entire, smooth, with a levigated spire; pillar with four plaits; lip without tooth, or margin; $1\frac{1}{2}$ inch long. Island of Goree. Lister, t. 817. f. 28.

reticulata. 69. With slight decussated grooves; lip internally striated; pillars slightly perforated; two inches long. American ocean and Guinea. Lister, t. 830. f. 22.

ziervogelii 70. Ovate, rugose; plaited longitudinally; grooved transversely at the base; sutures channelled and crenated; pillar 4-plaited; outer lip denticulated. Ency. Meth. t. 375. f. 9.

mercatoria. 71. Striated, with an obtuse spire; pillar retuse, toothed; lip gibbous, denticulated; $\frac{1}{4}$ inch long. Mediterranean, American, and Indian seas. Lister, t. 824. f. 43.

rustica. 72. Smooth, with a prominent spire; pillar retuse, toothed; lip gibbous, denticulated. Mediterranean and American seas. Lister, t. 824. f. 44.

torva. 73. Oval, oblong, smooth, obsoletely striated at the base; spire elevated; subventricose; pillar retuse, slightly toothed; outer lip gibbous and denticulated. Barbadoes. Lister, t. 826. f. 48 and 49.

paupercula. 74. Entire, smooth, with a striated base; spire a little prominent; pillar with four plaits; lip obtuse. Mediterranean and Indian seas. Lister, t. 819. f. 35.

pica. 75. Ovate, transversely striated throughout; spire prominent; pillar five-plaited. Saint Bartholomew. Ency. Meth. t. 372. f. 7.

ferrugata. 76. Suboval, ventricose, transversely ribbed; pillar 4-plaited. Martini, iv. t. 150. f. 1398. and 1399.

patriarchalis. 77. Ovate, solid, transversely striated, and angulated, with longitudinal plaits, forming nodules on the margins of the whirls; base granulated; pillar 4 plaited. East Indies. Chem. x. t. 150. f. 1425. and 1426.

muricatula. 78. Ovate, solid, transversely grooved; grooves granulated; spire short, angulated, and coronated; pillar with 4 plaits. Indian ocean. Chem. x. t. 150. f. 1427.

mendicaria. 79. Slightly striated, with a slightly granulated spire; pillar smooth; lip gibbous and denticulated; size of a kidney bean. Mediterranean and Indian seas. Lister, t. 826. f. 47.

nana. 80. Ovate, ribbed longitudinally, and at the base transversely grooved; pillar three-plaited; outer lip denticulated. Mediterranean. Martini, ii. t. 44. f. 459.

microzonias. 81. Ovate, obtusely ribbed longitudinally; transversely wrinkled at the base; pillar 3-plaited. East Indies. Ency. Meth. t. 374. f. 8.

cancellata. 82. Entire, plaited, reticulated; pillar with three plaits, slightly umbilicated, and a little produced. African ocean. Lister, 830. f. 33. and 34.

nassa. 83. Entire, ovate, transversely striated and sharply ridged longitudinally, with the whirls flattened at the sutures;

sutures; pillar umbilicated and three-plaited. Guinea. Martini, iv. t. 124. f. 1172. and 1173.

elegans. 84. Smooth, white, with blue bands and yellow mouth; spire nearly obliterated; pillar six-toothed; scarcely one inch long. Martini, ii. t. 42. f. 424. and 425.

bullata. 85. Smooth, greenish white, with numerous bands; lip inflected; pillar with four plaits; 2¼ inches long. Indian ocean. Lister, t. 803. f. 11.

marginata 86. Spire obsolete; sides with thickened margins; four plaits in the pillar. Guinea. Ency. Meth. t. 376. f. 9.

nucea. 87. Substriated, glabrous; spire obtuse, smooth, prominent; five plaits in the pillar. Indian ocean. Gronovius, t. 18. f. 11.

conus. 88. Conic, white, with hollow punctured grooves at the base; whirls crenated; six plaits in the pillar. Lister, t. 814. f. 23. b.

**** *Fusiform.*

tringa. 89. Nearly entire, oblong, smooth, with a prominent excoriated spire; three plaits in the pillar; lip slightly toothed inwardly. Mediterranean. Lister, t. 825. f. 45.

cornicula. 90. Oblong, slightly emarginated, smooth, and horn-coloured; spire rather long; pillar four-plaited; outer lip equal and toothless. Mediterranean. Chem. xi. t. 179. f. 1731. and 1732.

schroeteri. 91. Oblong, fusiform, nearly entire, smooth, of a horn-colour, clouded with white and yellowish brown spots; pillar four plaited. Guinea. Ency. Meth. t. 371. f. 2.

virgo. 92. Entire, tapering, plaited, and transversely striated; three plaits in the pillar, which is perforated. About a finger's length, and marked with about twelve grooves. Haynam.

fissurata. 93. Fusiform, emarginate, very smooth, of a pale colour, irregularly reticulated with white lines; pillar four-plaited. Ency. Meth. t. 377. f. 1.

scabricula 94. Emarginated, striated, and transversely wrinkled; four plaits in the pillar, which is perforated; lip notched; two inches long. India. Ency. Meth. t. 371. f. 5.

ruffina. 95. Nearly entire, transversely wrinkled; four plaits in the pillar; lip crenulated. India. Lister, t. 822. f. 40.

nubila. 96. Nearly entire, smooth, yellowish with red clouds transversely striated; lip crenulated; four plaits in the pillar. Friendly islands. Chem. xi. t. 177. f. 1705. and 1706.

sanguisuga. 97. Emarginated, longitudinally grooved and transversely striated; lips smooth; four plaits in the pillar; 1½ inch long. Mediterranean and Indian seas. Lister, t. 821. f. 38.

caffra. 98. Emarginated, round, smooth; whirls of the spire with plaited striæ; four plaits in the pillar; 2½ inches long. Asiatic sea. Ency. Meth. t. 373. f. 4.

morio. 99. Slightly emarginated, round, smooth; about three plaits in the pillar. W. Indies.

acus. 100. Tapering, marked with transverse rays of red dots; spire pointed, smooth: scarcely an inch long. Martini, iv. t. 157. f. 1493. and 1494.

vulpecula. 101. Emarginated, subangular, unarmed, and transversely striated; four plaits in the pillar; throat striated; two inches long. India. Amboyna. Ency. Meth. t. 373. f. 5.

costellaris. 102. Turreted, emarginate, longitudinally ribbed, and striated transversely; whirls angulated above; pillar four-plaited. East Indies. Ency. Meth. t. 373. f. 3.

melongena 103. Fusiform, with small longitudinal ribs and transverse striæ, which are strongest under the sutures; pillar four-plaited. Indian ocean. Ency. Meth. t. 373. f. 3.

tæniata. 104. Turreted, elongated, longitudinally plaited, ribbed and angular, and transversely grooved; pillar four-plaited. Bombay. Ency. Meth. t. 373. f. 7.

plicaria. 105. Emarginated, angular, anterior angles a little spinous; four plaits in the pillar; lip smooth; 2 inches long. Indian ocean. Lister, t. 820. f. 37.

cruentata. 106. Turreted, emarginate, angular, with longitudinal knotty ribs; and transversely striated; pillar three-plaited. East Indies. Chem. x. t. 157. f. 1438. and 1439.

scutulata. 107. Tapering, black with white spots, transversely striated, first whirl a little ventricose; four plaits in the pillar. Indian ocean. Chem. x. t. 151. f. 1428. and 1429.

nigra. 108. Tapering, emarginated, blackish; whirls flattish; four plaits in the pillar. Guinea, Greenland. Chem. x. t. 151. f. 1430. and 1431.

subdivisa. 109. Tapering, emarginated, longitudinally ribbed, plaited, and transversely striated; three plaits in the pillar. Indian ocean. Ency. Meth. t. 373. f. 1.

turricula. 110. Turreted, with the whirls transversely angular; outer lip thick, pillar two-plaited. Martini, iv. t. 149. f. 1376.

abbatis. 111. Fusiform, elongated, subemarginate, and transversely striated; outer lip rather thick; pillar four-plaited. East Indies. Chem. xi. t. 177. f. 1709. and 1710.

serpentina 112. Subfusiform, with transverse punctured striæ, and longitudinal undulated chesnut stripes; pillar five-plaited. Indian ocean. Ency. Meth. t. 370. f. 4.

olivaria. 113. Ovate, fusiform, nearly smooth, with obsolete transverse striæ; pillar five-plaited. Ency. Meth. t. 371. f. 3.

digitalis. 114. Oblong, fusiform, emarginate, with transverse crenulated grooves, and the margin of the whirls toothed; outer lip denticulated; pillar above five-plaited. East Indies. Ency. Meth. t. 370. f. 5.

exasperata 115. Tapering, emarginated, granulous, with decussated striæ and longitudinal ribs barred with brown; five plaits in the pillar. Indian ocean. Chem. x. t. 151. f. 1440. and 1441.

granosa. 116. Tapering, emarginated, transversely striated and longitudinally grooved, with elevated dots and reddish lines; three plaits in the pillar. Indian ocean. E. Indies. Chem. x. t. 151. f. 1442. and 1443.

casta. 117. Tapering, smooth, brown with white bands; six plaits in the pillar, which is emarginated at the base. Shores of Amboyna. Chem. x. vig. 20. f. C. and D.

leucogonias. 118. Tapering, chesnut, with flexuous white bands; pillar obsoletely plaited: two inches long. Martini, iv. t. 148. f. 1371. and 1372.

maculosa. 119. Tapering, white with reticulated and spotted brown bands: one inch long. Martini, iv. t. 149. f. 1377.

119. Tapering,

nodulosa. 120. Tapering, brown, cancellated; angles of the section nodulous, and whitish: four plaits in the pillar. West Indies. Martini, iv. t. 149. f. 1385.

spadicea. 121. Tapering, chesnut with yellow clouds and spots; eight whirls in the spire, which are longitudinally plaited and transversely striated; five plaits in the pillar. Martini, iv. t. 150. f. 1392.

aurantia. 122. Tapering, orange; a white band in the four first whirls of the spire; lip denticulated; four plaits in the pillar. Ency. Meth. t. 375. f. 5.

decussata. 123. Tapering, with decussated striæ; the longitudinal ones undulated; about four plaits in the pillar. Martini, iv. t. 150. f. 1395.

polygona. 124. Tapering, punctured, whirls longitudinally ribbed, and finely striated transversely; three first angular, about five plaits in a slightly umbilicated pillar. East Indies. Martini, iv. t. 150. f. 1401. and 1402.

acuminata 125. Tapering, cancellated; beak short and cancellated; four plaits in the pillar. Tranquebar. Martini, iv. t. 150. f. 1403. and 1404.

biplicata. 126. Tapering, smooth, white with yellow spots and black dots; pillar doubly plaited. Martini, iv. t. 149. f. 1375.

lineata. 127. Tapering, with perpendicular black lines crossing a white band; 3 plaits in the pillar. Martini, iv. t. 149. f. 1376.

discors. 128. Tapering, beneath brown dotted with white; above white, with perpendicular waved yellow stripes; a minute shell. West Indies. Martini, iv. t. 150. f. 1400.

striata. 129. Tapering, finely striated transversely; dusky, with red dots, and two paler bands; minute. Minorca. Martini, iv. t. 150. f. 1405. and 1406.

sulcata. 130. Tapering and grooved longitudinally; brown, with a transverse white nodulous band; pillar five-toothed. Tranquebar. Martini, iv. t. 150. f. 1407.

lævigata. 131. Tapering, smooth, brown; spire with a paler band; narrow, small. Mediterranean. Martini, iv. t. 150. f. 1408.

ocellata. 132. Tapering, chesnut, with white eyes; minute. W. Indies. Martini, iv. t. 150. f. 1409.

nasuta. 133. Tapering, red, with rows of black dots; lip prominent; beak reflected. W. Indies. Martini, iv. t. 150. f. 1411.

marmorea 134. Tapering, varied with white and brown; lip inflected. W. Indies. Martini, iv. t. 150. f. 1411.

barbadensis. 135. Tapering, reddish, finely striated transversely; aperture oblong, oval; spire obtuse; 1¼ inch long. American seas, Barbadoes. Lister, t. 819. f. 33.

turrita. 136. Tapering, chesnut brown, with undulated brown lines; aperture striated; 3 plaits in the pillar. Lister, t. 836. f. 62.

rugosa. 137. Tapering, a little ventricose; longitudinally wrinkled, and transversely striated; whitish, with piceous lines. E. Indies. Ency. Meth. t. 373. f. 8.

strigosa. 138. Tapering, cinereous, striated with red; spire glabrous; whirls rather tumid.

clathrus. 139. Tapering, whitish, cancellated; whirls with a band of yellow spots. China. Knorr. iii. t. 27. f. 2.

leucostoma 140. Tapering; spire acute, with longitudinal ribs, which reach half down the body; transversely striated transversely; pillar with 8 plates: the whole shell covered with longitudinal undulated clouds of a brown colour; outer lip crenulated. E. Indies. Very rare. Knorr. iv. t. 11. f. 3.

141. Tapering, transversely striated; yellow, with *variegata.*
a brown band and spots. Knorr. v. t. 18. f. 6.

142. Emarginated, tapering, marked with decussa- *filaris.*
ted striæ, and red thread-like lines; pillar 3-plaited.

143. Tapering, white; spire with fine transverse *costata.*
striæ, and rounded ribs; first whirl with 3 brown
bands; 4 plaits in the pillar. Schroeter, i. t. 1. f. 17.

144. Ovate, white; spire spotted with brown; six *spuria.*
brown bands in the first whirl; tail emarginated; lip
impressed; pillar 6-plaited.

145. Emarginated, striated, and marked with hollow *pertusa.*
punctures; lip denticulated; 5 plaits in the pillar; 3
inches long. India. Lister, t. 858. f. 65.

146. Emarginated, smooth; margin of the whirls *episcopalis*
entire; lip denticulated; 4 plaits in the pillar; 5 inches
long. India. Lister, t. 839. f. 66.—The animal of
this shell is said to be poisonous when it is eaten, and
has the power of inflicting a wound on those who touch
it, with a kind of pointed trunk. The natives of the
island Tanna employ the shell as a hatchet, fixing it in
a handle.

147. Emarginated, transversely striated; margins *papalis.*
of the whirls and lip denticulated; pillar 4-plaited. Indian ocean. Lister, t. 839. f. 67.

148. Emarginate, with transverse, hollow, punctured *tiara.*
striæ; whirls contracted below, and strongly toothed
at the margins; outer lip denticulated, and pillar 4-plaited. Madagascar. Lister, t. 840. f. 68.

149. Ovate, fusiform; transversely striated and *coronata.*
punctured, with the sutures nodulous; pillar 5-plaited.
W. Indies. Ency. Meth. t. 371. f. 6.

150. Margined, with obtuse spines in the whirls; *musica.*
lip smooth and very thick; pillar 8-plaited. American
ocean. The plaits in the pillar are from 9 to 12 in
some varieties. Lister, t. 806. f. 15.

151. Emarginate, with pointed nodules on the *virescens.*
whirls; spire produced at the summit; plaits on the
pillar numerous. Guinea. Ency. Meth. t. 382. f. 3.

152. Emarginate, longitudinally plaited and angu- *plicata.*
lar, and transversely grooved; spire nodulous; pillar
with 12 plaits. E. Indies. Chem. x. t. 149. f. 1403
and 4.

153. Emarginated, with acute spines on the whirls; *vespertilio*
lip smooth; pillar 4-plaited; from 3 to 6 inches long.
Indian seas. Lister, t. 807. f. 16.

154. Emarginate; spire with curved spines; sum- *imperialis.*
mit slightly mamillary; pillar 4-plaited. Molucca and
Philippine islands. Ency. Meth. t. 382. f. 1.

155. Oblong, fusiform, emarginate; spire much pro- *pacifica.*
duced, and transversely angulated and nodulous; pillar
with 5 plaits. Otaheite and New Zealand. Chem. xi.
t. 178. f. 1713 and 14.

156. Emarginated; whirls with subacute spines; 5 *ebræa.*
stronger and 3 obsolete plaits in the pillar; 6 inches
long. India, Jamaica. Very rare. Lister, t. 809.
f. 18.

157. Nearly entire, turbinated, with conic some- *turbinel-*
what erect spines; upper ones larger; pillar 4-plaited; *lus.*
3 inches long. Indian ocean. Lister, t. 811. f.
20.

158. Ovate, rugged, knotty; 3 plaits in the pillar; *capitellum.*
2¼ inches long. Indian and American seas. Chem.
xi. t. 179. f. 1723 and 4.

159. Ovate, triangular, rugged, knotty, transversely *rhinoceros*
grooved and umbilicated; pillar 3-plaited; lip toothed;

throat striated; whirls muricated with knobs. Shores of New Guinea. Chem. x. t. 150. f. 1407 and 8.

muricata. 160. Ovate, with alternately smaller ribs; base nodulous; whirls spinous; pillar 5-plaited. Jamaica. Lister, t. 810. f. 19.

ceramica. 161. Ovate, acute, with divergent spires; about 5 plaits in the pillar; spines on the outer whirls gradually lessening into tubercles. Coromandel and Ceram. Lister, t. 829. f. 51.

pyrum. 162. Obovate, slightly tailed, with striated whirls on the spire; tip produced and quite glabrous; pillar 3-plaited; 7 inches long. Tranquebar and Ceylon. Lister, t. 815. f. 25.

gravis. 163. Ovate, somewhat beaked; striated, and slightly reticulated; spire rather depressed; whirls convex; pillar 3-plaited. Molucca. Ency. Meth. t. 390. f. 1.

globosa. 164. Subglobular, emarginate, solid, longitudinally plaited and grooved, with transverse striæ; spire nodulous; pillar 3-plaited. Chem. xi. t. 178. f. 1715 and 16.

lapponica. 165. Obovate, smooth, with a pointed spire, and ventricose; pillar 5-plaited. Indian and American seas. Ency. Meth. t. 381. f. 3.

zebra. 166. Ovate, fusiform, emarginate, smooth, with the spire somewhat papillary at the summit; pillar 5-plaited, with the uppermost plait obsolete. New Holland. Rare. Leach. Zool. Misc. i. t. 12. f. 1.

flavicans. 167. Pyriform, smooth, with yellowish clouds; spire varied with chesnut spots; 4 plaits in the pillar. E. Indies. Martini, iii. t. 95. f. 922.

vexillum. 168. Ventricose, yellowish-white, with orange bands; first whirl tuberculated and larger than the rest; pillar 6-plaited. Indian ocean. Very rare. Ency. Meth. t. 381. f. 1.

rupestris. 169. Elongated, ribbed; ribs crossed with fine transverse lines; lip margined; spire papillary at the tip; many plaits in the pillar; 4 inches long. Japan. Martini, t. 98. f. 941. and 2.

undulata. 170. Ovate, fusiform, emarginate, scored at the base; spire short, and conical; pillar 4-plaited. Australasia and Van Diemen's Land. Shaw's Nat. Misc. xvii. t. 702.

volva. 171. Cylindrical, whitish, glabrous; spire projecting, obtuse, emarginated at the base; pillar 4-plaited; 2 inches long. Shores of Guinea. Chem. x. t. 148. f. 1389 and 90.

junonia. 172. Ovate, smooth, transversely striated at the base; spire striated longitudinally, and the summit papillary; pillar with 7 plaits. Pacific ocean. Shaw's Nat. Misc. xix. t. 815.

nivosa. 173. Ovate, smooth; whirls transversely angular, and subpapillary at the summit; outer lip sharply angulated above; pillar 4-plaited.

scapha. 174. Coarse, clouded, with zig-zag brown lines; lip subulate; pillar bluish, with 4 plaits. Cape of Good Hope. Very rare. Lister, t. 709. f. 6.

spiralis. 175. Longitudinally ribbed, and finely striated transversely; a row of acute tubercles on the two first whirls; 3 plaits on the pillar. Indian seas. Rumphius, t. 29. f. X.

magellanica. 176. Ventricose, ochraceous, with white and brown lines; lip subulate; whirls of the spire convex; first largest; 2 inches long. Straits of Magellan. Ency. Meth. t. 385. f. 1 and 3.

filosa. 177. Finely reticulated and striated, with elevated transverse belts; lip crenated; 4 plaits in the pillar, which is a little umbilicated. E. Indies. Gualteri, t. 53. f. H.

178. Ovate, emarginate, subventricose, glabrous; *magnifica.* whirls transversely angulated; summit papillary; aperture effuse; pillar 4-plaited. New Zealand. Chem. xi. t. 174. f.

***** *Ventricose, and the summit of the spire papillary.*

179. Subglobular, with a transverse row of nodulous *colocynthis* plaits on the body whirl; spire short; elevated pillar 2-plaited. Chem. xi. t. 176. f. 1695 and 6.

180. Emarginated; spire crowned with vaulted *æthiopica.* spines; 4 plaits in the pillar; 7 or 8 inches long. Persia, Asia, and the Cape of Good Hope. Lister, t. 797.

181. Ovate, emarginate, with longitudinal striæ, *corona.* ending on spines on the upper margin of the body; pillar 4-plaited. E. Indies. Chem. x. t. 148. f. 1387 and 8.

182. Emarginated; whirls of the spire with grooved *cymbium.* margins; 4 plaits in the pillar; lip callous. Spain, Africa, and America. Lister, t. 796. f. 3.

183. Ovate, glabrous; whitish, with longitudinal *cymbiola.* red lines; whirls knotty; 3 plaits in the pillar; 2 inches long. Indian ocean. Chem. x. t. 148. f. 1385.

184. Somewhat cylindrical, whitish, with the spire *porcina.* truncated, rather concave, and its margin keeled; pillar 3-plaited. Philippine islands. Ency. Meth. t. 386. f. 2.

185. Emarginated; spire smooth; pillar 3-plaited; *olla.* 4 inches long. Spain, America, Philippine isles. Lister, t. 794. f. 1.

186. Emarginated; covered with a brown cuticle, *neptuni.* under which it is reddish; lip a little prominent; 4 plaits in the pillar; 4 whirls in the spire; 8 inches long; nearly as broad. Persian gulf. Lister, t. 802. f. 8.

187. Emarginated; lip a little prominent; pillar 4- *navicula.* plaited; 2 inches long. Guinea. Lister, t. 795. f. 2.

188. Elongated, yellow, with 3 bands of brown dots; *indica.* 4 plaits in the pillar. India. Ency. Meth. t. 389. f. 1.

189. Subovate, testaceous, with reddish bay spots, *præputium.* emarginated at the base; 4 plaits in the pillar. Coromandel coast. Lister, t. 798. f. 5.

190. Cylindrical, yellowish, emarginated; aperture *glans.* effuse, spreading; 3 plaits in the pillar. Eastern shores of Africa. Chem. x. t. 148. f. 1393 and 94.

Gen. 24. Buccinum, *Whelk.* 52 Buccinum.

Gen. Char.—Shell univalve, spiral, gibbous; aperture ovate, terminating in a short canal which bends to the right, with a retuse beak; pillar-lip flattened.

Species.

* *Inflated, rounded, thin, slightly transparent and brittle.*

1. Roundish, transversely ribbed, with an elevated *olearium.* line in the interstices; aperture without teeth; 6 inches long. Indian ocean. Rumphius, t. 27. f. D.

2. Ovate, transversely ribbed; ribs convex, and be- *galea.* coming

coming double near the edge; aperture toothless; 10 inches long. Mediterranean. Lister, t. 898. f. 18.

perdix. 3. Ovate, inflated, slightly grooved and undulated with white; aperture toothless; 6 inches long. West Indies. Lister, t. 984. f. 43.

pomum. 4. Ovate, with transverse convex ribs; pillar wrinkled; outer lip toothed and thickened; 2¾ inches long. Amboyna, &c. Lister, t. 792. f. 45.

sulcosum. 5. Ovate, with transverse flat ribs; pillar-lip smooth; outer lip toothed and thickened; 4 inches long. China. Martini, iii. t. 118. f. 1081.

dolium. 6. Ovate, inflated, with remote semi-cylindrical ribs; beak prominent; 4 inches long. Mediterranean. Lister, t. 899. f. 19.

chinense. 7. Globose, inflated, ribbed and striated transversely; aperture spreading; outer-lip crenated; 7 inches long. Java and China. Chem. xi. t. 188. f. 1804. and 1805.

caudatum. 8. Ovate, with transverse rounded ribs, beak somewhat prominent; outer-lip plaited and toothed within; 1¼ inch long. Martini, iii. t. 118. f. 1083. and 1084.

*** With a short exserted reflected beak, and the outer-lip unarmed outwardly.*

echinophorum. 9. With four tuberculated belts, and the beak prominent; and with transverse elevated striæ; 3½ inches long. Lister, t. 1003. f. 68.

nodosum. 10. With five acute transverse belts; upper one tuberculated; beak prominent; 1½ inch long. Lister, t. 1011. f. 71. f.

rugosum. 11. With crowded transverse elevated striæ, of which two of the upper are tuberculated, and broader than the others; aperture toothed on both sides; 3½ inches long. Mediterranean. Lister, t. 1011. f. 71. e.

abbreviatum. 12. With crowded transverse, elevated equal striæ; whirls inflated, and decreasing gradually; base abbreviated; aperture toothed on both sides; beaks truncated; 1½ inch long. Indian ocean. Chem. x. t. 153. f. 1465. and 1466.

plicatum. 13. Slightly plaited on the fore-part, with decussated striæ; aperture toothed, beak recurved; 2½ inches long. Jamaica. Lister, t. 1002. f. 67.

cornutum. 14. Turbinated, and armed with three transverse rows of tubercles; inner-lip much dilated and rounded; aperture toothed; beak much recurved; 13 inches long. Amboyna. Lister, t. 1006. f. 70.

rufum. 15. With decussated striæ, and nodulous transverse belts, between which is a double line; aperture toothed; beak recurved; 7 inches long. Amboyna. Lister, t. 1007, f. 71.

tuberosum 16. Turbinated, and armed with 3 transverse rows of tubercles; inner-lip much dilated and triangular; aperture toothed, beak recurved; 7 inches long. W. Indies. Gualteri, t. 41.

flammeum 17. Shell longitudinally plaited, transversely nodulous, and slightly coronated; plaits on the spire imbricated; aperture toothed, beak recurved; 4½ inches long. West Indies. Lister, t. 1004. f. 69.

testiculus. 18. Shell ovate, with elevated longitudinal and decussated striæ; aperture toothed; beak recurved; 3 inches long. West Indies. Lister, t. 1001. f. 66.

decussatum. 19. With decussated striæ, covered with small square scales; aperture toothed; beak recurved; 1½ inch long. Mediterranean. Lister, t. 1000. f. 63.

areola- 20. Body whirl smooth; spire elevated, rough, with decussated striæ; aperture toothed; pillar wrinkled; beak recurved; 2½ inches long. Mediterranean. Lister, t. 1012. f. 76.

strigatum. 21. Subventricose; body whirl rather smooth, and the spire rough with decussated striæ; aperture toothed; beak recurved; pillar wrinkled; 3½ inches long. Mediterranean. Lister, t. 1014. f. 78.

saburon. 22. Whirls inflated and rounded, with narrow transverse grooves; aperture toothed; pillar-lip strongly wrinkled transversely at the base; beak recurved; 2½ inches long. Mediterranean. Lister, t. 1012. f. 76.

granulatum. 23. Shell transversely grooved, and longitudinally striated; aperture toothed; beak recurved; pillar-lip granulated; 4 inches long. Lister, t. 1056. f. 9.

undulatum. 24. Thick, with transverse broad convex ribs; aperture toothed; beak recurved; pillar-lip granulated; 3½ inches long. Mediterranean. Lister, t. 996. f. 61.

inflatum. 25. Ventricose, and slightly ribbed transversely; upper whirls with decussated striæ; aperture toothed; beak recurved; pillar-lip wrinkled and granulated; 4½ inches long. Indian ocean. Chem. xi. t. 186. f. 1792. and 1793.

tesselatum 26. Slightly plaited longitudinally, and granulated above; spire rather depressed; aperture toothed; beak recurved; pillar lip wrinkled and granulated; 4½ inches long. Amboyna. Lister, t. 997. f. 62.

bilineatum * 27. Smooth, with a double row of tubercles on the body whirl; aperture toothed; beak recurved; pillar lip wrinkled and granulated; size of a hazel nut. Weymouth. Lister, t. 998. f. 63.

cicatricosum. 28. Ovate, smooth, covered with hollow dots; spire elongated; aperture toothed; beak recurved; pillar lip wrinkled and granulated. Indian ocean. Gronovius, t. 19. f. 1. and 2.

recurvirostrum. 29. Slightly striated longitudinally; body whirl inflated; spire rather prominent; outer lip toothed; beak recurved; pillar smooth; 2½ inches long. Barbadoes. Lister, t. 1016. f. 75.

cassis. 30. Slightly striated transversely; beak recurved; inner lip membranaceous, and united to the pillar, with crowded transverse elevated striæ; outer lip thin; 1½ inch long. Bay of Naples. Chem. x. t. 152. f. 1456.

**** Resembling the last division, but the outer lip on the outside is spinous at the base.*

erinaceus. 31. Slightly plaited longitudinally, and crowned with papillæ; outer lip muricated at the base; 1½ inch long. Amboyna. Lister, t. 1015. f. 73.

bicarinatum. 32. Slightly plaited longitudinally, and crowned with papillæ; outer lip with two rows of sharp spines; 1 inch long. Schroeter, i. t. 2. f. 9.

fimbria. 33. Longitudinally plaited, and nodulous on the shoulder; crowned with papillæ; spire cancellated; outer lip toothed within, and muricated at the base; 2½ inches long. Indian ocean. Chem. x. t. 153. f. 1459. and 1460.

glaucum. 34. Smooth, and crowned with papillæ; spire cancellated; outer lip toothed within, and muricated at the base; 4 inches long. Amboyna. Lister, t. 996. f. 60.

vibex. 35. Quite smooth and level; outer lip externally muricated towards the base; pillar slightly plaited; 2 inches long. Jamaica, &c. Martini, ii. t. 35. f. 364. 5. and 6.

36. Covered

papillosum 36. Covered with rows of tubercles; outer lip muricated at the base; $1\frac{1}{4}$ inch long. Amboyna. Lister, t. 969. f. 23.

glans. 37. Smooth; summit of the spire longitudinally grooved; outer lip muricated; inside delicately striated; $1\frac{1}{4}$ inch long. Asiatic ocean. Lister, t. 981. f. 40.

gibbum. 38. Subventricose, smooth, slightly striated; outer lip muricated at the base; upper part of the pillar lip becomes abruptly rounded by the inflated contour of the whirl; $1\frac{1}{4}$ inch long. Bay of Naples. Lister, t. 975. f. 30.

**** *With the pillar lip diluted and thickened.*

arcularia. 39. Plaited longitudinally, and transversely striated; whirls papillary above; pillar lip dilated and thickened; outer lip crenated on the margin, and striated within; 14 lines long. Isle of France. Lister, t. 970. f. 24.

coronatum. 40. Striated at the base; whirls smooth, and with white tubercles at the sutures; outer lip spinous; 1 inch long. Madagascar. Schroeter, i. t. 2. f. 4.

hepaticum * 41. Ribbed longitudinally, and papillary at the sutures; spire sharp-pointed; with 7 strongly ribbed whirls; pillar lip dilated, and rugose; 1 inch long. Dorsetshire coast. Montagu, t. 8. f. 1.

pullus. 42. Gibbous, obliquely striated, and cancellated; pillar lip dilated and thickened; $\frac{1}{4}$ inch long. Mediterranean. Lister, t. 970. f. 25.

thersites. 43. Gibbous, with half the body whirl, and the whole spire longitudinally plaited; pillar lip dilated and thickened; $\frac{1}{4}$ inch long. Asiatic ocean. Lister, t. 971. f. 26.

verrucosum. 44. Gibbous and tuberculated; pillar lip dilated and thickened; has 4 rows of tubercles on the body whirl, in which it differs from B. thersites; $\frac{1}{4}$ inch long. E. Indies. Lister, t. 972. f. 27.

gibbosulum. 45. Gibbous, smooth; pillar lip dilated and thickened; spire short, pointed, and half buried in the lip; $\frac{1}{2}$ inch long. Mediterranean. Lister, t. 973. f. 28.

mutabile. 46. Oblong-oval, smooth; upper whirls longitudinally grooved; pillars two plaited; 13 lines long. Senegal. Chem. xi. t. 188. f. 1010. and 1011.

neritium. 47. Convex, obtuse, depressed, and smooth; pillar lip obsoletely dilated and thickened; aperture emarginate at the base; $\frac{1}{2}$ inch long. Adriatic. Chem. v. t. 166. f. 1602.

***** *Pillar lip appearing as if worn flat.*

harpa. 48. With longitudinal, keeled, mucronate, remote ribs, and longitudinally striated; pillar smooth; from $\frac{1}{2}$ inch to $3\frac{1}{2}$ inches long. Indian ocean. Lister, t. 994. f. 57.

This beautiful shell has very properly been instituted a new genus, of which there are about 10 species; one of which, the many-stringed harp, a native of Amboyna, is often sold for 50l. or 60l. sterling.

cancellatum. 49. With 16 longitudinal mucronate ribs, with their interstices transversely striated; pillar smooth; $1\frac{1}{2}$ inch long. Tranquebar. Chem. x. t. 152. f. 1453.

costatum. 50. With crowded longitudinal mucronate ribs; pillar smooth. Philippine islands. Martini, iii. t. 119. f. 1093.

persicum. 51. Scabrous, with a crenated outer lip and flat pillar; brown, with transverse bands and lines. Amboyna. Lister, t. 987. f. 47.

52. Muricated; outer lip crenated without, and the pillar oblique and falcated; with six or seven spinous elevated belts on the body; 2 to 4 inches long. America and E. Indies. Lister, t. 989. f. 49. *patulum.*

53. Transversely ribbed, and longitudinally wrinkled, which gives it a scaly appearance; outer lip crenulated, and armed with a subulate tooth at its base; $2\frac{1}{2}$ inches long. Cape Horn. Martini, iii. t. 69. f. 761. *monodon.*

54. Transversely ribbed, and the spire short; pillar oblique; outer lip crenulated, and striated within. Resembles the former; but is smooth, and has no teeth; 2 inches long. Chem. x. t. 152. f. 1449 and 50. *haustrum*

55. Spire obliquely recurved; aperture very large; outer lip reflected; pillar lip with two obsolete teeth at the base; external surface rugged; inside smooth; 4 inches long. Peru. Favanne, i. t. 4. f. H. 2. *concholepas.*

56. Submuricated; outer lip striated within; pillar flattened; throat and aperture fulvous; transversely striated, with four elevated belts; upper two nodulous; 4 inches long. Mediterranean. Lister, t. 988. f. 48. *hæmostoma.*

57. Turbinated, armed with three transverse rows of large conical tubercles on the body whirl; aperture white; 3 inches long. South sea. Chem. xi. t. 187. f. 1798 and 9. *armigerum.*

58. With crowded transverse striæ, and four rows of tubercles on the body whirl, and two on the spire; aperture yellowish; 2 inches long. South sea. Chem. xi. t. 187. f. 1800 and 1801. *luteostomum.*

59. Deeply channelled transversely, with longitudinal remote and narrow ribs; body whirl lamellated towards the outer lip, and the inside bright blue; $2\frac{1}{2}$ inches long. New Zealand. Chem. x. Vig. 21. f. A. and B. *lamellosum.*

60. Ribbed transversely, and longitudinally wrinkled, with curled imbricated membranes; aperture ovate; $1\frac{1}{2}$ inch long. New Zealand. Chem. xi. t. 187. f. 1802 and 3. *crispatum.*

* 61. Ovate, acute, striated longitudinally and transversely, without any protuberances; pillar flattish; aperture oval; outer lip slightly toothed; 2 inches long. Coasts of Great Britain. Don. i. t. 11. *lapillus.*

The famous purple dye, supposed to be the same as the indelible *Tyrian purple*, is extracted from a vein on the back of the animal which inhabits this shell.

62. Ovate, whitish, with red transverse striæ; spire rather prominent; aperture oval; outer lip striated with red, and the pillar subumbilicated; 1 inch long. Martini, iii. t. 121. f. 1113 and 14. *filosum.*

63. Oblong-ovate, with the whirls contiguous and transversely grooved; outer lip crenulated and striated within; $1\frac{1}{4}$ inch long. Tranquebar. Lister, t. 976. f. 31. *sulcatum.*

64. Ovate-oblong, with transverse crenulated striæ; the pillar livid; 2 inches long. Tranquebar. Lister, t. 986. f. 45. *sertum.*

65. Ovate, acute, and very smooth; outer lip crenated, and striated within; pillar slightly plaited; aperture beaked; $1\frac{1}{4}$ inch long. Tranquebar. Lister, t. 831. f. 55. *smaragdulus.*

66. Ovate, coarse, with transverse elevated nodulous ribs; aperture ovate, and the pillar without plaits; $1\frac{1}{2}$ inch long. Martini, iii. t. 121. f. 1106. *varium.*

67. Subfusiform; body nearly smooth, and thrice as long as the spire, which is cancellated; $3\frac{1}{4}$ inches long. *tuba.*

long. Indian ocean. Martini, iii. p. 201. t. 94. f. 908.

pyrum. 68. Pyriform, with a short depressed spire, and the body ventricose; pillar smooth, transversely striated at the base; aperture orange; 1½ inch long. Martini, iii, t. 94. f. 908 and 10.

plumbeum 69. Subglobose, ponderous, glabrous, with a deep transverse groove near the base of the body whirl, and an obsolete one lower down, and ends in a projecting tooth on the pillar lip, which is thick; 1½ inch long. California. Chem. xi. t. 188. f. 1806 and 7.

spadiceum 70. Pyriform, smooth, chesnut-coloured, with transverse undulated white lines; 1½ inch long. W. Indies. Martini, iii. t. 94. f. 911.

umbilicatum. 71. Oblong, subturbinated, and slightly plaited longitudinally; spire nodose, transversely striated at the base; aperture grooved within, and the pillar subumbilicated; 2½ inches long. Martini, iii. t. 94. f. 915.

candidum 72. Ovate, ventricose, ponderous; smooth, white, without any markings; spire short; 2 inches long. Martini, iii. Vig. 31. p. 191. f. 3.

crassum. 73. Subglobose, ventricose, and glabrous; aperture oval, and the pillar thickened, with two callosities; spire small, with five whirls; 2 inches long. Martini, iii. t. 120. f. 1099 and 1100.

orbita. 74. Ovate, thick, with transverse, distant, knotty, reflected ribs, and intermediate smaller ones; outer lip plaited; 3 inches long. New Zealand. Chem. x. t. 154. f. 1473.

scala. 75. Ovate, with distant recurved elevated transverse white belts, and their interstices longitudinally striated; whirl faced, flattened at top; aperture toothed on the outer lip, and strongly grooved within; ½ inch long. Cape. Lister, t. 1059. f. 2.

****** *Somewhat polished, and not enumerated in the former divisions.*

spiratum. 76. Smooth, with the whirls separated by a deep canal, somewhat sunk into each other; pillar abrupt and perforated; 2 inches long. E. Indies. Lister, t. 983. f. 42. c.

zeylanicum. 77. Smooth, with the whirls produced; pillar abrupt, with a large umbilicus, and toothed at the margin. Amboyna. Lister, t. 982. f. 42.

glabratum 78. Umbilicated, highly polished, with obsolete sutures; body whirl channelled and produced at the base; 3 inches long. Tranquebar. Lister, t. 974. f. 29.

turgitum. 79. Ovate, subumbilicated, smooth, with transverse rows of red spots, and a sinus in the outer lip; spire with 6 whirls; upper 3 slightly plaited longitudinally; under ones smooth and level; 2 inches long. New Zealand. Chem. x. t. 156. f. 1475 and 1476.

scutulatum. 80. Ovate, smooth, brown, with longitudinal veins; whirls flattish, and beak obtuse; 2½ inch long. New Zealand. Chem. vig. 21. f. C. and D.

testudineum. 81. Oblong-ovate, smooth, with transverse rows of crowded dark brown spots, and somewhat produced at the base; 1½ inch long. New Zealand. Chem. x. t. 152. f. 1454.

catarracta 82. Ovate, rough, with crowded, minute, transverse grooves; and marked longitudinally with undulated decurrent stripes; 1½ inch long. New Zealand. Chem. x. t. 152. f. 1455.

lævissimum. 83. Oblong-ovate, polished; obliquely truncated at the base; apex obtuse; pillar-lip concave; 2 inches long. E. Indies. Martini, iv. t. 127. f. 1215 and 1216.

cyaneum. 84. Ovate-oblong, brittle, transversely striated, and bluish; whirls imbricated at the sutures; pillar with one plait; striated minutely; 1½ inch long. Chem. x. t. 152. f. 1448.

læve. 85. Ovate-oblong, smooth, brown, with darker bands; and minute, distant, transverse striæ; aperture oval, ending in a canal; body ventricose, double the length of the spire; 16 lines long. E. Indies. Martini, iv. t. 124. f. 1150.

igneum. 86. Oblong, narrow, glabrous, yellowish, clouded with red, upper part longitudinally striated; 1½ inch long. Martini, iv. t. 127. f. 1217.

plumatum 87. Oblong, transversely striated; pillar lip with a tooth at the upper end, and the outer lip striated; 2 inches long. Jamaica. Lister, t. 822. b. f. 41.

ocellatum. 88. Smooth, black, with rows of white spots and dots; body whirl ventricose, and the spire rather prominent and nodulous; inside blue; 1 inch long. E. Indies. Martini, iv. t. 124. f. 1160 and 1161.

glaberrimum. 89. Very smooth, minute, with the base truncated; 7 lines long. Martini, iv. t. 125. f. 1177.

nucleus. 90. Oblong-ovate, transversely striated; pillar obliquely grooved; aperture truncated at the base; 7 lines long. Madagascar. Lister, t. 976. f. 32.

lineatum. 91. Oblong, smoothish, transversely striped; spire acute, pyramidal; outer lip a little expanded; ½ inch long. W. Indies. Martini, iv. t. 125. f. 1188 and 1189.

exile. 92. Oblong, cancellated; aperture expanded; spotted and crenated; ½ inch long. Martini, iv. t. 125. f. 1190 and 1191.

prærosum 93. Ovate, smooth, black; spire carious and abrupt; pillar glabrous; 7 lines long. S. of Europe. Fluviatile. Chem. ix. t. 121. f. 1035 and 1036.

cochlidium 94. Oblong, smooth, white; whirls flattened at the sutures; aperture oval and effuse; 3 inches long. S. sea islands. Terrestrial. Chem. xi. t. 209. f. 2053 and 2054.

australe. 95. Oblong, smooth, with narrow, transverse, variegated bands and veins; aperture oval, and entire; 3 inches long. New Zealand. Fluviatile. Chem. ix. t. 120. f. 1033 and 1034.

******* *Angulated, and not included in the former divisions.*

undosum. 96. Ovate, with transverse, elevated, glabrous striæ; body obtusely 5-angled; pillar slightly plaited at the base; 2 inches long. Amboyna. Lister, t. 938. f. 33.

affine. 97. Ovate, with transverse, elevated, glabrous striæ; body rounded; outer lip swollen; pillar toothed; 2 inches long. Straits of Malacca. Martini, iv. t. 123. f. 1135.

fulmosum. 98. Nearly oval, longitudinally plaited, and transversely ribbed; interstices striated; aperture effuse; 2 inches long. Martini, iv. t. 123. f. 1145 and 1146.

indicum. 99. Ovate, reticulated, with transverse ribs, and elevated longitudinal striæ; aperture effuse; 1½ inch long. E. Indies. Martini, iv. t. 123. f. 1138 and 1139.

tranquebaricum. 100. Ovate, with 12 angles; nodulous, striated transversely; aperture toothed; outer lip orange; pillar toothed;

toothed; 2 inches long. Coromandel. Martini, iv. t. 123. f. 1146 to 1149.

versicolor. 101. Coarse, transversely striated, with 2 intermediate rows of black dots; spire with 4 concave whirls; 1½ inch long. Martini, iv. t. 123. f. 1145.

cruentatum. 102. Ovate, white, minutely striated transversely, with squarish red spots; whirls convex. Martini, iv. t. 123. f. 1143 and 1144.

bezoar. 103. Roundish, whirls lamellated above; pillar perforated; 2½ inches long. China. Martini, iii. t. 68. f. 754 and 755.

bulbosum. 104. Roundish, obliquely contracted at the base, with two transverse rows of vaulted spines; whirls channelled at the sutures; aperture and umbilicus very wide; 4 inches long. Tranquebar. Lister, t. 894. f. 14.

glaciale. 105. Ovate-oblong, smooth, and somewhat striated transversely; body slightly keeled; 3 inches long. Northern ocean. Chem. x. t. 152. f. 1446 and 1447.

carinatum 106. Oblong, transversely striated; upper whirls with many oblique and obtuse angles; lower whirls single keeled; 2 inches long. Spitsbergen. Phipps' Voyage, t. 13. f. 2.

lamellatum. 107. Oblong, lamellated longitudinally; white, with a purple inside, and white pillar lip; 1½ inch long. Kæmmer Cab. t. 9. f. 2.

undatum. * 108. Oblong, coarse, with transverse striæ, and longitudinal oblique ribs; whirls ventricose; 5 inches long. Britain. Don. iii. t. 104.

ciliatum. 109. Turreted, patulous; somewhat beaked, angulated, longitudinally ciliated; pillar slightly plated; 6 inches long. Greenland.

solutum. 110. Ovate, with unequally distant longitudinal tubercles on the body; outer lip channelled, and somewhat detached. Hermann, t. 2. f. 3 and 4.

papyraceum. 111. Ovate-oblong, slender; obsoletely striated transversely, and the whirls depressed at their summits. Lister, t. 963. f. 17.

otaheitense. 112. Oblong, transversely grooved, with the grooves wrinkled and dotted, and the sutures finely crenulated. Otaheite. Chem. x. t. 154. f. 1477.

porcatum. 113. Ovate-oblong, subventricose, thick, transversely ribbed, and the interstices striated; pillar convex. Mexico. Lister, t. 963. f. 16.

lyratum. 114. Fusiform, longitudinally ribbed, and the ribs transversely striated; apex blackish. Martini, iv. t. 127. f. 1221 and 1222.

pyrozonias. 115. With transverse plaits, and undulated striæ; the base and spire a little prominent; body whirl with a double, and the other whirls with a single fulvous band. Martini, iii. t. 109. f. 1017.

textum. 116. Shell turreted, longitudinally ribbed, and transversely striated; whirls flattish at the top. Martini, iv. t. 125. f. 1201 and 1202.

clathratum. 117. Ovate, ventricose, longitudinally ribbed; decussated with transverse undulated striæ, and channelled at the sutures. E. Indies. Born, t. 9. f. 17 and 18.

niveum. 118. Suboval, with elevated cancellated striæ, and the body whirl ventricose, and produced at the base. Martini, iv. t. 122. f. 1122 and 1123.

lima. 119. Oval, ventricose, acuminated, and channelled with longitudinal ribs, and transverse elevated striæ; aperture roundish and effuse. E. Indies. Chem. xi. t. 188. f. 1808 and 1809.

reticulatum. * 120. Ovate-oblong, transversely striated, and longitudinally ribbed; aperture toothed. Mediterranean and Britain. Don. t. 76.

ambiguum. * 121. Subpyramidal, with distant longitudinal ribs, and striated transversely; outer lip slightly denticulated. Britain. Linn. Tr. viii. t. 4. f. 5.

macula. * 122. Ovate, longitudinally ribbed, and transversely striated; outer lip gibbous. Norway and Britain. Linn. Tr. viii. t. 4. f. 4.

stolatum. 123. Oblong-ovate, with one side of the body nearly smooth, and the rest plaited longitudinally and obsoletely striated transversely; aperture roundish. Tranquebar. Martini, iv. t. 124. f. 1167 to 1169.

cinctum. * 124. Conical, closely ribbed longitudinally, and the interstices obsoletely striated transversely; apex acute; aperture oval. Weymouth. Montagu, t. 15. f. 1.

minimum. * 125. Acuminated, minute, and reticulated, with longitudinal elevated ribs, and transverse striæ; aperture oval. Devonshire. Montagu, t. 8. f. 2.

plicatulum 126. Oblong, longitudinally plaited, and transversely striated; brownish white, with darker brown bands, and the inside violet. Martini, t. 124. f. 1158 and 1159.

piscatorium. 127. Cancellated, and nodulous at the intersections on the lower whirls; pillar with one plait, and umbilicated; aperture effuse. E. Indies. Martini, iv. t. 124. f. 1151 and 1152.

mauritii. 128. Ovate, with longitudinal ribs, which form on the body four transverse rows of tubercles; outer lip six toothed. Island of St Maurice. Martini, iv. t. 124. f. 1153. and 1154.

armillatum. 129. Ovate, with each whirl crowned by a row of tubercles; aperture large and toothless. Martini, iv. t. 124. f. 1155. to 1157.

nitidulum. 130. Ovate, oblong, polished, transversely striated, and marked with articulated bands; outer lip toothed within. Mediterranean. Gualteri, t. 52. f. 6.

ventricosum. 131. Ovate, oblong, brown, striated with white, and somewhat plaited. St George's Bay. Martini, ii. t. 47.

******** *Turreted, subulate, and slightly polished.*

maculatum. 132. Subfusiform, with smooth undivided very entire whirls. Amboyna. Lister, t. 846. f. 74.

oculatum. 133. Subfusiform, with the upper half of the whirls convex and ocellated. East Indian seas. Martini, iv. t. 153. f. 1442.

subulatum 134. Subulate, smooth, with undivided very entire whirls. Indian ocean. Lister, t. 841. f. 69.

felinum. 135. Pellucid, with all the whirls slightly emarginate on the back. Gualteri, t. 56. f. G.

crenulatum. 136. With the whirls transversely divided, and crenated on their margins. Amboyna. Lister, t. 846. f. 75.

hecticum. 137. With the whirls transversely divided, and the upper margin compressed and attenuated. African ocean. Chem. xi. t. 188. f. 1817. and 1718.

geminum. 138. Whirls transversely divided, with the lower divisions slightly striated, and the upper more protuberant.

proximatum. 139. With the whirls transversely divided; lower division striated, and the upper filiform.

monile. 140. Whirls transversely divided, with the lower division grooved, and the upper moniliform.

vittatum. 141. Striated transversely, with a double crenulated suture

suture on the upper margin. Ceylon. Lister, t. 977. f. 34.

digitale. 142. Conical, subturreted, glabrous, with the aperture effuse at the base.

strigilatum. 143. Whirls transversely divided, and obliquely striated. Asiatic ocean. Lister, t. 846. f. 145. C.

concinnum 144. Longitudinally striated, whirls undivided, and marked at the sutures with a spotted belt. Gualteri, t. 57. f. O.

duplicatum. 145. Whirls transversely divided, and longitudinally grooved. Coasts of Hainan. Lister, t. 837. f. 64.

cinereum. 146. Subulate, with the upper part of the whirls longitudinally plaited. Amboyna. Rumphius, t. 30. f. 1.

succinctum. 147. Minutely striated transversely, and whirls transversely divided. East Indian ocean. Martini, iv. t. 154. f. 1451.

acus. 148. Whirls transversely divided, crenulated, and wrinkled; pillar twisted spirally. Martini, iv. t. 154. f. 1449.

lanceatum 149. Smooth; whirls entire, and marked with testaceous longitudinal stripes. Amboyna. Rumphius, t. 30. f. G.

dimidiatum. 150. Whirls transversely divided and smooth, orange spotted. Amboyna. Lister, t. 843. f. 71.

murinum. 151. Whirls somewhat angular, with three muricated striæ. Africa. Gualteri, t. 57. f. P.

pertusum. 152. With longitudinal elevated striæ, and transverse rows of excavated dots; whirls transversely divided. Martini, iv. t. 155. f. 1457.

hastatum. 153. Subfusiform, with alternate brown and white bands, and longitudinal striæ. Martini, iv. t. 154. f. 1453. and 1454.

sinuatum. 154. Whirls longitudinally plaited, and attenuated near the sutures; aperture emarginate at both ends. East Indian rivers. Martini, iv. t. 155. f. 1464. and 1465.

bifasciatum. 155. Glabrous, white, with two bands; whirls continuous. East Indies. Petiver, t. 53. f. 5.

radiatum. 156. With transverse granulated striæ; whirls convex, and the first twice as large as the next. Coast of Naples. Gualteri, t. 52. f. D.

virgineum 157. Whirls of the spire flattish; aperture large and oval. Virginian rivers. Lister, t. 113. f. 7.

acicula. * 158. Minute, with the whirls well defined by an oblique suture; aperture oblong. Mosswold, walls about Paris, and in Kent. Montagu, t. 8. f. 3.

53 Strombus.

Gen. 25. Strombus.

Gen. Char.—The animal a limax: the shell univalve, spiral; aperture much dilated; the lip expanding, and produced into a groove leaning to the left (c).

Species.

* *The lip projecting into linear divisions or claws.*

fusus. 1. Tapering, smooth, and slightly ventricose, with a subulate beak and toothed lip. Red sea. Lister, t. 854. f. 12.

unicornis. 2. Turreted, smooth; aperture ending in a long straight beak, and the outer lip toothed. E. Indies. Lister, t. 916. f. 9.

3. Turreted, smooth, with a longitudinal fissure extending from the aperture to the summit, of which the acute margin, and also the outer lip, are toothed. Chem. xi. t. 195. A. f. 1869. *fissus.*

* 4. *Corvorant's Foot;* lip with four palmated angular claws; mouth smooth; whirls tuberculated; 2 inches long. European and American seas, shores of Britain. Lister, t. 865. f. 20. *pes-pelicani.*

5. Lip with 6 curved claws, and recurved beak; lip striated; two hind claws divergent and bent outwards; beak tuberculated. Indian ocean. Lister, t. 870. f. 24. *chiragra.*

6. Lip with 4 knotty claws; hinder one very long; 4 inches long. Amboyna. Lister, t. 867. f. 22. *scorpius.*

7. Lip with seven straightish claws; mouth smooth. Asia. A large shell. Lister, t. 866. f. 21. *lambis.*

8. Ovate, with the spire very obtuse and knotty; aperture with straightish claws, of which one is smaller. China. Lister, t. 882. f. 24. *truncatus.*

9. Lip with 10 inflected claws; mouth substriated; back compressed; gibbous. Asia. Rare. Lister, t. 868. f. *millipeda.*

** *Outer lip lobed.*

10. Lip thickened, and 3-lobed on the fore-part; back warty, and crowned with tubercles; beak obtuse; $3\frac{1}{2}$ inches long. Asia, America. Lister, t. 861. f. 18. *lentiginosus.*

11. Transversely striated, and transverse nodulous bands; spire coronated; outer lip growing to the spire, and situated at the base. E. Indies. Chem. x. t. 158. f. 1510 and 11. *papilio.*

12. Lip entire; back crowned with 3 rows of protuberances, and rosy between them. Africa. Lister, t. 860. f. 17. *fasciatus.*

13. Subovate, with dark transverse interrupted stripes, and a row of pointed tubercles on each whirl; outer lip sinuated only outwards at the base. Red sea. Chem. x. t. 155. f. 1483 and 84. *polyfasciatus.*

14. Lip mucronate on the fore-part, and very long; back crowned with tubercles; beak straight; 6 inches long. Asia and America. Lister, t. 874. f. 30. *gallus.*

15. Transversely ribbed and nodulous; outer lip sinuated near the base, and much scolloped towards its upper angle. E. Indies. Chem. x. t. 158. f. 1506 and 1507. *lacinatus.*

16. Lip projecting into a sharp point; back muricated; beak erect and acute; 3 inches long. Asia. Lister, t. 872. f. 28. *auris-dianæ.*

17. Anterior lip prominent, rounded, smooth; spire spinous; beak 3-lobed, obtuse. South America. Martini, iii. t. 81. f. 830 and 31. *pugilis.*

18. Lip a little prominent; beak entire; back margined, smooth. China. *marginatus.*

19. Lip a little prominent; back smooth; whirls rounded, equal; $2\frac{1}{2}$ inches long. Asia. Lister, t. 850. f. 5. *luhuanus.*

20. Lip

(c) It ought to be observed, that these shells, in their young state, want the lip, and then have a thin turbinated appearance; from which circumstance they have been sometimes referred to a different genus.

gibberulus 20. Lip a lip prominent; beak smooth; whirls gibbous, unequal. Asia. Lister, t. 847. f. 1.

oniscus. 21. Obovate, with knotty belts, and a subulate, smooth projection; an inch long. South America. Lister, t. 791. f. 44.

*** *With the outer lip very large.*

gigas. 22. Lip rounded, and very large; shell crowned; belly and spire with conic expanded spines; glossy white; within, a rich rose colour; 10 inches long. South America and W. Indies. Lister, t. 886. f. 7.

latissimus. 23. Lip rounded, very large; belly unarmed; spire a little knotty; 14 inches long. Asia. Lister, t. 856. f. 12. c.

accipeter. 24. Body crowned with spinous tubercles, and their interstices striated; first whirl of the spire ribbed, and the next striated transversely. Asiatic ocean. Lister, t. 863. f. 18. b.

epidromis. 25. Lip rounded, short; belly smooth; spire a little knotty; $3\frac{1}{2}$ inches long. Southern Asia. Lister, t. 853. f. 10.

minimus. 26. Lip retuse, gibbous; belly and spire with knotty plaits; aperture 2-lipped, smooth; $2\frac{1}{2}$ inches long. India. Rumphius, t. 36. f. P.

canarium. 27. Somewhat heart-shaped; with a round, short, retuse, smooth lip; pillar smooth; $1\frac{1}{2}$ inch long. Asia. Lister, t. 853. f. 9.

vittatus. 28. Lip rounded, short; belly smooth; spire elongated; whirls divided by an elevated suture; 4 inches long. Lister, t. 852. f. 8.

sulcatus. 29. Transversely grooved, with the spire produced and channelled at the sutures; outer lip rounded, short, and sinuated. China. Lister. t. 852. f. 8.

accinctus. 30. Lip rounded, retuse; belly smooth, with 4 pale, linear, punctured belts. Asia. Lister, t. 859. f. 16.

fissurella. 31. Lip continued into a longitudinal cleft ridge. India. Frequently found fossil in Campania. Martini, iv. t. 158. f. 1498 and 1499.

urceus. 32. Lip tapering, retuse, short, striated; belly and spire with knotty plaits; aperture 2-lipped, unarmed; $2\frac{1}{2}$ inches long. Indian ocean. Lister, t. 857. f. 13.

erythrinus. 33. With nodulous plaits on the body and spire; outer lip striated on both sides; inner lip white and reflected. Red sea. Chem. xi. t. 195. A. f. 1874 and 1875.

samar. 34. Thin, white, with orange spots and clouds; back smooth, plaited; whirls grooved; lip 3-toothed; beak violet. Indian ocean. Lister, t. 858. f. 14.

dentatus. 35. Lip tapering, short-toothed; belly and spire plaited; $1\frac{1}{4}$ inch long. Isle of France. Chem. x. t. 157. f. 1501 and 1502.

vexillum. 36. Solid, subcylindrical, with alternate, reddish and ochraceous bands; lip denticulated within; pillar flat, glabrous, and emarginated at the base. Indian ocean. Very rare. Chem. x. t. 157. f. 1504 and 1505.

norwegicus. 37. Oblong, subulate, white, with round whirls; aperture spreading; ovate; beak a little ascending. Norway. Chem. x. t. 157. f. 1497 and 1498.

**** *Turreted, with a very long spire.*

tuberculatus. 38. Oblong, ovate, tuberculated; lip thickened. Mediterranean. Martini, iv. t. 157. f. 1490.

39. Smoothish; lip separated behind. Savannahs of the Indian ocean. Lister, t. 837. f. 63. *palustris.*

40. Smooth; lip separated before and behind; 26 lines long. Fens of Amboyna. Lister, t. 115. f. 10. *ater.*

41. Barred with brown; whirls 7, muricated; each with 7 yellow compressed tubercles; aperture ovate; 10 lines long. Africa. Lister, t. 121. f. 16. *auritus.*

42. Subangulated, and armed with spinous nodules; outer lip separated on the anterior side. Chem. xi. Part ii. t. 136. f. 1269 and 1270. *lividus.*

* 43. Very thick; first whirl crowned with tubercles; interstices of the tubercles plaited; the next whirl transversely ribbed; the rest transversely striated; 6 inches long. W. of England and Bantry Bay. Montagu, t. 30. f. 7. *costatus.*

Gen. 26. Murex. 54 Murex.

Gen. Char.—The animal a limax: the shell univalve, spiral, rough, with membranaceous sutures; aperture oval, terminating in an entire, straight, or slightly ascending canal.

Species.

* *Spinous, with a produced beak.*

1. Ovate, tuberculated; with a long subulate, straight, muricated beak. Asia, America, Red sea. Lister, t. 903. f. 23. *haustellum.*

2. Triangular, with three thick, somewhat spinous varices, and transversely grooved; beak rather long, subulate, and slightly ascending. E. Indies. Chem. x. t. 163. f. 1563. *motacilla.*

3. Subovate, with 3 spinous varices, and darker transverse ribs; beak very long, straight, and armed with similar long spines. Red sea. Chem. xi. t. 189. f. 1819 and 1820. *scolopax.*

4. *Thorny-woodcock.* Ovate, with a triple row of setaceous spines: beak elongated, subulate, with similar spines. Var. 1. With spines shorter than the beak. 2. With spines as long as the beak. This last is rare. Asia, America, Red sea. Lister, t. 900. f. 22. *tribulus.*

5. Roundish, surrounded with subulate, oblique spines; beak long, subulate, straight, with a few short spines; 8 inches long; spines 2 inches. Africa. Very rare. Lister, t. 901. f. 21. *cornutus.*

6. Subovate, surrounded with straight spines; beak subulate, straight, obliquely surrounded with spines. Mediterranean, Adriatic. Lister, t. 900. f. 20. *brandaris.*

7. Ovate, knotty, and surrounded with spines on the fore part; beak short, perforated, truncated. Mediterranean, Jamaica. Lister, t. 947. f. 42. *trunculus.*

8. Ovate, with 7 furbelowed spinous varices; beak short and perforated. Chem. x. t. 161. f. 1528 and 1529. *rosarium.*

9. Ovate, knotty, with 3 to 7 protuberances; beak broad; coarse and ponderous. Eastern shores of Africa. Lister, t. 994. f. 30. a. *pomum.*

10. Ovate, scabrous, with 9 crenulated, subfoliated, oblique varices; outer lip double and toothed; beak short, ascending, and narrow. Nicobar. Chem. x. t. 161. f. 1532 to 1535. *miliaris.*

11. Transversely striated, with 8 rows of hollow black *melanomathos.*

black spines; spire a little knotty and prickly; beak subulate. E. Indies. Martini, iii. t. 188. f. 1015.

** *Foliated, and the beak short.* PURPURA.

ramosus. 12. A triple row of foliations; spire contiguous; beak truncated. America, Asia, Red sea. Lister, t. 946. f. 41.

foliatus. 13. A triple row of foliations; aperture 1-toothed. North America. Chem. x. t. 161. f. 1568 and 1569.

lingua. 14. Subtriangular, ovate, with three membranaceous varices, and somewhat nodulous; whirls contracted at the sutures; beak closed. Coasts of Goree. Chem. x. t. 161. f. 1540. and 1541.

tripterus. 15. Long, narrow, and subtriangular, with three membranaceous varices; beak rather long. Batavia. Martini, iii. t. 110. f. 1031 and 1032.

triquester. 16. Long, narrow, and subtriangular, with reticulated ribs, and three membranaceous varices; beak rather long, and closed. Tranquebar. Martini, iii. t. 111. f. 1038.

scorpio. 17. Four rows of foliations; spire capitate; beak truncated. Asia. Very rare. Gualteri, t. 37. f. M.

saxatilis. 18. Five rows of foliations; spire contiguous; beak abbreviated. Mediterranean, Asia. Martini, iii. t. 107. f. 1004 to 1010.

erinaceus. * 19. Subangular; whirls crowned with tubular and subspinous rays, scales or points; beak short and covered; 2 inches long. European seas, shores of Britain. Don. t. 35.

sacellum. 20. Umbilicated with muricated ribs; whirls flattish above, with acute margins; lip crenated; beak straight, ascending. Nicobar. Chem. x. t. 163. f. 1561 and 1562.

*** *With thick, protuberant, rounded varices.*

lyratus. 21. Protuberances crossed by smooth belts; aperture ovate. New Zealand. Chem. x. t. 169. f. 1634.

rana. 22. Rough, with opposite, impressed protuberances, and one or two muricated belts. Asia. Lister, t. 995. f. 58.

spinosus. 23. With two opposite varices, and remote transverse spinous belts; whirls flattened; spines on the varices very long; aperture ovate. Tranquebar. Lister, t. 949. f. 44.

crassus. 24. With two opposite very thick varices, and remote transverse obsolete belts, and granulated striæ; whirls rather flattened; aperture ovate; outer lip very thick. Madagascar. Martini, iv. t. 133. f. 1272. and 1273.

gyrinus. 25. Protuberances opposite, continued, and barred with tuberculated dots; aperture orbicular. Mediterranean, Atlantic, India. Lister, t. 939. f. 34.

bufonicus. 26. Nodulous, with two opposite varices, and transverse granulated striæ; outer lip furrowed, and ending in a channel above. South sea. Chem. xi. t. 192. f. 1843. to 1846.

argus. 27. With two subalternate varices, and rounded nodules on transverse ribs; outer lip double, and strongly toothed within. Amboyna. Martini, iv. t. 127. f. 1223.

lampas. 28. Protuberances nearly opposite, gibbous, with longitudinal tuberculated protuberances; from 4 to 14 inches long. Indian ocean. Lister, t. 1023. f. 88.

olearium. 29. Protuberances alternate, and numerous tubercles; back unarmed and striated behind; aperture toothless. Mediterranean and African seas." Lister, t. 937. f. 32.

femorale. 30. Protuberances decussated, triangular, wrinkled and knotty on the fore-part; aperture ovate, toothless; from 5 to 7 inches long. Asia, Guinea, and America. Lister, t. 941. f. 37.

cutaceus. 31. With a single protuberance; angular, and a little wrinkled with knots; pillar perforated; aperture toothed; 3 inches long. Barbary, Guinea, South America. Lister, t. 942. f. 38.

lotorium. 32. Protuberances decussated, angular, with longitudinal tuberculous knots; beak flexuous; aperture toothed. Mediterranean. Lister, t. 934. f. 29.

pileare. 33. Protuberances decussated, and a little wrinkled with knots; aperture toothed; beak subascending. Mediterranean. Chem. xi. t. 191. f. 1837. and 1838.

caudisatus. 34. Turreted, with alternate varices, and granulated all over; aperture channelled above, and the outer lip toothed within; beak short and straight. Chem. x. t. 162. f. 1544. and 1545.

bufonius. 35. Six opposite, continued, vaulted protuberances, and knotty belts; beak oblique. A rare shell. Chem. xi. t. 192. f. 1843. to 1846.

maculosus. 36. Turreted, elongated, with alternate varices, and decussated striæ, forming granules at their intersections; beak short and slightly ascending. Amboyna. Lister, t. 1022. f. 86.

spengleri. 37. Angulated with decussated varices, and a concatenated row of granules in the interstices of the transverse ribs; beak short and straight. Chem. xi. t. 191. f. 1839. and 1840.

pyrum. 38. Varicose, ovate, transversely grooved and knotty; beak long, flexuous, subulate. Indian ocean. Martini, iii. t. 112. f. 1050. and 1051.

clavator. 39. Ovate, with two varices, longitudinally plaited and striated, and transversely ribbed; beak long and flexuous. Ceylon. Chem. xi. t. 190. f. 1825. and 1826.

caudatus. 40. Thin, transversely striated; beak subulate; spire a little prominent, tipt with brown; whirls grooved; first gibbous. Coromandel. Lister, t. 893. f. 13.

rubecula. 41. Protuberances decussated, obtuse, with knotty wrinkles; belly equal; aperture toothed. Africa, India, South America. Rare. Chem. x. t. 162. f. 1546. and 7.

scrobiculator. 42. Protuberances hollowed, smooth, nearly opposite; aperture toothed. Mediterranean. Lister, t. 943. f. 39.

reticularis 43. Protuberances nearly opposite, reticulated with tuberculated spots; pillar almost toothless; beak ascending; 6 inches long. Mediterranean, America. Lister, t. 935. f. 30.

mulus. 44. Whirls unequally gibbous; ribs decussated, and slightly tuberculated at their intersections; aperture surrounded by a thin dilated membrane, and the beak produced and ascending. Coasts of Chiloe. Martini, ii. t. 41. f. 405 and 6.

anus. 45. Protuberances and lips membranaceous, dilated; gibbous and reticulated with tubercles; aperture sinuous; beak erect; 3 inches long. Mediterranean and Asia. Lister, t. 833. f. 57.

**** *Somewhat spinous, and without a beak.*

ricinus. 46. Obovate, with subulate spines in rows; aperture and lip toothed; $1\frac{1}{2}$ inch long. Asiatic ocean. Lister, t. 804. f. 12 and 13.

nodus. 47. Obovate, with conic spines; lip toothed; pillar smooth, coloured; $3\frac{1}{2}$ inches long. Jamaica. Lister, t. 991. f. 53.

neritoideus. 48. Knots in numerous rows; lip with pointed angles; pillar flattish. India. Lister, t. 990. f. 50.

hystrix. 49. Subovate, with acute spines in 4 rows; aperture toothless, repand. Friendly islands.

mancinella. 50. Ovate, with obsolete spines, which are blackish; aperture toothless; pillar transversely striated. Amboyna. Lister, t. 957. f. 9.

hippocastanum. 51. Ovate, striated, with 3 or 5 rows of obtuse spines or tubercles; aperture transversely striated. Guinea, India. Martini, iii. t. 99. f. 945 and 6.

nodatus. 52. Whirls knotty; aperture violet; lip toothed; beak straight. New Holland. Martyn's Univ. Conch. ii. t. 51.

lacerus. 53. Ovate, transversely striated, and armed with two rows of compressed spines; spire muricated, and the whirls keeled. Guinea. Lister, t. 958. f. 11.

plicatus. 54. Ovate, ventricose, with the whirls longitudinally plaited and striated transversely; throat violet. E. Indies. Martini, iii. t. 100. f. 954. and 5.

morbosus. 55. Ovate, transversely striated, and the whirls nodulous; aperture roundish. W. Indies. Lister, t. 990. b. f. 51.

senticosus. 56. *Small prickly whelk.* Tapering, longitudinally ribbed, and transversely cancellated; aperture striated; ribs prickly; 2 inches long. Indian ocean. Gualteri, t. 51. f. G.

melangena 57. Obovate, glaucous, with a subspinous whirl; spire somewhat prominent; aperture smooth; $5\frac{1}{2}$ inches long. India, America. Lister, t. 904. f. 24.

calcaratus 58. Somewhat turbinated, with transverse striæ and spinous belts; aperture subovate. Amboyna. Martini, ii. t. 40. f. 400 and 401.

consul. 59. Thick, ventricose, transversely grooved and knotted; aperture repand, ovate; lip sinuous, inwardly plaited and denticulated. India. Chem. t. 160. f. 1516 and 17.

stramineus. 60. Ovate, grooved and striated transversely, and the upper ends of the whirls flattish and nodulous; aperture wide, and lips thickened.

australis. 61. Ovate, longitudinally striated, with 4 plaits on the body, and 3 on the next whirl; whirls channelled, and the outer lip undulated.

***** *With a long, straight, subulate, closed beak, and unarmed with spines.*

babylonius 62. Tapering, with acute spotted belts, and straight tail; lip cleft; 4 inches long. Indian and American islands. Lister, t. 717. f. 11.

javanus. 63. Tapering, with immaculate knotty belts; lip with a separate scoop. India. Chem. xi. t. 190. f. 1827 and 28.

dubius. 64. Longitudinally plaited; and transversely ribbed; spire a little prominent; aperture ovate; lip crenulated. Martini, iv. t. 150. f. 1396 and 1397.

clavatulus 65. Somewhat turreted and coronated, with decussated striæ and prickly nodules; whirls excavated at the sutures; outer lip with a notch at the summit, and the beak short and obtuse. Guinea. Chem. xi. t. 190. f. 1550 and 1551.

gibbosus. 66. With longitudinal plaits and transverse grooves, and an elevated belt at the sutures; outer lip with a notch at the summit, and the beak short and obtuse. Red sea. Chem. xi. t. 190. f. 1829 and 1830.

virginicus 67. With longitudinal grooves and transverse granulated striæ; whirls with a belt at the sutures; outer lip sinuated; beak short. Guinea. Chem. xi. t. 190. f. 1835 and 1836.

colus. 68. Tapering, striated, knotty; carinated, with a long straight beak; lip crenulated; beak 3 inches long. Indian ocean. Lister, t. 917. f. 10.

fenestratus. 69. Oblong, angulated, nodulous, with decussated striæ, and the interstices excavated; outer lip double and toothed; beak rather short and straight. Chem. x. t. 161. f. 1536.

tornatus. 70. Smooth, with the whirls concave above and convex below; outer lip with a notch at the summit, and the beak rather long.

morio. 71. Black, with a white band; beak dilated; pillar wrinkled; whirls knotty; 6 inches long. Africa. Lister, t. 988. f. 22.

cochlidium 72. Beak dilated; whirls of the spire flat above. Indian ocean. Chem. x. t. 164. f. 1569.

spirillus. 73. Beak long, spire mucronated; whirls convex above. Tranquebar. Martini, iii. t. 115. f. 1069.

canaliculatus. 74. Beak dilated; whirls of the spire separated by a small canal. Canada, Frozen sea. Lister, t. 878. f. 2.

carica. 75. With the body ventricose, and armed at the shoulder with large compressed nodules; aperture dilated; beak long. Lister, t. 880. f. 3. b.

ficus. 76. Beak dilated; whirls separated by a small canal; first crowned with knobs at the base. Red sea. Martini, iii. t. 66. f. 741.

clandestinus. 77. Subovate, with 6 rounded whirls, and transverse minute longitudinal striæ; aperture toothed; outer lip double, ending in a straight somewhat produced beak. Lister, t. 940. f. 36.

aruanus. 78. Ventricose, beak dilated; spire crowned with spines. New Guinea. Martini, iv. vig. 39. p. 143. f. D.

perversus. 79. Beak dilated and repand; spire recurved and slightly crowned. American ocean. Exceedingly rare. Lister, t. 907. f. 27.

antiquus. * 80. Beak dilated; shell oblong; 8 round whirls, first ventricose; 4 to 6 inches long. European seas, Scotland. Donovan, t. 31.

despectus. * 81. Oblong, striated, and somewhat rugged; beak dilated; whirls 8, with two elevated lines; 5 inches long. European seas, shores of Britain. Don. t. 180.

subantiquatus. * 82. Oblong, with 8 whirls, angulated, and strongly keeled transversely; aperture dilated; beak short. Britain. Don. t. 117.

fornicatus 83. Ovate-oblong; beak dilated; whirls ventricose; a little angular and longitudinally striated; 7 inches long. Greenland seas. Martini, iv. t. 138.

magellanicus. 84. Ventricose, umbilicated, transversely striated; whirls of the spire with parallel ribs; the first large. Straits of Magellan. Chem. x. t. 164. f. 1570.

lamellosus 85. Ventricose, turreted, with parallel membranaceous longitudinal ribs, and transverse striæ; beak short. Falkland Islands. Chem. xi. t. 90. f. 1823 and 1824.

tritonis. 86. Ventricose, oblong, smooth, with rounded whirls; aperture toothed; beak short; 16 inches long. India and the South seas.—This shell is used by the natives of of New Zealand as a musical instrument, and by the Africans and many nations of the East, as a military horn. Lister, t. 959. f. 12.

nerei. 87. Ventricose, with alternate varices, decussated striæ, and transverse nodulous ribs; inner lip with a transverse callosity, and the beak short. South sea. Lister, t. 960. f. 13.

fiscellum. 88. Ovate, longitudinally plaited, and transversely ribbed; outer lip double, and toothed; beak short. Coasts of Pulo Condore. Chem. x. t. 160. f. 1524.

virgatus. 89. Ovate, longitudinally plaited, nodulous, and transversely ribbed; aperture ovate, and the outer lip toothed within. E. Indies. Martini, iv. t. 123. f. 1441 and 1442.

amplustre 90. With dark blue, yellow, and white bands, and transverse, tuberculated keel, near the margins of the whirls; beak short and straight, and the pillar three plaited. Friendly Islands. Chem. xi. t. 191. f. 1841.

pusio. 91. Ventricose, oblong, smooth; spire striated with rounded whirls; aperture smooth; beak short; $1\frac{1}{2}$ inch long. Mediterranean and Africa. Rare. Lister, t. 914. f. 7.

tulipa. 92. Ventricose, oblong, smooth; whirls rounded with a double suture; pillar with two plaits; beak dilated, striated. South America. Lister, t. 910. f. 1.

clathratus 93. Oblong beak, and grooved with longitudinal membranaceous plaits. Iceland. Lister, t. 926. f. 19.

nassa. 94. Solid, black or pale brown, with a white subdiaphanous band; whirls knotty; pillar a little plaited. Lister, t. 828. f. 50.

scala. 95. Umbilicated, with distant, wedged, ribbed, and transversely striated whirls; aperture heart-shaped. E. Indies. Martini, iv. vig. 37. p. 1. f. a, b, c.

corona. 96. Fastigiated with brown and yellowish bands; beak straight, entire. Mexico. Chem. x. t. 161. f. 1526 and 1527.

dolarium. 97. Ovate, with a few elevated obtuse belts on the whirls; size of a walnut. Portugal. Martini, iii. t. 118. f. 1087 and 1088.

corneus. * 98. Oblong, slender, white; margins of the whirls complicated; aperture toothless; 3 inches long. British and North seas. Don. t. 38.

lignarius. 99. Oblong, coarse, with obtusely knotty whirls; aperture toothless; beak short. South of Europe. Bonanni, t. 3. f. 32.

trapezium 100. Oblong, obtusely angular, with slightly knotty whirls; aperture toothed; 6 inches long. Indian ocean. Lister, t. 931. f. 26.

pugilinus. 101. Solid, ventricose, smooth, with an oblong oval aperture; beak and crowned spire striated; 4 inches long. Indian ocean. Lister, t. 885. f. 6. b.

scolymus. 102. Thin, diaphanous, ventricose, and transversely striated; middle of the beak smooth; spire with obtuse, undulated knots; pillar 3 plaited. Martini, iv. t. 142. f. 1325.

harpa. 103. Ventricose, longitudinally ribbed; ribs transversely striated; spire a little prominent; whirls distant. Martini, iv. t. 142. f. 1328. and 1329.

tuba. 104. Fusiform, transversely striated; white, with a brown tip to the spire, which has 8 whirls distant, and crowned at the base with knots. China. Martini, iv. t. 143. f. 1333.

105. Oblong, with striated plaited whirls, covered with tuberculated ridges; aperture toothless; beak short. Mediterranean; rare. Bay of Naples. Chem. x. t. 162. f. 1542. and 1543. *syracusanus.*

106. Oblong, with rounded, plaited, and transversely reticulated whirls; aperture toothed, striated within. Mediterranean. Lister, t. 919. f. 13. *craticulatus.*

107. Nearly without a beak; fusiform, smooth, pale, with longitudinal brown striæ; lip toothed; very small. Mediterranean. *scriptus.*

108. Transversely striated, with distant undulately tuberculated whirls; aperture oblong; beak straight; 4 inches long; yellow. Ternate island. Lister, t. 892. f. 82. *ternatanus.*

109. Umbilicated, undulately knotty; striæ elevated, brown; perforation funnel-shaped; pillar two-plaited; 4 inches long. W. Indies. Lister, t. 921. f. 14. *infundibulum.*

110. Ventricose, undulated with tubercles; striated, grooved, and obtusely angled; black, with an oval aperture, and short beak; $3\frac{1}{2}$ inches long. Indian ocean. Martini, iv. t. 140. f. 1306. to 1309. *polygonus.*

111. Solid, ventricose, with waved angles; and finely striated transversely; spire mucronate; whirls knotty at the base; lip denticulated; $8\frac{1}{2}$ inches long; ponderous. India. Chem. xi. t. 192. f. 1851. and 2. *undatus.*

112. Narrowed; whirls of the spire transversely ribbed, and longitudinally crenated; aperture ovate; ribbed with white within, and toothed at the margin; pillar two-plaited. Amboyna. Martini, iv. t. 145. f. 1347. *lancea.*

113. Subcylindrical; spire obtuse; whirls round and striated; lower ones mostly glabrous. India. Martini, iv. t. 146. f. 1348. *versicolor.*

114. Umbilicated and surrounded with belts; middle ones more raised; whirls crowned with tubercles, which are spotted with brown. Red sea. Martini, iv. t. 146. f. 1349. and 1350. *verrucosus.*

115. Thin, transversely striated; spire mucronate; whirls round; lip crenulated; 4 inches long. Martini, iv. t. 146. f. 1351. and 1352. *striatulus.*

116. Rounded, white, with violet spots, longitudinally ribbed, and transversely striated; spire obtuse. Martini, iv. t. 149. f. 1384. *pardalis.*

117. Oblong, ventricose; whirls with a striated margin; aperture glabrous; beak short, and bent outwards. Born. t. 11. f. 10. and 11. *vulpinus.*

118. Whirls of the spire with decussated ribs, the first large, three outermost smooth; lip toothed outwardly; very small. Sandy shores of India. Spengler, t. 2. f. 8. *arenosus.*

119. Narrow, transversely striated; spire mucronated; whirls distant, contrary, round, and longitudinally ribbed; beak prominent; $1\frac{1}{2}$ inch long. Shores of Morocco. Chem. ix. p. i. t. 105. f. 896. *maroccensis.*

120. Oblong, whitish, with transverse, reddish striæ; beak short, straight. New Zealand. Chem. x. t. 164. f. 1572. *lineatus.*

121. A little tapering; whirls carinated above, margined and flattened; beak long and straight. Southern ocean. Chem. x. t. 164. f. 1573. *perron.*

122. Ovate, angular, iridescent; longitudinally grooved and plaited; beak short; lip denticulated. India, and South seas. Chem. x. t. 169. f. 1635. *prismaticus.*

128. Ribs

columbarium. 123. Ribs longitudinally plaited, and transversely grooved; angular, spinous, carinated; alternately varied with white and brown; whirls suddenly diminishing; beak short, straight. Pulo Condore. Chem. x. t. 169. f. 1637. and 1638.

bamffius. * 124. Ventricose, white with acute longitudinal ribs; beak rather short and slightly ascending. Frith of Forth. Donovan, t. 169. f. 1.

gracilis. * 125. Turreted, with longitudinal ribs interrupted by a flat space at the sutures, and transversely striated; beak rather long and slightly ascending. Britain. Montagu, t. 15. f. 5.

attenuatus * 126. Fusiform, with the whirls subcontinuous, and nine equidistant strong ribs; beak rather long and straightish. West of England. Montagu, t. 9. f. 6.

nebula. * 127. Turreted, with longitudinal ribs, and minutely reticulated; beak short and slightly bent. West of England. Montagu, t. 15. f. 6.

costatus. * 128. Oblong, with 8 longitudinal elevated ribs; beak very short and obsolete. Britain and Norway. Don. t. 91.

proximus. * 129. Oblong, with about 11 longitudinal elevated ribs; beak short, and rather spreading at the end. Scotland. Montagu, t. 30. f. 8.

septangularis. * 130. Oblong, with 7 longitudinal continuous ribs, scarcely interrupted by the sutures; beak short. West of England. Montagu, t. 9. f. 5.

turricula. * 131. Turreted, with longitudinal plaits and transverse striæ; whirls subcylindrical, and flattened at their upper extremities; beak short and broad. Britain. Montagu, t. 9. f. 1.

rufus. * 132. Turreted, with longitudinal plaits and transverse striæ, and the whirls convex. England and S. Wales.

sinuosus. * 133. Turreted, with 7 longitudinal ribs, and minute transverse striæ; beak very short; upper angle of the outer lip channelled. Weymouth. Montagu, t. 9. f. 8.

linearis. * 134. With about 9 longitudinal ribs, dotted by elevated striæ; and the whirls convex; outer lip crenated; beak slightly produced. West of England. Montagu, t. 9. f. 4.

purpureus * 135. Oblong, acuminated, with convex cancellated whirls; pillar striated and somewhat tuberculated; outer lip crenated. Devonshire, Montagu, t. 9. f. 3.

muricatus * 136. Oblong and very rough; whirls ventricose, with longitudinal ribs, and transverse elevated striæ, forming tubercles at their intersections; beak long and narrow. Devonshire. Montagu, t. 9. f. 2.

minutissimus. * 137. Minute, with 5 spirally striated whirls and remote ribs; beak closed. Pembrokeshire.

****** *Tapering, subulate, with a very short beak.*

obeliscus. 138. Ventricose, with four granulated ribs, of which the uppermost is tuberculated; pillar with one tooth, and the beak ascending. W. Indies. Lister, t. 1018. f. 80.

vertagus. 139. Whirls of the spire plaited above; pillar plaited within; beak ascending; three inches long. India. Lister, t. 1021. f. 85. b.

aluco. 140. Whirls of the spire tuberculated, with a spinous streak in the middle; pillar with a single plait; beak ascending; four inches long. Southern ocean, Red sea, Atlantic. Lister, t. 1017. f. 19.

plicatulus 141. Ventricose; spire transversely striated; whirls longitudinally plaited and knotty; aperture oval. E. Indies. Martini, iv. t. 157. f. 1488.

142. Transversely striated, with large pointed nodules on the lower part of the whirls; outer lip strongly grooved, and the beak slightly recurved. Amboyna. Lister, t. 1025. f. 87. *tuberosus*

143. Ventricose, with transverse striæ, and a row of conical tubercles on each whirl; outer lip crenulated. River Gambia. Gualteri, t. 57. f. B. *adansoni.*

144. Turreted, transversely striated, with the four lower whirls armed in the middle with hooked spines, and the 5th and 6th ribbed, and the others glabrous. Schroeter, t. 8. f. 15. *uncinatus.*

145. Turreted, with transverse striæ, and two tuberculated belts on each whirl; outer lip striated within, and the beak nearly straight. Born, t. 11. f. 17 and 18. *atratus.*

146. Transversely striated, with spinous plaits below the middle of the whirls, and crenulated above; beak slightly recurved. Mediterranean. Lister, t. 1019. f. 82. *alucoides.*

147. Turreted, angulated, and transversely striated; whirls nodulous in the middle; outer lip sinuous. Friendly islands. Chem. x. t. 162. f. 1548 and 1549. *ebeninus.*

148. Whirls crenulated; the upper striæ denticulated. Mediterranean. Lister, t. 121. f. 17. *fuscatus.*

149. Whirls of the spire with a slightly knotty zone above; beak short. East Indies. Lister, t. 121. f. 16. *torulosus.*

150. Whirls of the spire tuberculated, with a double row of punctured striæ. Africa. Lister, t. 122. f. 26. *radula.*

151. Turreted, with two granulated ribs below, and a large compressed tuberculated belt at the upper extremity of the whirls; pillar with one plait. East Indies. Linn. Tr. viii. t. 4. f. 6. *marginatus.*

152. Turreted, with longitudinal striæ, and two transverse serrated ribs, of which the upper is largest; serratures spinous, and compressed. Friendly islands. It is also found fossil. Martyn's Univ. Conch. ii. t. 58. *serratus.*

153. Whirls of the spire grooved, transversely striated and muricated. Guinea. Lister, t. 120. f. 84. *asper.*

154. Rough, with decussated tubercles; beak acute, ascending; 2 inches long; white. India. Martini, iv. t. 157. f. 1492. *granulatus.*

155. Ovate, turreted, with longitudinal plaits and transverse ribs; beak straight, very short and tubular. Molucco islands. Lister, t. 121. f. 85. *sulcatus.*

156. Turreted, ventricose, with numerous dotted muricated striæ on each whirl; upper striæ tuberculated. Guadaloupe. Born, t. 11. f. 14. *litteratus.*

* 157. Turreted, with longitudinal ribs, and four transverse grooves on each whirl, forming uniform tubercles all over. Britain. Da Costa's Brit. Conch. t. 8. f. 13. *reticulatus.*

* 158. Transversely striated, and surrounded with glabrous knots; lip thickened. Britain. Linn. Tran. viii. p. 150. *tubercularis.*

* 159. Turreted, with the whirls reversed, and on each 3 transverse rows of tubercles, of which the middle one is smallest. Britain. Walker, f. 48. *adversus.*

* 160. Turreted, with two rows of tubercles, divided by a depressed line in each whirl. Sound of Mull, Scotland. Montagu, t. 30. f. 6. *subulatus.*

viridis. 32. Green; first whirl with 5 rows of knots, second with 4, the rest glabrous. New Zealand. Chem. v. t. 170. f. 1643 and 1644.

agrestis. 33. Black-brown; obtusely pyramidal; smooth; pillar with one obsolete tooth. China. Chem. v. t. 170. f. 1645. and 1646.

niger. 34. Deep black; whirls flattish; spire transversely striated; pillar 1-toothed. China. Chem. v. t. 170. f. 1647.

famulum. 35. Whirls of the spire ochraceous, with spotted tubercles; and with an intermediate, spotted, wrinkled groove. Fernambuca. Chem. v. t. 170. f. 1648 and 1649.

strigosus. 36. Ochraceous, varied with black at the tip; pyramidal and transversely striated; whirls of the spire flattish; margin tumid and spotted with red; very small. Shores of Morocco. Chem. v. t. 170. f. 1650 and 1651.

dubius. 37. Pyramidal, with chesnut spots and clouds; margin of the whirls vaulted and nodulous; ½ to 2 inches long. Chem. v. t. 170. f. 1652 and 1653.

variegatus. 38. Depressed, varied with white and chesnut; base convex, with a scarlet ring marked with deeper spots. Cape. Chem. t. 171. f. 1661 and 1662.

declivis. 39. Depressed, white spotted with red; whirls transversely striated and plaited, distant; pillar 1-toothed; ½ inch long. Red sea. Chem. v. t. 171. f. 1663 and 1664.

depressus. 40. Whitish, radiated with red, and red at the tip; depressed; whirls surrounded with a belt of moniliform dots. Chem. v. t. 171. f. 1668 and 1669.

lævis. 41. Pale brown; base subconvex; whirls smooth, obsoletely striated transversely; perforation white, funnel-shaped. Chem. v. t. 171. f. 1670.

groenlandicus. 42. Pellucid, flesh-colour; base convex; whirls 6; convex and finely striated transversely. Greenland. Chem. v. t. 171. f. 1671.

muricatus 43. Ovate-subumbilicated, and armed with pointed tubercles. Mediterranean. Gualteri, t. 64. f. H.

roseus. 44. Convex, rosy, grooved; perforation very minute; shell small. Cape of Good Hope. Chem. v. t. 171. f. 1675.

petholatus * 45. Depressed, brown, with whitish spots; very minute. England and Scotland. Montagu, t. 10. f. 4.

viridulus. 46. Greenish, obliquely radiated with white; whirls convex, with a belt of moniliform granulations; pillar toothed. Chem. v. t. 171. f. 1677.

urbanus. 47. Convex, with numerous rows of granulations; perforation denticulated; aperture crenulated. Chem. v. t. 171. f. 1679.

guineensis 48. Clouded with brown and gray; rows of granulations numerous, with knots; aperture crenated; perforation toothed; 6 lines long. Guinea. Chem. v. t. 171. f. 1680.

carneus. 49. Depressed, pale flesh-colour, with crowded moniliform belts of granulations; perforation large; 1-toothed. Chem. v. t. 171. f. 1682.

tesselatus. 50. Transversely striated; whirls distant; numerous square spots on the spire. European seas.

quadratus 51. Subovate, tesselated and transversely striated; whirls shelving at the upper margin, and more perpendicular below. Mediterranean. Chem. v. t. 171. f. 1683.

croceus. 52. Convex, chesnut; whirls of the spire convex, the outer one saffron-coloured. Africa. Chem. v. t. 171. f. 1684.

53. Depressed, convex, with oblique violet rays; whirls convex. Mediterranean. Pennant, iv. t. 80. f. 106. *obliquatus*

54. Convex, chesnut; whirls with a fillet, varied with red and white at the upper margin. Chem. v. t. 171. f. 1687. *vittatus.*

55. Conic-convex; whirls unarmed; aperture semi-heart-shaped; perforation spiral; scarcely 1 inch high. India. Chem. v. t. 172. f. 1697 and 8. *indicus.*

56. Depressed, chesnut; whirls transversely striated and crenated, with rows of granulations; perforation pervious, crenulated. Chem. v. t. 173. f. 1702. and 3. *infundibuliformis.*

57. Straw colour; whirls convex, with decussated striæ separated by a groove; perforation pervious. Tranquebar. Lister, t. 635. f. 23. *stramineus.*

58. Convex, transversely striated; white, with square reddish spots; perforation crenulated, whirls of the spire separated by a white streak. Chem. v. t. 173. f. 1710 and 11. *areola.*

59. Greenish yellow, with longitudinal plaited ribs terminated by a spine; aperture compressed; perforation wrinkled. W. Indies. Chem. v. t. 173. f. 1712 and 13. *inermis.*

60. Conic, olive, covered with rows of raised violet scales; whirls inflated, with a spinous radiate margin; spire with 7 whirls; large. South seas. Chem. v. t. 173. f. 1714. *imperialis*

61. Depressed, straw colour, with darker ribs; whirls of the spire plaited; perforation pervious. Chem. v. t. 174. f. 1721 and 2. *planus.*

62. Conic; white, with oblique brown bands; whirls channelled near the suture. Born, t. 11. f. 19 and 20. *albidus.*

63. Conic; base greenish gray, spotted with brown; whirls round, flattish at the suture. Born, t. 12. f. 1. and 2. *fuscatus.*

64. Conic, red, dotted with white; slightly perforated; whirls round, the first with 15, the next with 6 rows of tubercles; 6 whirls in the spire; 4 lines long. Senegal. Chem. v. t. 165. f. 1571. *corallinus.*

65. Very thin, and of a wax colour; first whirl large, with a brown band in the middle. Schroeter, t. 3. f. 16. *fragilis.*

66. Obtusely pyramidal; 4 elevated contiguous whirls, tumid at the margin, in the spire. Saxe-Weimar. Chem. ix. part 2. t. 122. f. 1501. *carinatus.*

67. Pyramidal, with flattish whirls, separated by a very depressed suture, and the umbilicus cylindrical; base concave. Mediterranean. Lister, t. 633. f. 21. *cinereus.*

68. Conical, smooth, with the whirls rounded, and flattened at their upper margins; umbilicus deep, and the outer lip crenulated. Born, t. 12. f. 2. *fasciatus.*

69. Depressed, transversely striated, and slightly granulated; umbilicus pervious and crenated; aperture roundish. Chem. v. t. 173. f. 1708 and 9. *perspectiviunculus.*

70. Convex, with two teeth on the pillar, and the umbilicus crenulated. Mediterranean. Chem. v. t. 173. f. 1702 to 1705. *hybridus.*

71. Conical, subumbilicated, coarse, obtusely plaited; pellucid, and the whirls imbricated; base con- *conchyliophorus.*

cave; pillar lip sickle-shaped. St Domingo. Born, t. 12. f. 21.

perlatus. 72. Depressed, with transverse equally granulated striæ; base convex; aperture roundish; inner lip toothed.

pumilio. 73. Conical, with the whirls marginated at their bases, and the marginal ribs muricated; base scabrous and slightly convex. Africa. Chem. xi. t. 196. f. 1888.

terrestris. * 74. Conical, longitudinally striated; whirls marginated at their bases; base flat and striated from the centre. Cumberland and Italy. A land shell. Lister, t. 61. f. 58.

bidens. 75. Subconical, somewhat keeled, with 8 finely striated whirls; base convex; aperture narrow; outer lip with 2 teeth, and reflected. Strasburgh. Chem. ix. part 2. t. 122. f. 1052.

fulmineus. 76. Subpyramidal, smooth, with the whirls separated by a deep suture; aperture roundish. River Huines. D'Argenville, t. 27. f. 4.

afer. 77. Convex, gray, with whitish spots; whirls flattish; 6 lines long. Senegal. Adanson, t. 12. f. 6.

neritoideus. 78. Subovate, convex, depressed; smooth, reddish, glabrous; 2 lines long. Greenland. Olaffsen, N° 1015.

** *Imperforated, and erect.*

vestiarius. 79. Conic, convex, with a gibbous callous base; aperture somewhat heart-shaped; very small. Mediterranean and Asia. Lister, t. 560. f. 45.

labio. 80. Ovate, substriated; pillar 1-toothed. Asia, Africa, New Zealand. Lister, t. 584. f. 42.

quadricarinatus. 81. Ovate, with transverse nodulous ribs, and 4 muricated transverse keels; aperture silvery, with the outer lip double and grooved; pillar toothed. Mediterranean. Chem. xi. t. 196. f. 1892 and 3.

turbinatus 82. Ovate, smooth, and the whirls convex; outer lip somewhat double; pillar obsoletely toothed. Mediterranean. Lister, t. 642. f. 33. and 4.

crassus. * 83. Subovate, thick, coarse, with one tooth on the pillar, and the base by the inner lip white and flattened. Britain. Don. t. 71.

tuber. 84. Depressed; whirls somewhat keeled, and knotted at the upper and lower margin; 2 inches diameter. Mediterranean and South America. Lister, t. 646. f. 38.

striatus. * 85. Conic; aperture obovate; last whirl angular; minute. Mediterranean, Falmouth. Don. t. 155. f. 1.

conulus. * 86. Conic, smooth; whirls separated by a prominent line. European seas; Britain. Chem. v. t. 166. f. 1588 and 9.

zizyphinus. * 87. Conic, livid, smooth, transversely striated; whirls margined. European and African coasts, shores of Britain. Don. t. 52.

papillosus. * 88. Conical, thin, whirls rather convex, with transverse granulated striæ; base slightly convex. Britain. Don. t. 127.

virgineus. 89. Subconical, slightly ventricose, with transverse rows of granules, and red dots, and a band round the base of the whirls; base convex. New Zealand. Chem. x. t. 165. f. 1581 and 2.

obeliscus. 90. Conic; surrounded with numerous rows of white or green moniliform granulations; pillar 1-toothed; 2 inches high. India. Chem. v. t. 160. f. 1510 to 12.

91. Pyramidal, with rosy and white stripes, and numerous rows of knots; base with concentric white and red circles. India. Lister, t. 631. f. 17. *virgatus.*

92. Cinereous, variegated with greenish, whitish, and reddish; whirls of the spire tuberculated at the lower margin. Red sea. Chem. t. 161. f. 1516 and 17. *foveolatus.*

93. Thin, pellucid, with alternate chesnut and white moniliform belts of granulations; 1½ inch high. New Zealand. Chem. v. t. 161. f. 1520 and 21. *diaphanus*

94. Subconical, with granulated transverse striæ; body broad and marginated at the base, which is convex; spire acuminated. New Zealand. Chem. xi. t. 196. f. 1896. *selectus.*

95. Covered with a smooth coat, under which it is bluish and reddish, shining and iridescent. Southern ocean. Chem. v. t. 161. f. 1522 and 23. *iris.*

96. Striæ decussated; grooved within; tip deep red. South sea. Schroeter, v. f. 10 and 11. *notatus.*

97. Pyramidal, striated, brownish purple. South sea. Born, vii. t. 2. f. D 1. and D 2. *elegans.*

98. Obtusely pyramidal; spotted with greenish. South sea. Chem. v. t. 161. f. 1526. *melanostomus.*

99. Pyramidal; striated with white and red. Morocco. Lister, t. 621. f. 8. *erythroleucus.*

100. Red, punctulated; very minute. Morocco. Chem. v. t. 162. f. 1530. *punctulatus.*

101. Pyramidal, obliquely grooved, plaited and ribbed; whirls a little prominent at the margin. South American seas. Lister, t. 628. f. 14. *imbricatus.*

102. Ochraceous; longitudinally grooved; whirls transversely striated; lip denticulated. South America and W. Indies. Chem. v. t. 162. f. 1534 and 1535. *americanus.*

103. Sea-green, with protuberances and oblique scaly plaits; whirls of the spire transversely striated and grooved in the middle; concave spines on the lower margin of the first whirl. Isle of France. Lister, t. 647. f. 40. *cœlatus.*

104. Conical, with oblique plaits on the upper part, a transverse row of tubercles below, and the margins of the whirls spinous. New Zealand. Chem. x. vig. 23. f. A. B. *gibberosus.*

* 105. Subconical, transversely striated, and the body whirl transversely flattened in the middle; aperture roundish. Barbadoes and Britain. Lister, t. 583. f. 38. *zic-zac.*

106. Slightly conical, with the spire flattened, and the whirls marginated; base convex; aperture roundish. Chem. xi. t. 196. f. 1894 and 1895. *obtusus.*

107. Purple, with plaited tuberculated whirls. Chem. v. t. 162. f. 1538 and 1539. *purpurascens.*

108. Sea-green, with numerous rows of tubercles and oblique undulated plaits; 4 inches long, as broad, and covered with a horny lid. Cook's bay. Chem. v. t. 163. f. 1540. *cookii.*

109. Pyramidal; white, varied with reddish and green; whirls spinous; pillar emarginated, plaited. Bourbon and Mauritius islands. Lister, t. 625. f. 11. *mauritianus.*

110. Pyramidal; white; whirls of the spire longitudinally ribbed, with transverse moniliform belts of green granulations; 1½ inch wide. Indian and South seas. Chem. v. t. 163. f. 1549 and 1550. *fenestratus.*

111. Ovate,

argyrostomus. 111. Ovate, with undulated ribs and transverse striæ; whirls ventricose; 2 inches broad and high. South sea. Chem. v. t. 165. f. 1562 and 1563.

sinensis. 112. Obtusely pyramidal; black, with a purple band at the base; pillar white. China. Chem. v. t. 165. f. 1564.

asper. 113. Obtuse; whirls round, with many rows of tubercles, grooved and transversely striated; pillar toothed. New Zealand. Chem. v. t. 166. f. 1582.

tesselatus. 114. Conic, convex, transversely striated, with oblong square spots disposed in rows; pillar lip spotted with black. Mediterranean, Africa. Chem. v. t. 166. f. 1583.

granatum. 115. Pyramidal, white, variegated with scarlet; 2 first whirls very large; 2 inches high. South seas. Chem. x. t. 170. f. 1654.

crocatus. 116. Smooth, conic, white with a saffron tip. Born, t. 12. f. 11 and 12.

hortensis. 117. Subconical, with the whirls rounded, and the summit obtuse; base slightly convex. Inhabits gardens in southern climates. Chem. ix. p. 2. t. 122. f. 1055 and 1056.

grandinatus. 118. Rough, with concatenated globules; base convex, with concentric, granulated striæ; lip double-toothed. Palmerston island. Chem. x. t. 169. f. 1639.

*** *Tapering, with an exserted pillar, and falling on the side when placed upon the base.*

telescopium. 119. Imperforated, striated; pillars spiral; 4 inches long. Indian ocean. Lister, t. 624. f. 10.

dolabratus 120. Umbilicated, glabrous; pillar with recurved twisted plaits. South America. Lister, t. 844. f. 726.

terebellus. 121. Subconical, turreted and glabrous; pillar lip with 3 plaits, and the inside of the outer lip smooth. Barbadoes. Lister, t. 844. f. 72.

perversus. 122. Glabrous, imperforated; whirls reversed; small. Mediterranean. Ency. Meth. p. 496.

pusillus. 123. Flat at the base; finely striated transversely; whirls reversed; $\frac{1}{4}$ inch long. Indian seas. Chem. ix. part 1. t. 113. f. 966.

undulatus. 124. Flat at the base; longitudinally ribbed; whirls reversed. Indian shores. Chem. ix. part 1. t. 113. f. 967.

ventricosus. 125. Cancellated, glabrous at the base; whirls reversed; upper ones ventricose; very small. Indian sands. Chem. ix. part i. t. 113. f. 968.

annulatus. 126. Aperture nearly square; whirls reversed, and ribbed on each side; small. Indian sands. Chem. p. i. t. 113. f. 969.

punctatus. 127. Whirls with a triple row of prominent dots; imperforated; size of a barleycorn. Southern Europe, Africa.

striatulus. 128. Imperforated; longitudinally and obliquely striated; small. Mediterranean. Lister, t. 1018. f. 81.

lunaris. 129. Whirls 3, reversed; convex, smooth, umbilicated. Chem. ix. t. 113. f. 971.

56 Turbo.

Gen. 28. Turbo, *the Wreath.*

Gen. Char.—The animal a limax: the shell univalve, spiral, solid; aperture contracted, orbicular, entire.

Species.

* *Pillar margin of the aperture dilated and imperforated.*

1. Roundish, smooth, very obtuse; above ventricose. North seas. Chem. v. t. 185. f. 1854. a. to f. *obtusatus.*

2. Ovate, glabrous, obtuse; minute. Mediterranean, America. Gualteri, t. 45. f. F. *neritoides.*

* 3. *Periwinkle;* subovate, acute, striated; $1\frac{1}{2}$ inch high; finely striated transversely. Shores of Europe; Britain. Don. t. 33. f. 1. and 2. The animal of this species is frequently eaten. *littoreus.*

* 4. Subconical, rather obtuse, with the body whirl ventricose. Britain. Montagu, t. 20. f. 4. *tenebrosus*

* 5. Subovate, rather obtuse; whirls ventricose. Norway and Britain. Don. t. 33. f. 3. *pudis.*

6. Umbilicated, subovate, acute; surrounded with striæ of raised dots; pillar margin a little obtuse; an inch high. Europe, America. Lister, t. 30. f. 28. *muricatus.*

7. Transversely grooved; first whirl black, finely striated; the rest silvery; lips bordered with brown. New Zealand. Chem. v. t. 182. f. 1820 and 21. *æthiops.*

8. Ovate, thick, with 6 depressed whirls, of which the 2 lower are very large, and the spire mucronated; inside brown. Goree. Favanne, ii. t. 71. f. A 1. and A 2. *punctatus.*

9. Subovate, rather ventricose, transversely ribbed, and the margin of the pillar flattish. South Wales. Montagu, t. 20. f. 2. *jugosus.*

* 10. Conical, coarse, with 5 rounded obsoletely striated whirls, depressed at the suture, and the body whirl slightly keeled. *crassior.*

* 11. Conical, acute, and the aperture pear-shaped. Dorset and Devonshire. Dorset. Cat. t. 18. f. 13. *petræus.*

* 12. Subconical, minute, smooth, with 3 whirls, of which the body one is large, and the apex small and obtuse. Pembrokeshire. *fulgidus.*

13. Brownish, reticulated; whirls surrounded with belts; throat golden. Nicobar islands. Chem. v. t. 182. f. 1822 and 23. *nicobaricus.*

14. Smooth, deep black; whirls distant, with a hollowed margin. Southern ocean. Chem. v. t. 185. f. 1846. *nigerrimus.*

** *Imperforate and solid.*

* 15. Oblong-ovate; striæ decussated and raised with dots; very minute. Shores of Europe, Britain. Don. t. 2. f. 1. *cimex.*

* 16. Subconical, with crowded, cancellated striæ, forming punctures by their interstices; with 6 whirls. Britain. Montagu, t. 30. f. 5. *calathiscus.*

* 17. Ovate, smooth; variegated with red and white; minute, transparent, glossy. European seas, shores of Britain. Don. t. 2. f. 2 to 6. *pullus.*

18. Convex, smooth; aperture somewhat angular. India. Rumphius, t. 19. f. N° 1. *personatus*

19. Ovate, smooth, glossy; whirls somewhat angular on the upper part. India, South America. Lister, t. 584. f. 39. *petholatus.*

20. Ovate, striated, with one stria thicker on the back. India. Lister, t. 584. f. 40. *cochlus.*

21. Conical-ovate, with two rows of white granules on the body whirl, and one on each whirl of the spire. Southern ocean. Chem. v. t. 163. f. 1545 and 6. *trochiformis.*

22. Subimperforate, with broad radiated spines, of which there are 12 on the base of the body whirl. South sea. Chem. v. t. 164. f. 1552 and 3. *stellaris.*

23. Subimperforate, with lacinated spines, of which there *aculeatus.*

there are 9 very large, and compressed on the body. Nicobar islands. Chem. v. t. 164. f. 1556 and 7.

stellatus. 24. Subpyramidal, yellowish, with the base flattened, and the lower margins of the whirls spinous. Chem. v. t. 164. f. 1558 and 9.

armatus. 25. Subimperforate, scabrous, with the summit of the spire depressed, and a spinous rib round the middle of the lower whirl; base with concentrical somewhat granulated striæ. Bay of Naples. Lister, t. 608. f. 46. a.

chrysostomus. 26. Subovate, wrinkled; whirls surrounded with 2 rows of vaulted spines; yellowish, radiated with brown. India. Chem. v. t. 181. f. 1797.

tectum-persicum. 27. Ovate; spines obtuse, depressed; beneath papillous. India. Chem. v. t. 163. f. 1543 and 4.

pagodus. 28. Conic; spines obtuse, concatenated; striæ papillous beneath; 3 inches high. India. Lister, t. 644. f. 36.

calcar. 29. Nearly imperforated, depressed; whirls rough; with compressed hollow spines above. India. Chem. v. t. 164. f. 1552.

rugosus. 30. Subovate, striated; whirls rugged above. Mediterranean, New Zealand. Lister, t. 647. f. 41.

marmoratus. 31. Subovate, smooth; 3 rows of protuberances in the whirls; beak dilated behind. South America. Lister, t. 587. f. 46.

sarmaticus 32. Convex, obtuse; whirls knotty above, and separated by a canal. Asiatic and African seas. Chem. v. t. 179. f. 1777.

olearius. 33. Ponderous, convex, obtuse, smooth, angular. India. Chem. v. t. 178. f. 1771 and 1772.

cornutus. 34. Whirls and spire round, with decussated striæ; the first with 3 rows of imbricated spines; a large shell. China. Chem. v. t. 179. f. 1779 and 1780.

radiatus. 35. Rugged; whirls round, distant, transversely striated, and armed with small imbricated spines. Red sea. Chem. v. t. 180. f. 1788 and 1789.

imperialis. 36. Glabrous, glossy green; within snowy; aperture silvery; pillar lip callous above; whirls of the spire very convex. China. Chem. v. t. 180. f. 1790.

coronatus. 37. Wrinkled; white, with greenish clouds; tip orange; whirls crowned with spines and knots; pillar produced into a beak. Seas of Malacca. Very rare. Chem. t. 180. f. 1793.

canaliculatus. 38. Grooved and transversely striated; whirls 6; very convex. India. Chem. v. t. 181. f. 1794.

setosus. 39. Whirls of the spire cylindrical; grooved and transversely striated. India. Chem. v. t. 181. f. 1795 and 1796.

sparverius 40. Oblong, with broad, smooth striæ; yellowish spotted with brown. India. Chem. v. t. 181. f. 1798.

moltkianus. 41. Silvery grey, with transverse orange and yellow bands; whirls of moniliform belts of granulations. Chem. v. t. 181. f. 1799 and 1800.

spenglerianus. 42. Variegated white and yellowish; whirls round, transversely striated, and separated by a canal. Indian ocean. Very rare. Chem. v. t. 181. f. 1801 and 1802.

castaneus. 43. Transversely striated; chesnut brown, spotted with white; whirls 5, surrounded with rows of knots. South America. Don. v. t. 173.

crenulatus 44. Silvery grey, surrounded with many rows of knots; aperture milk-white within. Chem. v. t. 181. f. 1811 and 1812.

semicostatus. 45. Conical, minute, with 4 or 5 rounded whirls; body minutely striated transversely, and the upper part longitudinally ribbed.

smaragdus. 46. Ponderous, slightly depressed; smoothish and obliquely wrinkled; 4 whirls in the spire; first round and larger; 2 inches broad and high. New Zealand. Chem. v. t. 182. f. 1815 and 1816.

papyraceus. 47. Pellucid, thin and finely annulated; first whirl large, the next with a band varied with red and white. E. Indian seas. Chem. v. t. 182. f. 1817 and 1818.

æthiops. 48. Transversely grooved; first whirl black, finely striated; the rest silvery; lips bordered with brown. New Zealand. Chem. v. t. 182. f. 1820.

nicobaricus. 49. Brownish, reticulated; whirls surrounded with belts; throat golden. Nicobar islands. Chem. v. t. 182. f. 1822 and 1823.

cidaris. 50. Smooth, with compressed roundish whirls; the first round and very large; aperture compressed, silvery; pillar a little prominent. India, China. Chem. v. t. 184. f. 1840 and 1841.

helicinus. 51. Smooth, nearly subimperforated; roundish, with contiguous convex whirls; pillar thickened. Born, t. 12. f. 23 and 24.

vitreus. * 52. Minute, subcylindrical, with 4 rounded whirls; aperture suboval, and a little contracted at the upper end. Cornwall. Montagu, t. 12. f. 3.

punctura. * 53. Conical, minute, glossy, with 6 rounded and finely reticulated whirls. West of England. Montagu, t. 12. f. 5.

arenarius. * 54. Conical, minute, with 5 rounded whirls, and decussated striæ. Salcomb bay, Devon. Montagu, t. 12. f. 4.

unifasciatus. * 55. Conical, minute, smooth, with 5 flattish transversely fasciated whirls; outer lip expanded. Britain. Montagu, t. 20. f. 6.

nivosus. * 56. Minute, subturreted, obtuse, smooth, with 5 or 6 rounded whirls, and the pillar quite smooth and even. Devonshire.

labiosus. * 57. Subconical, small, with about 7 flattish whirls, and slightly ribbed longitudinally; aperture expanded, and the outer lip somewhat reflected. Britain and Ireland. Montagu, t. 13. f. 7.

ulvæ. * 58. Conical, small, acuminated, with about 6 smooth flattish whirls, and the aperture subovate. Britain. Dorset. Cat. t. 18. f. 12.

ventrosus. * 59. Conical, minute, with 6 glossy ventricose whirls; aperture subovate. Britain. Montagu, t. 12. f. 13.

subumbilicatus. * 60. Conical, minute, subumbilicated, with four or five tumid whirls; aperture completely ovate. Weymouth. Dorset Cat. t. 18. f. 12. b.

cingillus. * 61. Conical, minute, with 6 flattish slightly striated contiguous whirls, and alternate bands of chesnut brown and horn colour. Britain. Montagu, t. 12. f. 7.

interruptus. * 62. Conical, minute, acuminated, with 5 flattish whirls, and interrupted longitudinal yellowish brown streaks. Montagu, t. 20. f. 8.

semistriatus. * 63. Conical, minute, with 5 or 6 slightly rounded whirls, which are transversely striated at both ends, and plain in the middle. Devonshire.

albulus. * 64. Opaque; whirls 5, longitudinally ribbed; aperture roundish; not margined. Pembrokeshire coast.

ruber. * 65. Opaque, smooth, with 5 whirls. Cornwall. Adams in Linn. Tr. iii. t. 13. f. 21. and 22.

pellucidus. * 66. Pellucid, white, with 5 reticulated whirls. Pembrokeshire coast. Montagu, t. 12. f. 4.

*** *Solid*

*** *Solid and perforated.*

pica. 67. Conic, rounded, smooth; a small tooth near the umbilicus; $3\frac{1}{7}$ inches broad. In most seas. Lister, t. 640. f. 30.

nodulosus. 68. Conical, rounded, with the whirls nodulous, and striated; umbilicus toothed. W. Indies. Chem. v. t. 178. f. 1769 and 70.

auricularis. 69. Conical, small, rather smooth; whirls much rounded; aperture oval-ear-shaped.

vinctus. 70. Minute, conical, and smooth, with 6 rounded whirls; summit rather obtuse; aperture suborbicular. Devonshire. Montagu, t. 20. f. 3.

quadrifasciatus. 71. Subconical, minute, and smooth; body-whirl somewhat keeled at the base; pillar lip broad, with a small groove ending in an umbilicus. Cornwall and Devon. Montagu, t. 20. f. 7.

sanguineus. 72. Umbilicated, conic, convex, striated and smooth; whirls slightly grooved; size of a pea. Africa, and Bay of Naples. Chem. v. t. 177. f. 1756. and 1767.

undulatus. 73. Ovate, convex, with longitudinal undulated streaks; spire obtuse; mouth silvery. New Zealand. Martyn, ii. t. 29.

argyrostomus. 74. Subovate, with transversely striated lines on the back. India. Chem. v. t. 177. f. 1760. and 1761.

margaritaceus. 75. Subovate, with smooth, elevated, dorsal lines. Indian ocean. Chem. v. t. 177. f. 1762.

delphinus. 76. Umbilicus rough; whirls, with branched spines. India. Chem. v. t. 175. f. 1727. to 1735.

exasperatus. 77. Depressed, knotty; an unequally tuberculated ridge on the back of the first whirl. Chem. vi. t. 174. f. 1723. and 1724.

mespilus. 78. Whirls convex, and separated by a band, tesselated with brown and white; colour of a medlar. South sea. Chem. v. t. 176. f. 1740. and 1741.

granulatus 79. Surrounded with knotty rings; dirty green, with a reddish tip. Indian and South seas. Chem. v. t. 176. f. 1744. to 1746.

torquatus. 80. With a keel and row of nodules, transversely ribbed, and strongly wrinkled obliquely; pillar lip broad and white; with a large umbilicus.

atratus. 81. Black, with double, alternate, black, and cinereous moniliform belts of granulations; pillar 1-toothed; size of a nut. Nicobar islands. Chem. v. t. 177. f. 1754. and 1755.

dentatus. 82. Depressed, orbicular; white, varied with brown; lower margin of the pillar denticulated. Chem. v. t. 178. f. 1767, and 1768.

diadema. 83. Dirty green, varied with brown; whirls 4, first large. New Zealand. A large shell. Chem. v. vig. 43. p. 145. f. A. and B.

cinereus. 84. Smooth, roundish, cinereous; whirls substriated, ventricose, flattened at the suture. Born. t. 12. f. 25. and 26.

anguis. 85. Transversely grooved, green, with blackish longitudinal zig-zag stripes; within margaritaceous. S. sea. Martyn's Univ. Conch. ii. t. 70.

distortus. 86. Slightly mucronated, and covered all over with smooth spines. Chem. v. t. 175. f. 1737 to 1739.

**** *Cancellated.*

crinellus. 87. Umbilicus flattish, spreading; whirls round, with crenated striæ.

thermalis. * 88. Umbilicated, somewhat oblong and obtuse, with 4 round and smooth whirls; minute. Fresh water near the baths in Tuscany. Britain, Don. iii. t. 102.

scalaris. 89. *Wentle-trap;* conic; whirls distant, longitudinally ribbed. Var. 1. perforated with 8 whirls! 2. Imperforated with 10 whirls; 2 inches long. Barbary, Coromandel. Martini, iv. t. 152. f. 1426, 1427, 1430, and 1431.—The wentle-trap is a very rare shell, and therefore greatly esteemed among collectors. As a proof of this, in the year 1753, four specimens, which were disposed of at the sale of Commodore Lisle's shells in London, brought 75l. 12s. Two were sold at 16 guineas each; one at 18 guineas, and the fourth at 23l. 2s. The celebrated specimen lately in the possession of Mr Bullock, London museum, was brought from Amboyna by the late William Webber of Blackheath, who once refused the sum of 500l. offered for it by the late Earl of Bute. It is supposed to be the finest specimen in any cabinet; and was brought at the sale of the London museum by a niece of Mr Webber, in whose possession it now is, for 27l. 10s.

principalis. 90. Imperforated, turreted, with 10 contiguous, cancellated whirls, and longitudinal ribs. Coromandel. Chem. x. t. 195. f. 1876 and 1877.

clathrus. * 91. *False wentle-trap;* taper, not umbilicated; spire with longitudinal ribs; whirls smooth, ventricose, and separated by a deep canal; from 1 to 3 inches long. Indian and European seas, Britain, Falmouth, South Devon. Don. t. 28.

clathratulus. 92. Imperforate, turreted, with rounded subcontiguous whirls, and thin longitudinal crowded ribs. Britain. Linn. Trans. viii. t. 5. f. 1.

pulcher. 93. Imperforate, turreted, with contiguous whirls, and strong distant longitudinal ribs, ending in a transverse keel on the body-whirl. W. Indies. Lister, t. 588. f. 50.

ambiguus. 94. Tapering, perforated; whirls contiguous; smooth, ribbed. Mediterranean.

crenatus. 95. Taper, subcancellated; whirls 8-ribbed, contiguous; crenated above. W. Indies. Chem. v. t. 195. A. f. 1880 and 1881.

lacteus. 96. Taper; striæ crowded, longitudinal, raised; size of a barley-corn. Mediterranean. Ginarmi, t. 6. f. 55.

elegantissimus. * 97. Turreted, with the whirls obliquely ribbed, and the aperture somewhat angulated at both ends. England and Ireland. Montagu, t. 10. f. 2.

simillimus * 98. Turreted, with longitudinal straight ribs; aperture subovate. Island of Jura.

parvus. * 99. Turreted, minute, with 5 or 6 whirls, and distant elevated ribs. Britain. Don. t. 90.

striatulus. * 100. Turreted, minute, subcancellated, with the whirls contiguous, and interrupted by varicose belts. Britain and Mediterranean. Montagu, t. 10. f. 5.

reticulatus * 101. Conical, minute, with rounded whirls, and strongly reticulated. Pembrokeshire. Montagu, t. 21. f. 1.

bryereus * 102. Turreted, small and glossy, with contiguous ribs, and the aperture ovate. Britain and W. Indies. Montagu, t. 15. f. 8.

coniferus. * 103. Turreted, small, with continuous undulated ribs; and the whirls somewhat crenulated at the suture. Weymouth. Montagu, t. 15. f. 2.

denticulatus. * 104. Conical, small, with oblique ribs; whirls denticulated at the suture. Weymouth. Montagu.

105.

arcuatus. 105. Turreted, small, with continuous ribs, which are arched over at the suture. Guernsey.

striatus. * 106. Ovate, imperforated, ventricose; finely striated spirally; 6 lines long. Woods of Europe, Britain. Walker, f. 49.

costatus. * 107. Subturreted, minute, with the whirls obliquely ribbed, and transversely striated; aperture with a thick sulcated rim. Britain. Montagu, t. 10. f. 6.

unicus. * 108. Acuminated, minute, with 9 very convex whirls, and cancellated striæ. Sandwich. Montagu, t. 12. f. 2.

indistinctus. * 109. Subcylindrical, minute, with longitudinal ribs, and punctured transverse striæ in their interstices.

uva. 110. Ovate, obtuse; whirls contiguous, imbricated, and longitudinally striated; $1\frac{1}{4}$ inch long. South America. Gualteri, t. 58. f. D.

mumia. 111. Subcylindrical, and obliquely ribbed; aperture semi-ovate, 2 toothed; inside tawney. America. Lister, t. 588. f. 48.

alviarea. 112. Cylindrical, obtuse at both ends, and obliquely striated; aperture semiovate, one tooth; with a white inside. St Domingo. Lister, t. 588. f. 49.

cylindrus. 113. Subumbilicated, cylindrical, obtuse; longitudinally striated, with contiguous equal whirls. Jamaica. Lister, t. 21. f. 17.

croceus. 114. Cylindrical, glabrous, obtuse, of an orange colour; lip marginated. Chem. ix. Part 2. t. 135. f. 1233.

sulcatus. 115. Ovate, obtuse, umbilicated; obliquely striated, and white; aperture semiovate; and outer lip reflected. Ceylon. Lister, t. 588. f. 47.

corneus. 116. Umbilicated, rounded, rather acute; whirls round, with decussated striæ; aperture reflected.

reflexus. 117. Umbilicated, convex, a little prominent; whirls round, substriated; aperture reflected. S. Europe.

elegans. * 118. Ovate, with 5 ventricose whirls, with strong, transverse, and fine longitudinal striæ. Britain and Italy. Montagu, t. 22. f. 7.

lincina. 119. Oblong, obtuse, with wrinkled striæ; aperture with a dilated, flat, crenated border; 8 lines long. Jamaica. Lister, t. 26. f. 24.

labio. 120. Oblong, umbilicated, brown, striated with convex dots; lip white, dilated; 15 lines long. Jamaica. Lister, t. 25. f. 23.

lunulatus. 121. White, cylindrical, reticulated; aperture remote.

ligatus. 122. Subumbilicated, nearly globular, acuminated; aperture thickish in the margin. Chem. ix. part 2. t. 123. f. 1071. to 1074.

foliaceus. 123. Trochiform, with foliaceous wrinkles, variegated with white and rose colour; umbilicus large. Chem. ix. part 2. t. 123. f. 1069. and 70.

marginatus. 124. Umbilicated, subovate, wrinkled, and the whirls transversely marginated and striated. Coromandel. Chem ix. p. 2. t. 123. f. 1075.

carinatus. 125. Rounded, subpyramidal, with 3 keels on each whirl, and a large spiral umbilicus. Jamaica; land shell. Lister, t. 28. f. 26.

separatista. 126. Rather smooth, with 3 keels, and the lower end of the body-whirl detached; aperture triangular. E. Indies. Chem. x. t. 165. f. 1589. and 90.

niveus. 127. Depressed, pellucid, white, with three transversely striated and slightly attached whirls; umbilicus large. Nicobar islands. Chem. x. t. 165. f. 1587. and 8.

helicoides. 128. Depressed, white, with longitudinal brown zigzag stripes, and the whirls rounded; umbilicus deep and wide. Chem. ix. part 2. t. 123. f. 1067. and 8.

***** *Turreted.*

imbricatus. 129. Whirls of the spire imbricated downwards; 4 inches long. American islands. Knorr. vi. t. 25. f. 2.

replicatus. 130. Smooth; whirls imbricated upwards; 3 inches long. Tranquebar. Martini, iv. t. 151. f. 1412.

octangularis. 131. With a single prominent, acute, transverse rib; 4 inches long. Tranquebar. Lister, t. 591.

duplicatus 132. Whirls with two prominent, acute, transverse ribs; 5 inches long. Coromandel. Lister, t. 591. f. 57.

torcularis. 133. With the whirls transversely striated, and an obtuse rib near both extremities of each. Born, t. 13. f. 8.

obsoletus. 134. With the whirls longitudinally wrinkled, and an obtuse rib on each of the sutures. Lister, t. 589. f. 53.

exoletus. * 135. Whirls with two prominent, obtuse, distant, transverse ribs; 2 inches long. Europe, Guinea, shores of Britain. Lister, t. 592. f. 60.

terebra. * 136. Whirls 6, prominent, acutely striated; from 2 to 6 inches long. Shores of Europe, Africa and China; Britain. Lister, t. 591. f. 57.

archimedis. 137. With about 24 rounded whirls, and ten sharp ribs on each. China. Chem. x. t. 165. f. 1591.

variegatus 138. Whirls of the spire flattish, with 7 obtuse striæ; 2 to 3 inches long. S. America, Barbary. Bonanni, Rec. 3. f. 122.

ungulinus 139. With 10 obsolete striæ on each whirl. European ocean.

terebellum 140. Umbilicated, glabrous, and yellow, with a keel on each whirl. Nicobar. Chem. x. t. 165. f. 1592 and 3.

annulatus. 141. With a prominent marginated suture. Gualteri, t. 58. f. L.

turris-thomæ. 142. With about 12 reversed whirls, and two rows of nodules on each. Island of St Thomas. Chem. xi. t. 213. f. 3022. a. to d.

bidens. * 143. Pellucid; whirls contrary; sutures subcrenated; aperture 2-toothed behind; $1\frac{1}{4}$ inch long. Europe; roots of trees, Britain. Chem. ix. part i. t. 5. f. 3.

perversus. * 144. Pellucid; whirls reversed, not crenated; aperture 3-toothed; $\frac{1}{4}$ inch long. Europe, Britain, among moss, and in old walls. Linn. Tr. viii. t. 5. f. 2.

laminatus. 145. Pellucid, and the whirls reversed; pillar lip not detached, and furnished with two large teeth. Europe and Britain. Montagu, t. 11. f. 4.

biplicatus. 146. Opake, longitudinally striated, whirls reversed; pillar lip slightly detached, and furnished with two approximated teeth. Europe and Britain. Montagu, t. 11. f. 5.

corrugatus. 147. With the whirls reversed, and the base plaited and wrinkled; aperture with two teeth. Spain. Chem. ix. part i. t. 112. f. 961. and 2.

labiatus. * 148. Opake, striated, and the whirls reversed; aperture with two teeth, and a thick dilated white margin. Near London. Montagu, t. 11. f. 6.

quinquedentatus. 149. Slightly striated longitudinally, and of a greyish white colour; aperture ovate, with 5 teeth. France. Born, t. 13. f. 9.

tridens. * 150. Subcylindrical; smooth, pellucid; aperture 3-toothed. Italy, Britain. Montagu, t. 11. f. 2.

151.

juniperi. * 151. Conical, turreted, brown, with the aperture subovate, and 7-toothed. France and Britain. Montagu, t. 12. f. 12.

muscorum * 152. Ovate, obtuse, pellucid, with 6 whirls; aperture with a white margin, and nearly toothless. Britain. Montagu, t. 22. f. 3.

quadridens. 153. Subcylindrical, and the whirls reversed; aperture with 4 white teeth. France and Italy. Lister, t. 40. f. 38.

sexdentatus. * 154. Subcylindrical, smooth, with 5 rounded whirls; aperture 6-toothed. England. Montagu, t. 12. f. 8.

vertigo. * 155. Oval, with 5 reversed and finely striated whirls; aperture subtriangular; slightly marginated, and toothed. Denmark, Britain. Montagu, t. 12. f. 6.

carychium * 156. Conical, polished, and pellucid; aperture marginated, with 2 teeth on the inner, and a knob on the outer lip. Great Britain. Montagu, t. 22. f. D.

auriscalpium. 157. White, and very smooth; aperture with a flattish, concave, obtuse, reflected lip. Mediterranean.

politus. * 158. Imperforated, extremely glabrous, and the aperture ovate. Mediterranean and West of England. Don. t. 177.

subulatus. * 159. Subulate, extremely glabrous, white, with yellowish transverse lines, and the aperture ovate. Britain. Don. t. 172.

decussatus * 160. Subulate, decussated, with longitudinal and very minute transverse striæ; aperture suboval, and contracted at both ends. Dorsetshire. Montagu, t. 15. f. 7.

****** *Depressed.*

nautileus. * 161. Flattish, with the whirls annulated, and crested on the back. Germany, Switzerland, and Britain. Montagu, t. 25. f. 5.

cristatus. * 162. Flattish above, and umbilicated beneath, with 3 or 4 rounded whirls. France and Britain. Walker, f. 18.

depressus. * 163. Minute, depressed, with 4 slightly wrinkled whirls, and umbilicated beneath. Devonshire. Montagu, t. 13. f. 5.

serpuloides. * 164. Minute, depressed, with three smooth whirls, and umbilicated beneath. Devonshire. Montagu, t. 21. f. 3.

Helix. 57

Gen. 29. Helix, *Snail.*

Gen. Char.—The animal a limax; shell univalve, spiral, subdiaphanous, brittle; aperture contracted, semilunar, or roundish.

Species.

* *Whirls longitudinally angulated on both sides.*

scarabæus 1. Ovate, both edges keel-shaped; aperture toothed. Mountains of Asia, and the Friendly islands. Lister, t. 577. f. 31.

afra. 2. Ovate, thick, obliquely striated, and the aperture 5-toothed. Goree. Adanson, t. 1. f. 4.

** *With a carinated margin on the body whirl.*

lapicida. * 3. Umbilicated; convex on each side; aperture transverse, margined, ovate; ½ inch in diameter. Rocks, woods, and hedges in Europe, Britain. Don. t. 39. f. 2.

marginata 4. Subumbilicated, a little depressed; obliquely striated; aperture transverse; 9 lines in diameter. Jamaica. Chem. ix. p. 2. t. 125. f. 1097.

cicatricosa 5. Umbilicated, depressed and wrinkled; whirls reversed. Jamaica and China. Chem. ix. p. 1. t. 109. f. 923.

cornu. 6. Umbilicated, convex, with the body whirl very broad, and the summit obtuse; aperture oval-ear-shaped, and the outer lip marginated. New Zealand. Chem. xi. t. 208. f. 2051 and 2052.

oculus-capri. 7. Subcarinated, umbilicated, convex; aperture margined. Trees in Asia. Lister, t. 55. f. 51.

involvulus. 8. Umbilicated, slightly keeled, white, with the summit mucronated, and the whirls convex and striated; aperture roundish, and the lip reflected. It is nearly allied to the above species.

albella. 9. Umbilicated, flat above, and the base gibbous; aperture semi-heart-shaped.

albina. 10. Umbilicated, keeled, with the spire flattened, and the base gibbous; aperture quadrangular. Lister, t. 86. f. 86.

rotundata. 11. Umbilicated, slightly keeled, with 6 strongly striated whirls; spire depressed, and base convex. Denmark and Norway. Lister, t. 1058. f. 11. A.

striatula. 12. Subcarinated, umbilicated, convex, striated; more gibbous beneath; aperture roundish, lunated; minute. Water-falls of Lombardy. Algiers.

algira. 13. Subangular, umbilicated, convex, whirls 6; umbilicus pervious. Africa. Lister, t. 79. f. 80.

leucas. 14. Subcarinated, umbilicated, convex, smooth; beneath gibbous; umbilicus very minute; aperture roundish, lunate. Africa.

lævipes. 15. Perforated, subcarinated, contrary, convex, pale, with a rufous band, united to a white one; ½ inch in diameter. Guinea. Martini, iv. t. 3. f. 22 and 23.

exilis. 16. Perforated, depressed, subcarinated; pale with a rufous band joined to a white one; whirls striated; 10 lines across. Tranquebar. Chem. ix. p. 2. t. 129. f. 1149.

vermiculata. 17. Subglobular, depressed, rough, imperforated; dotted with white; lip reflected, white. Italy and Portugal. Chem. ix. p. 2. t. 129. f. 1148.

incarnata 18. Perforated, subglobular, subcarinated; whirls 7; lip flesh-coloured; 6 lines broad. Woods of Denmark and Germany. Chem. ix. p. 2. t. 133. f. 1206.

cantiana. * 19. Umbilicated, very slightly keeled; rather depressed, with 6 striated whirls, and the umbilicus small. Britain. Montagu, t. 23. f. 1.

rufescens. * 20. Umbilicated, keeled, somewhat depressed, with 6 transversely striated whirls, and the umbilicus rather large. Britain. Montagu, t. 22. f. 2.

crenulata. * 21. Umbilicated, slightly depressed; somewhat keeled and striated, and the summit brown. France and Britain. Montagu, t. 11. f. 11.

planorbis. * 22. Subcarinated, umbilicated, flat; above concave; aperture oblique; ovate and acute on each side. Ponds and rivers of Europe and Barbary, Britain. Montagu, t. 25. f. 1.

complanata. * 23. Carinated downwards, umbilicated, convex; flat beneath; aperture semi-heart-shaped. Ponds and rivers of Europe. Britain. Montagu, t. 25. f. 4.

fontana. * 24. Compressed, obtusely keeled; convex on both sides, with 3 whirls, and the base umbilicated. Britain. Montagu, t. 6. f. 6.

ringens. 25. Subcarinated, imperforated, convex, with an inverted, ringent aperture; lip 4-plaited behind; 1½ inch wide. India and Brazil. Lister, t. 99. f. 100.

plicata. 26. Umbilicated, keeled, and rather depressed; aperture ear-shaped; distorted, toothed, and sinuated, with a prominent marginated lip. E. Indies. Chem. xi. t. 208. f. 2048.

sinuata. 27. Imperforated, subcarinated, reddish brown, with a white ridge; aperture transverse; toothed and 3-plaited behind; 9 lines in diameter. America. Lister, t. 97. f. 98.

lucerna. 28. Imperforated, white; flattish above; beneath gibbous; aperture transverse, 1-toothed; 13 lines broad. E. Indies and Jamaica. Lister, t. 96. f. 97.

lampas. 29. Imperforated, flattish above, beneath gibbous; whirls scared. A rare shell. Chem. ix. t. 208. f. 2044 and 2045.

caracolla. 30. Imperforated, a little convex on each side, with a white transverse lip. India and America. Lister, t. 63. f. 61.

lychnuchus. 31. Imperforated, top-shaped, white, with fulvous bands; aperture transverse, 2-toothed. Jamaica. Lister, t. 90. f. 90.

cepa. 32. Subglobular, umbilicated, subcarinated; yellowish, with a whitish band; aperture transverse, 2-toothed, and sinuated behind. Jamaica. Lister, t. 88. f. 89.

unidentata 33. Subumbilicated, slightly keeled, with 6 whirls ending in an obtuse summit; base convex, with 1 tooth on the pillar lip, and the outer lip marginated. Ceylon. Chem. xi. t. 208. f. 2049 and 1050.

cornu-militare. 34. Subcarinated, imperforated, convex; aperture with a white margin. India and Germany. Chem. ix. p. 2. t. 129. f. 1142 and 1143.

pellis-serpentis. 35. Subcarinated, with flame-coloured, red, and white bands; beneath surrounded with 4 rows of dots; aperture fringed. Warm parts of S. America. Lister, t. 66. f. 64.

vortex. 36. Flat, thin, concave above; aperture oval, flat; 3 lines wide. Ponds and rivers of Europe, Britain. Montagu, t. 25. f. 3.

scabra. 37. Subcarinated, imperforated, ovate, pointed, and striated. Jamaica. Lister, t. 583. f. 37.

gothica. 38. Convex on each side; horny, with subferruginous bands. Woods of Sweden. Linnæus, p. 1243.

gualteriana. 39. Imperforated, depressed, with decussated striæ; aperture acute on each side. India. A land species, very rare. Spain. Chem. v. vig. 44. f. a, b, and c.

turcica. 40. Umbilicated, depressed, rough, with elevated dots, and the keel crenated; aperture somewhat quadrangular. Mogadore and Morocco. Chem. xi. t. 209. f. 2065 and 2066.

avellana. 41. Umbilicated, roundish, thick, with a broad rib-like keel on the body whirl, and the spire depressed; outer lip notched near the upper end. New Zealand. Chem. v. t. 188. f. 1919 and 1920.

maculosa. 42. Umbilicated, subcarinated, obliquely striated and a little depressed; aperture lunated, with a margined lip. Born, t. 14. f. 15 and 16.

punctata. 43. Subumbilicated, subcarinated, aperture transverse, oblong; lip margined, 3-toothed. Virginia. Lister, t. 93. f. 93.

annulata. 44. Umbilicated, depressed, white; whirls 4, the first gibbous and doubly carinated; aperture ovate; 2 lines in diameter. Schroeter, t. 5. f. 30.

corrugata 45. Umbilicated, wrinkled, and obliquely striated; aperture lunated. Otaheite. Chem. ix. p. 2. t. 133. f. 1209.

**** Umbilicated, and the whirls rounded.*

* 46. Above umbilicated, flat, blackish; whirls 4. *cornea.* Fresh waters, Europe, Coromandel, Britain. Don. t. 39. f. 1.

* 47. Concave on each side, flat, whitish; whirls 5, *spirorbis.* rounded; 1½ line diameter. Stagnant waters, France, Germany. Britain. Montagu, t. 25. f. 2.

* 48. Flattish, orbicular; aperture oval; lip fringed. *polygyrata* Chem. ix. p. 2. t. 127. f. 1124 and 1125.

* 49. Subumbilicated, flat on each side, equal; aper- *contorta.* ture linear, arched; 1 to 2 lines wide. Stagnant waters of Europe. Britain. Montagu, t. 25. f. 6.

* 50. Polished, yellowish, above convex, umbilicated; *nitida.* flat beneath, perforated; 1 to 3 lines in diameter. Ditches of Denmark and Britain. Montagu, t. 23. f. 4.

* 51. White, umbilicated on each side; aperture di- *alba.* lated; 1 to 2 lines wide. Denmark, aquatic plants. Montagu, t. 25. f. 7.

* 52. Pellucid, umbilicated above; striated with dots. *similis.* Ditches in Denmark and Berlin. Martini, Ber. Mag. iv. t. 11. f. 64.

* 53. With 4 rounded whirls, rather convex above, *crystallina* and the base largely umbilicated; aperture nearly orbicular, with a reflected margin. Denmark and Britain. Linn. Trans. t. 5. f. 5.

54. Umbilicated, flattish; aperture oval; 12 to 16 *cornu-arietis.* lines in diameter. China. Lister, t. 136. f. 40.

55. Subimperforate, ovate, conical, with the two last *minima.* whirls placed in the centre of the first; aperture orbicular. Schroeter, t. 7. f. 18.

* 56. Umbilicated, convex, hispid, diaphanous; whirls *hispida.* 5; aperture roundish, lunated. Woods of Europe. Britain. Montagu, t. 23. f. 3.

* 57. Subconical, semi-pellucid, with 5 rounded stri- *umbilicata* ated whirls, and the umbilicus very large. Britain. Montagu. t. 13. f. 2.

58. Subumbilicated, somewhat conical, with 6 gla- *trochulus.* brous whirls; aperture sublunated, and transversely compressed. Denmark and Britain. Montagu, t. 11. f. 9.

59. Umbilicated, somewhat conical, with 5 trans- *aculeata.* versely striated whirls, and the striæ membranaceous and bristly. Denmark and Britain. Montagu, t. 11. f. 10.

60. Subglobular, with 4 ventricose smooth whirls; *lacuna.* aperture large, and nearly orbicular, and the pillar sinuated. Britain. Montagu, t. 13. f. 6.

61. Subumbilicated, subglobular, glabrous; whirls *ampullacea* above more ventricose; aperture large, ovate, oblong; 1 to 5 inches wide. Asia and America. Lister, t. 130. f. 30.

62. Ventricose, nearly globular, wrinkled longitudi- *urceus.* nally, and the spire somewhat produced; aperture ovate-oblong, and umbilicus large. Indian islands. Lister, t. 125. f. 25.

* 63. Subumbilicated, subovate, obtuse; aperture *pomatia.* roundish, semilunar; reddish brown, with obsolete, paler bands. Woods of Europe, Britain.—This species was a favourite dish among the Romans. It is still used as an article of food in many parts of Europe, during the season of Lent. It was introduced into England

land by Sir Kenelm Digby, as a cure for consumption. Don. t. 84.

glauca. 64. Umbilicated, roundish, pointed; lip margined; aperture oval. Guadaloupe. Lister, t. 129. f. 29.

sultana. 65. Ventricose, very thin, much variegated, and minutely striated longitudinally; aperture patulous and ovate.

scalaris. 66. Conical, subturreted, with fine ventricose almost unconnected whirls, and the aperture ovate. France and Italy. Chem. ix. t. 128. f. 1139. N° 1.

citrina. 67. Subumbilicated, convex, obtuse; yellowish, with a brown band; from 12 to 18 lines wide. Woods of Jamaica and China. Lister, t. 54. f. 50.

castanea. 68. Perforated, subglobular, dull chesnut, with a rufous band united to a white one; whirls 7, striated. Chem. ix. part 2. t. 131. f. 1177. and 8.

globulus. 69. Globular, subumbilicated, white; lip reflected; whirls 5. Tranquebar. Lister, t. 44. f. 41.

rapa. 70. Perforated, subglobular, with hollow dots and a red band; first whirl larger; 8 lines wide. Chem. ix. p. 2. t. 131. f. 1176.

incisa. 71. Depressed, umbilicated, white, with a cut margin. East Indies. Chem. ix. p. 2. t. 130. f. 1166.

lucana. 72. Umbilicated, nearly globular, with five whirls, and the base gibbous; outer lip white and reflected. Tranquebar. Chem. ix. p. 2. t. 130. f. 1155.

arbustorum. * 73. Umbilicated, convex, pointed; aperture suborbicular, a little reflected at the rim, brown, with a single black spiral band; 9½ lines wide. Shrubberies and hedges, Britain. Don. t. 136.

fulva. 74. Nearly imperforated, globular, pellucid; fulvous, with a white lip; 1 to 3 lines wide. Woods of Denmark. Muller, ii. p. 56.

epistylum. 75. Subimperforated, subglobular, striated; whirls 7; 12 lines in diameter. Jamaica. Lister, t. 62. f. 60.

pupilla. 76. Subumbilicated, obtusely pyramidal, wrinkled, and the summit flat and glabrous; aperture transverse and marginated. Chem. ix. p. 2. t. 122. f. 1053. and 1054.

kambeul. 77. Umbilicated, oblong-ovate, white, with decussated striæ, and brown longitudinal stripes; aperture contracted at the base. Senegal. Adanson, t. 1. f. 1.

labiosa. 78. Subcylindrical, polished, diaphanous, and white; aperture semiovate, marginated, and 1-toothed. Chem. ix. p. 2. t. 135. f. 1234.

cincta. 79. Subimperforated; white, with rufous lip and bands; whirls 5; 18 lines wide. Muller.

extensa. 80. Subimperforated, subglobular; pale, immaculate; aperture large; whirls 4, distant. Muller.

pisana. 81. Perforated; globular; white, with subinterrupted red bands; lip rosy; 5 to 7½ lines wide. Barbary, Italy. Montagu, t. 24. f. 1.

strigata. * 82. Perforated, with a depressed crown; white, with rufous bands, and numerous lines; lip white on each side; 10 lines wide. Italy, Britain. Montagu, t. 24. f. 4.

nemorensis. 83. Perforated, globular, polished; white, with brown bands; 15 lines wide. India. Chem. ix. p. ii. t. 129. f. 1146. and 7.

zonaria. 84. Umbilicated, convex, slightly depressed; aperture rather oblong and margined; whirls 5; first ventricose; 11 to 13 lines in diameter. Barbary, Europe. Chem. ix. p. 2. t. 132. f. 1188. and 9.

85. Umbilicated; subdepressed, striated, white, *striata.* 6 lines wide. Italy and Saxony. Schroeter, t. 2. f. 20.

* 86. Umbilicated, depressed, yellowish, with a brown band or bands; 4 to 11 lines wide. Europe, Britain. Lister, t. 78. f. 78. *ericetorum.*

87. Umbilicated, cinereous; whirls 4; ribs transversely plaited; aperture circular; 1 line wide. Highlands of Denmark. Muller. *costata.*

88. Umbilicated, subdepressed; aperture circinate; lip white, reflected; whirls 4; 1 line wide. Moist woods of Denmark. Geoffroy, N° 6. t. 2. *pulchella.*

89. Umbilicated, depressed; yellowish, polished; white beneath; aperture large; whirls 5; 3½ lines wide. Cellars in Germany. Chem. ix. p. 2. t. 127. f. 1129. *cellaria.*

90. Umbilicated, depressed on both sides; whirls obvoluted. Var. 1. Whitish, glabrous, with a triangular aperture. 2. Brown, hispid, with a linear aperture; 4 to 5 lines wide. Italy. Chem. ix. p. 2. t. 127. f. 1128. *obvoluta.*

91. Umbilicated, convex; aperture margined, suborbicular, and elongated above; of the shape of an apple; 16 lines wide. India. Chem. ix. p. 2. t. 125. f. 1098. and 9. *ungulina.*

92. Umbilicated, globular; aperture without pillar lip; 7½ lines wide. Hedges of Denmark. Chem. ix. p. 2. t. 133. f. 1203. *fruticum.*

93. Subglobular, subumbilicated; white, with crowded chesnut bands and blue crown; lip reflected, white; 9 lines in diameter. Coromandel. Lister, t. 67. f. 66. *vittata.*

94. Subglobular, subumbilicated; flesh coloured, and transversely striated; whirls 5; 19 lines wide. *rosacea.*

95. Umbilicated, convex, obtuse; whirls 5, round; umbilicus wide; size of a nut. Southern Europe. A land species. Gmelin. *itala.*

96. Umbilicated, perforated, convex, obtuse; whirls 5, round, and yellowish white; umbilicus spreading; size of a small apple. Southern Europe. A land species. Chem. ix. p. 1. t. 108. f. 913. and 14. *lusitanica.*

97. Umbilicated, ovate; whirls 3; striated; aperture large, ovate, and united to the tip. Rivers of Africa. Lister, t. 566. f. 15. *mammelaris.*

98. Umbilicated, convex; whirls 5, round; umbilicus thin, perforated; aperture suborbicular. Southern Europe. *hispana.*

99. Umbilicated, ovate-oblong; finely striated; aperture white within. *lutaria.*

100. Perforated, ovate, ventricose, and streaked; tip ribbed and rosy; lip of the same colour; pillar white; whirls 6; 4 inches long. E. Indies. Chem. ix. p. 2. t. 119. f. 1020. *ovata.*

101. Perforated, ovate, oblong, striated; lip and pillar rosy; whirls 6; aperture oval; 3 inches long. South America and India. Lister, t. 23, f. 21. *oblonga*

102. Perforated, oblong; white, with longitudinal rufous bands; pillar reflected; straight; 18 to 20 lines long. Guinea. Lister, t. 578. f. 33. *flammea.*

103. Top-shaped, white with rufous bands; whirls 6; aperture transverse, large; 15 lines long. Lister, t. 16. f. 11. *pileus.*

104. Umbilicated, oblong-ovate, thick, with the whirls reversed, and the outer lip emarginated and white. *otaheitana*

white. Rivers in the island of Otaheite. Chem. ix. p. 1. t. 112. f. 950. and 951.

tenuis. * 105. Umbilicated, pellucid, horny, transversely striated, and convex; whirls 6, gradually decreasing; aperture semilunar; 4 or 5 lines in diameter. Britain. Schroeter, t. 5. f. 33.

cornu-venatorium. 106. Depressed, deeply umbilicated. Leaves and branches of trees, Senegal. Lister, t. 1055. f. 4.

trifasciata 107. Conic, ovate, white, with 3 brownish bands in the first whirl; aperture fringed; lip white, dilated. Tranquebar. A land species. Chem. ix. p. 2. t. 134. f. 1215.

bontia. 108. Conic, ventricose, perforated, pellucid, with a black tip; first whirl with three yellowish bands. Bengal and Tranquebar. Chem. ix. p. 2. t. 134. f. 1216. and 17.

trochoides 109. Top-shaped, perforated, polished; longitudinally striated; whirls reversed, the first keel-shaped; aperture angular. East Indies. Chem. x. t. 173. f. 1686.

læva. 110. Subcylindrical, glabrous, contrary, barred; pillar yellow; lip slightly reflected; 12 to 16 lines long; very rare. East Indies. Lister, t. 33. f. 31.

labiosa. 111. Oblong, polished, white, diaphanous; whirls 8; aperture ovate, toothless; 11 lines long. India. Chem. ix. p. 2. t. 135. f. 1234.

**** *Imperforate, and the whirls rounded.*

aurea. 112. Subumbilicated, ovate-oblong, obtuse, smooth, yellow, with the outer lip white and marginated. W. Indies. Lister, t. 34. f. 33.

recta. 113. Conic, a little pointed; whitish with a rufous band and streaks; lip reflected; whirls 7; 2½ inches long. Chem. ix. p. 1. t. 110. f. 925. and 6.

interrupta 114. Conic, pointed, white with fulvous streaks; lip white, reflected; whirls 7; 22 lines long. Chem. ix. p. 2. t. 134. f. 1213. and 14.

arenaria. 115. Glossy, whitish, thin, longitudinally striated; spire contrary, hemispherical; minute. Coast of Rimini, Italy. Chem. ix. p. 1. t. 113. f. 972. and 3.

jamaicensis. 116. Globular, chesnut-brown, barred with white; lip fringed, white; crown obtuse. Jamaica. Lister, t. 42. f. 40.

rhodia. 117. Subglobular, depressed; base concave; aperture lunated. Rhode island. Chem. ix. p. 2. f. 1179.

ianthina. * 118. Nearly imperforated, roundish, obtuse, diphanous, and very brittle; aperture dilated behind, with an emarginated lip; 1 inch broad and high. In most seas.—The animal which inhabits this shell shines in the night, and stains the hand with a violet or purple dye. Asia, Africa, and Ireland. Lister, t. 572. f. 24.

vivipara. * 119. Imperforated, ventricose, subovate, obtuse; whirls 5 to 6, very convex; aperture nearly orbicular; 1½ inch long. Stagnant waters of Europe. Britain. This species is viviparous. Don. t. 87.

angularis 120. Imperforated, greenish; whirls 5; spirally angular; throat wide; 12 lines long. China. Chem. ix. p. 2. t. 134. f. 1222. and 3.

fasciata. 121. Ovate, ventricose; white, with 3 shining red bands; whirls 5; spire acute; 9 to 15 lines long. Italy and Saxony. Guinoni, ii. t. 1. f. 6.

dissimilis. * 122. Subovate, pointed, yellowish-white, with a black lip; whirls 6. Tranquebar. Schroeter, ii. t. 4. f. 10.

nemoralis. * 123. Perforated, roundish, thin, pellucid, and marked with variously coloured transverse bands; whirls 5, from 9 to 11 lines wide. Woods of Europe. Britain. Don. t. 13.

aspersa. * 124. *Garden Snail;* imperforated, globular, pale, with broad, interrupted, brown bands; lip white; 7 to 8 lines wide. Gardens and orchards, Europe, Britain. Don. t. 131.—This species is extremely destructive to the tender leaves of plants, and fruits. It is oviparous; the eggs are round, and about the size of small peas.

cartusiana 125. Imperforated, rather depressed, and white, with 6 whirls. France. Geoffroy, p. 33. t. 2.

lucorum. 126. Imperforated, roundish, smooth; whitish, with rufous streaks and bands. Southern parts of Europe. Lister, t. 1058. f. 1 and 2.

hæmastoma. 127. Imperforated, roundish, brown, with a longitudinal white band; whirls 5, round, first large; aperture pure purple; 1½ inch broad. Ceylon. Lister, t. 1055. f. 2.

lactea. 128. Imperforated, depressed, grey, with white scattered dots; aperture blackish; outer lip reflected, and 1-toothed.

pulla. 129. Imperforated, subovate; brown striped; whirls 4; aperture oblique, margined, whitish; 2 inches broad.

picta. 130. Imperforated, subglobular, glabrous; whirls 4, round, first ventricose, the others depressed; aperture lunated. Italy. Chem. ix. part 2. t. 130. f. 1162 and 5.

aperta. 131. Imperforated, subglobular, finely striated longitudinally; whirls 3, first ventricose; aperture lunated; pillar spiral. St Croix. Chem. ix. part 2. t. 133. f. 1204 and 5.

versicolor. 132. Imperforated, roundish, and transversely striated; whirls round; the first ventricose; aperture ovate. Born, t. 16. f. 9. and 10.

fusca. 133. Thin, pellucid, smooth, with 5 or 6 whirls, which are obsoletely wrinkled longitudinally; aperture lunated.

pellucida. 134. Rather depressed, transparent, and greenish, with 3 whirls. France. Geoffroy, p. 38. N° 8. t. 2.

***** *Turreted.*

consolidata. 135. Thick, transversely striated, brown, and the summit truncated; aperture oval. Surinam. Chem. ix. part 2. t. 136. f. 1258.

decollata. 136. Imperforated, tapering; spire mutilated, truncated; whirls 4 to 7, first large; 6 to 15 lines long. Europe, Asia, and Africa. Lister, t. 17. f. 12.

truncata. 137. Smooth, white, with transverse-coloured bands, and the summit truncated; aperture roundish.

calcaria. 138. Thick, longitudinally striated, white, and the spire entire, but rounded at the summit. E. Indies. Lister, t. 14. f. 9.

cuspidata. 139. Of a horn colour, finely striated transversely, and longitudinally plaited; aperture oval, and the outer lip acute. E. Indies. In fresh water. Lister, t. 118. f. 13.

aspera. 140. Pointed, cinereous, transversely striated; whirls 7 to 8, toothed, marked with red streaks, and armed

armed with sharp spines; 5 to 8 lines long. Coromandel. Chem. ix. part 2. t. 136. f. 1259. and 60.

truncatula 141. Ovate, oblong, whirls 5, truncated upwards; aperture ovate; 2 to 5 lines long. Greece.

acuta. 142. Conic, pointed, white, with a red band; whirls 7; aperture ovate, toothless; 4 lines long. Italy. Lister, t. 19. f. 14.

obscura. * 143. Conic, brown; whirls 6; aperture oval, toothless; snail white; above dusky, eyes only black. Roots of trees, Europe, Britain. Mont. t. 22. f. 5.

lubrica. * 144. Conic, fulvous, polished; whirls 5 or 6; aperture toothless; $2\frac{1}{2}$ lines long. Moss and wet rotten wood, Britain. Da Costa, t. 5. f. 18.

vibex. 145. Grayish, transversely striated; whirls nodulous, and striped with red; pillar lip white. Coromandel. Martini, Ber. Mag. iv. t. 10. f. 57.

contortuplicata. 146. Turbinated, cinereous, nearly imperforated; crown truncated; whirls 5; aperture circinated.

stagnorum. 147. Subperforated, and a little tapering; whirls 5; aperture ovate; minute. Fresh waters. Baster, t. 7. f. 4.

octona. 148. Subperforated, tapering; whirls 8; aperture roundish; 4 lines long. America, Europe. Lister, t. 20. f. 15.

lackhamensis. * 149. Ovate-oblong, somewhat perforated, rather pellucid, with 7 whirls; aperture roundish-lunated; outer lip slightly reflected. Britain. Montagu, t. 11. f. 3.

incumbens 150. White, with longitudinal elevated striæ, and remote tawny stripes; pillar sinuated and reflected.

columna. 151. Tapering, white, with a fulvous tip; whirls 7 or 8, contrary, spotted; aperture oblong; $27\frac{1}{2}$ lines long. Guinea and Jamaica. Lister, t. 39. f. 37.

pella. 152. Imperforated, ovate, pointed, transversely striated; brown, with yellow bands; band on the first whirl double, on the rest single. Iceland.

plicarea. 153. Subulate, semipellucid, longitudinally plaited; whirls 10, round; aperture ovate. Born, t. 16. f. 14.

undulata. 154. Subulate, smooth, finely striated transversely; whirls about 12, round; aperture ovate; pillar glabrous. Born, t. 16. f. 15.

crenata. 155. Tapering, white, transversely substriated, and surrounded with a crenulated belt near the suture. Rivers of India. Chem. ix. part 2. t. 135. f. 1230.

carinula. 156. White, tapering, somewhat umbilicated; first whirl a little keel-shaped, with a blackish band. Chem. ix. part 2. t. 136. f. 1263.

fluviatilis. 157. Tapering, very glabrous, chesnut brown with with darker spots; throat whitish. Fresh waters, Coromandel. Chem. ix. part 2. t. 135. f. 1243.

undata. 158. Imperforated, oblong, white, with longitudinal red undulations; whirls 6—7, first thrice as large as the next; $1\frac{1}{4}$ inch long. New Holland. Schroeter, t. 10. f. 4.

substriata. * 159. Subimperforated, oblong, finely striated with white; whirls 5; first twice as large as the next; aperture oval, margined; $\frac{1}{2}$ inch long. Rhone and Britain. Montagu, t. 11. f. 1.

peregrina. * 160. Ovate, imperforated; whirls 8—9, round, distant, and equally decreasing; aperture oval; $\frac{1}{2}$ inch long. American islands, Britain. Dorset Cat. t. 18. f. 11.

guadaloupensis. 161. Oblong, perforated, whitish, with transverse brown bands, and the outer lip thickened within. Guadaloupe. Lister, t. 8. f. 1.

162. Conical, obtuse, longitudinally wrinkled, distorted, and the side opposite the aperture gibbous; aperture compressed. E. Indies. Chem. x. t. 3. f. 7. *lyonetiana.*

****** *Ovate, and imperforated.*

163. Coarse, nearly imperforated, ovate, oblong; whirls 6; aperture oblong, lunated. Mauritania. *pupa.*

164. Coarse, oblong, imperforated; whirls 8; aperture roundish, lunated; size of a barley-corn. Algiers. *barbara.*

165. Oblong, imperforated; whirls toothed, spinous; 10 lines long. Rivers of India. Lister, t. 133. f. 33. *amarula.*

* 166. Imperforated, ovate, tapering to a point; somewhat angular, by several longitudinal wrinkles; whirls 6 to 7, first ventricose; aperture oblong, oval; $2\frac{1}{2}$ inches long. Still waters of Europe, Britain. Don. t. 51. f. 2. *stagnalis.*

* 167. Imperforated, ovate, tapering to a point; spire acute; whirls 5 to 7; aperture oblong, oval; 11 lines long. Still waters of Europe, Britain. Martini, Ber. Mag. iv. t. 9. f. 35. *fragilis.*

* 168. Oblong, pointed, brown; aperture ovate; whirls 5 to 6. Meadows of Europe, Britain. Don. t. 175. f. 1. *palustris.*

* 169. Imperforate, subovate, with 5 or 6 rounded whirls, and the suture conspicuous; aperture ovate. Britain. Montagu, t. 16. f. 9. *fossaria.*

170. Subconic, horny, with a sharp point; aperture ovate; 2 to 8 lines long. Stagnant waters of Denmark. Chem. ix. part 2. t. 135. f. 1244. *peregra.*

* 171. Ventricose, diaphanous, with an obtuse projection; 2 to 3 whirls; aperture wide; 2 to 4 lines long. Denmark, chiefly on the leaves of nymphæa lutea. Marshes at Deal. Montagu, t. 16. f. 5. *glutinosa.*

* 172. Imperforated, obtuse, ovate, yellow; whirls 3, the first large, the others minute; aperture ovate; 1 to 8 lines long. Ponds in Europe, Britain. Montagu, t. 16. f. 3. *putris.*

173. Conic, white, with transverse rufous lines; whirls 6; aperture ovate; $8\frac{1}{2}$ lines long. Saxony. Lister, t. 8. f. 2. *detrita.*

* 174. Imperforated, somewhat oblong, pellucid; aperture ovate. Wet meadows of Europe, Sandwich, river Avon. Montagu, t. 16. f. 4. *limosa.*

175. Ovate-oblong, with the whirls detruncated, and the aperture ovate. Thangelstadt in Saxony. Schroeter, t. 7. f. 13. *truncatula.*

* 176. Imperforated, ovate, obtuse, clouded with brown; whirls 4 or 5; aperture subovate; 1—4 lines long. Ponds and still waters of Britain. Don, t. 93. *tentaculata.*

177. Subconical, with 5 rounded smooth whirls, and the pillar grooved. Southampton. Montagu, t. 12. f. 11. *canalis.*

* 178. Suboval, thickish, and of a yellowish orange colour; aperture spreading and oval. Devonshire. Montagu, t. 16. f. 6. *lutea.*

* 179. Imperforated, ovate, gibbous, with a depression in the middle of the lip; whirls 3—5; the first ventricose; spire acute, short; aperture much dilated; 2—15 lines long. Ponds of Europe, Britain. Don. t. 15. f. 1. *auricularia.*

180. Ovate, smooth; whitish, with the apex acute, *sicula.*

2—15

and the pillar one-plaited. Sicily. Gualteri, t. f. N. N.

lævigata. * 181. Whirls 2; first ventricose; the other minute, and placed laterally; pale red, pellucid. Europe, Devonshire. Don. t. 105.

balthica. 182. Imperforated, ovate, pointed; whirls 4; wrinkles elevated; aperture ovate, dilated. Shores of the Baltic.

neritoidea. 183. Imperforated, convex, longitudinally striated; aperture roundish. Baltic. Gualteri, t. 64. f. 1.

perspicua. 184. Imperforated, convex, ovate; without lip; aperture extending to the tip, and exposes the whole inside. Mediterranean.

haliotoidea * 185. Imperforated, depressed, with waved striæ; aperture oval; open all the way down; whirls 4, lateral. Mediterranean, Atlantic, Indian and North seas. Britain. Montagu, t. 7. f. 6.

ambigua. 186. Subimperforated, convex; grooves remote, compressed; aperture semiorbicular. Mediterranean sea. Adanson, t. 13. f. 1.

inflata. 187. White, solid, opaque; first whirl twice as large as the rest; aperture large, margined. River Unstrut in Saxony. Schroeter, t. 7. f. 5.

albicans. 188. White, opaque, pointed; aperture oval. Waters of Hamburg. Schroeter, t. 7. f. 6.

repanda. 189. Ovate, pointed, subimperforated; first whirl ventricose, large; aperture semicircular; 6 or 7 lines long. Thinglestadt. Stagnant waters. Schroeter, t. 7. f. 16.

opaca. 190. Ovate, pointed; whirls 5; first large, aperture ovate, oblong. Hamburgh. Aquatic. Schroeter, t. 7. f. 17.

turbinata. 191. Oblong, imperforated, smooth, pointed; whirls inflated; the first larger, the rest gradually decreasing; aperture suboval, margined; 3¼ inches long. Danube. Schroeter, t. 10. B. f. 5.

58 Nerita.

Gen. 30. Nerita, *Nerite.*

Gen. Char.—The animal is a limax: the shell univalve spiral, gibbous, flattish at bottom; aperture semiorbicular, or semilunar; pillar lip transversely truncated, flattish.

Species.

* *Umbilicated.*

canrena. 1. Smooth; spire slightly pointed; umbilicus gibbous, and bifid. India, Africa, America. Lister, t. 560. f. 4.

cancellata. 2. With decussated striæ, and impressed dots; spire subclavate; umbilicus gibbous, bifid. American islands. Lister, t. 566. f. 16.

punctata. 3. Subglobular, whitish, with numerous scattered yellowish dots, and three transverse rows of reddish, irregular spots. Mediterranean. Chem. xi. t. 197. f. 1903 and 4.

glaucina. * 4. Smooth, glossy, faintly wrinkled; spire rather obtuse; umbilicus rather closed by the pillar lip, which is gibbous and two-coloured; 2 inches long. Barbary, Europe, Britain. Don. t. 20. f. 1.

vitellus. 5. Subglobular; umbilicus perforated, equal. Indian ocean. Lister, t. 565. f. 12.

albumen. 6. Convex; umbilicus somewhat heart-shaped, with a flattened lobe. Cape of Good Hope, Barbary, Indian islands. Extremely rare. Schroeter, ii. t. 4. f. 13.

7. Ovate, glabrous; umbilicus partly covered; whirls four or five; aperture ovate. East and West Indies. Lister, t. 571. f. 22. *mammilla.*

8. Subglobular, solid; tip bluish; lateritious bands in the throat, and a white one on the beak. Mauritius island. Rather large. Chem. xi. t. 197. f. 1901 and 1902. *spadicea.*

9. Thin, rufous; umbilicus darker, with a white border; throat with a reddish band. Mauritius island. Lister, t. 606. f. 34. *rufa.*

10. Subglobular, with angular tawney lines, and flattened lobe; white or yellowish. Africa, Senegal. Rare. Chem. v. t. 187. f. 1881. *fulminea.*

11. Subglobular, polished very smooth; base of the spire a little wrinkled; pillar snowy. Eastern seas. Bay of Naples. Chem. v. t. 188. f. 1898. *orientalis.*

12. Subglobular, white, with red spots; lip obtuse and bluish; umbilicus spiral. Tranquebar. Chem. v. t. 188. f. 1900 and 1901. *cruentata.*

13. Wrinkled; within glabrous; umbilicus bordered with white. American islands. Chem. v. t. 188. f. 1902 and 1903. *rugosa.*

14. Subglobular, smooth, light green, brownish within; livid at the tip; wrinkled at the angle of the whirls. Africa. Chem. v. t. 188. f. 1905. *marochia.*

15. Subglobular; obliquely plaited; spire with 4 whirls, mucronate; umbilicus bifid. Born, t. 17. f. 5 and 6. *sulcata*

16. White, reticulated with reddish lines, and blackish at the tip; umbilicus nearly covered; whirls convex. Chem. v. t. 188. f. 1915 and 1916. *arachnoidea.*

17. Subglobular, brown, with a double white fillet in the middle; reticulated and denticulated on each side. Africa. Chem. v. t. 188. f. 1917 and 1918. *vittata.*

* 18. Semitransparent, horn-colour; whirls prominent; aperture semilunar, and patulous; umbilicus large; a small shell. Coasts of Kent and Dorset. Da Costa, t. 4. f. 4 and 5. *pallidula.*

19. Pellucid, thin, oblong, with decussated striæ; dirty yellow; whirls 4; aperture suboval; pillar white; umbilicus half closed. Tranquebar. Chem. v. t. 189. f. 1939. *papilla.*

** *Imperforate; and the pillar lip toothless.*

20. Whirls of the spire crowned with spines; minute. India, America. Chem. ix. Part 2. t. 124. f. 1083 and 1084. *corona.*

21. Grooved, with equal, tuberculated ribs; size of a walnut. Indian islands. Chem. v. t. 190. f. 1946 and 1947. *radula.*

22. Obsoletely striated; white or pale violet. Red sea. Argenville, t. 7. f. M. *cornea.*

* 23. Rugged, spotted, streaked, or mottled with white and purplish brown or pink; mouth closed with a testaceous operculum; 4 lines long. In slow rivers of Barbary and Europe, Britain. Don. t. 16. f. 2. *fluviatilis.*

* 24. Smooth, with a curious crown; whirls 4 or 5, first large; size of a horse bean. Europe, shores of Britain. Common. Don. t. 20. f. 2. *littoralis.*

25. Smoothish, horny, or blackish, ending in a very fine *lacustris.*

fine point. Still water and warm springs of Europe; supposed to be only a variety of N. *fluviatilis*.

magdalenæ. 26. Grooves wide and black; within white; whirls 3; lip smooth, 2-toothed; 6 lines long. Magdalene islands. Adanson, t. 13. f. 5.

marginata 27. Thin, with decussated striæ; tuberculated; black, with ochraceous spots; subglobular; aperture margined outwardly. Schroeter, t. 4. f. 16.

dubia. 28. Thin, pellucid, ovate, polished; dull yellow varied with black; outer lip acute; inner glabrous; crown prominent. Very rare. Chem. v. t. 193. f. 2019.

*** *Imperforate, with the pillar lip toothed.*

pulligera. 29. Smooth, coarse, with an excavated eye-like small spire; inner lip smooth, crenulated; whirls 2, one large, terminating in an acute tooth; 14—16 lines long. Rivers of India. Lister, t. 143. f. 37.

flavescens. 30. Smooth, yellowish variegated with white, and 3 black bands; pillar lip two-toothed; outer lip slightly striated. Nicobar. Chem. x. t. 195. f. 1594 and 1595.

undulata. 31. Thin, smooth, undulated, with an obtuse crown; outer lip substriated, and toothless; inner one a little denticulated. India. Chem. v. t. 191. f. 1970 and 1971.

pupa. 32. Smooth, roundish, milk-white; whirls with transverse, parallel, black striæ; lip flat; teeth scarcely visible. Jamaica. Lister, t. 605. f. 31.

bidens. 33. Smooth; inner lip 2-toothed; size of a pea. New Zealand. Favanne, ii. t. 10. f. R.

viridis. 34. Smooth, green; inner lip crenulated in the middle. Minorca and Jamaica. Chem. ix. Part 2. t. 124. f. 1089.

virginea. 35. Smooth, ovate, inner lip denticulated; 2 to 10 lines long. Mediterranean. Lister, t. 604. f. 24 to 27.

polita. 36. Smooth; crown obliterated; lip toothed on each side; brown. India, South seas. Lister, t. 600. f. 17.

hieroglyphica. 37. Subglobular, white, with blackish undulated streaks; pillar-lip toothed and crenulated. E. Indian seas. Chem. v. t. 193. f. 2016 and 2018.

piperina. 38. Subglobular, smooth, thin, of a dull yellowish colour, with triangular black spots, and the pillar-lip denticulated. Malabar. Chem. xi. t. 197. f. 1905 and 1906.

larva. 39. Subglobular, smooth, with the summit very obtuse, and the pillar-lip very slightly denticulated. Amboyna. Rumphius, t. 22. f. No. 6.

nigerrima 40. Subglobular, smooth, thick, opake, and minutely striated transversely; outer lip entire, and pillar lip slightly wrinkled. Chem. v. t. 192. f. 1985 and 1986.

peloronta. 41. Striated; lips toothed; inner one flattish and wrinkled. American islands. Lister, t. 595. f. 1.

albicella. 42. Striated; lips slightly toothed; inner one tuberculated. Cape of Good Hope, Indian ocean. Chem. v. t. 193. f. 2000.

plexa. 43. Roundish, with transverse crenulated ribs, which are alternately larger; inner lip plaited above, and tuberculated below. Tranquebar. Lister, t. 598. f. 14.

histrio. 44. Grooved, transversely striated; inner lip toothed; ribs 30, unequal. E. Indies. Chem. v. t. 190. f. 1948 and 1949.

plicata. 45. Grooved; 17 to 20 transverse ribs; outer lip with 5 or 6 teeth within; inner convex, wrinkled, with three long, strong teeth, beside lesser ones. India. Chem. v. t. 190. f. 1952 and 1953.

grossa. 46. Grooved, lips toothed; inner lip with a yellow spot, and 3 or 4 teeth; convex and wrinkled. Molucca islands. Chem. v. t. 191. f. 1968 and 1969.

chamæleon. 47. With 20 grooves, varied with undulated alternate black and white rays; lips toothed; inner one wrinkled and tuberculated. Indian ocean. Banda. Chem. v. t. 192. f. 1988 to 1999.

stella. 48. Subglobular, transversely ribbed, and the summit obtuse and radiated; lips denticulated. E. Indian seas. Chem. xi. t. 197. f. 1907 and 1908.

undata. 49. Grooves 30; ribs about 30, flattened; lips toothed; inner one wrinkled and tuberculated. Indian seas. Chem. v. t. 190. f. 1950 and 1951.

exuvia. 50. Grooved, with 15 to 19 ribs; lips toothed; inner one tuberculated. India. Lister, t. 596. f. 5.

maxima. 51. Solid, thick, glabrous; undulated with black and yellowish rays; outer lip toothless; inner one concave, 4-toothed. A very large shell. Chem. v. t. 190. f. 1942. and 1943.

atrata. 52. Deep black, glabrous, and thinly striated above; both lips white; outer one finely grooved, and slightly toothed within. Atlantic and South seas. Chem. v. t. 190. f. 1954 and 1955.

ascensionis. 53. With 16 white grooves; ribs spotted with white; crown a little prominent; outer lip glabrous on each side; inner one concave, yellowish and toothed. Ascension island; a large shell. Chem. v. t. 191. f. 1956 and 1957.

lineata. 54. Mouth and lips white; whirls round, surrounded with black, parallel striæ; outer lip striated within. Malacca seas. Chem. v. t. 191. f. 1958. and 1959.

pica. 55. White, radiated with black without; striæ transverse, rounded, smooth; inner lip wrinkled and 4-toothed. Indian seas. Chem. v. t. 191. f. 1964. and 1965.

costata. 56. Yellowish within, subglobular, surrounded with thicker striæ; interstices snowy; lips white, toothed; outer one crenated without. Nicobar islands. Chem. v. t. 191. f. 1966 and 1967.

versicolor. 57. With bluish black, red and white square spots, and bands, spotted with red and white; inner lip striated within, and toothed on each side. Antilles islands. Chem. v. t. 191. f. 1962 and 1963.

quadricolor. 58. Pale violet, with a yellowish tip; white within, with elevated black striæ; lips toothed; outer one grooved within; inner one wrinkled. Red sea. Chem. v. t. 191. f. 1974 and 1975.

mallacecnsis. 59. Grooved, yellowish within; crown a little prominent; outer lip unarmed and crenulated outwardly; inner lip yellowish, smooth. Malacca. Chem. v. t. 192. f. 1976.

antillarum. 60. Subglobular, black; white within; grooved and striated; lips wrinkled and denticulated. Antilles islands. Chem. v. t. 192. f. 1987.

flammea. 61. Subglobular, with crowded transverse striæ; white, with purplish undulated rays; outer lip grooved within; inner lip wrinkled above. W. Indies. Chem. v. t. 192. f. 1992 and 1993.

fulgurans. 62. Subglobular, with crowded transverse striæ; deep black, with ochraceous rays; lips slightly denticulated;

hind, and concave. Barbadoes, Mediterranean. Lister, t. 545. f. 33. and 35.

aculeata. 11. Oval, brown, with prickly striæ; crown recurved. American islands. Da Costa, 8. t. 2. f. 2.

goreensis. 12. Oval, flat, thin, white, glossy, lamellated on the outside; 5 to 6 lines in diameter. Rocks at Goree. Favanne, i. t. 4. lower fig. D.

crepidula. 13. Oval, flattish, smooth; lip semilunar, flat behind. Mediterranean, Indian ocean. Martini, t. 13. f. 29. and 30.

*** *With the margin angular, or irregularly toothed.*

laciniosa. 14. Rays unequal, elevated; thicker and obtuse, on the outside. India. Favanne, t. 2. f. I.

saccharina. 15. Angular, with 7 keel-shaped, obtuse ribs. Java and Barbadoes. Lister, t. 532. f. 10.

repanda. 16. Ovate, thin, much depressed, with longitudinal somewhat scaly striæ, and the summit acute; margin irregularly indented. Cerigo. Favanne, ii. t. 2. f. G. 1.

tenuis. 17. Ovate, depressed, and very narrow at the end, with angulated diverging ribs, and the interstices longitudinally striated. Martini, i. t. 10. f. 87.

margaritacea. 18. Ovate, depressed, with irregular angulated ribs, and transverse striæ; summit acute, and the margin angulated and crenated. Patagonia. Martini, i. t. 10. f. 85. A. and B.

barbara. 19. Toothed, with 19 elevated, vaulted, and muricated rays, Falkland islands. Knorr, v. t. 13. f. 5.

granularis 20. Toothed, with elevated, angular, imbricated striæ; 2 inches long. Southern Europe, and Cape of Good Hope. Lister, t. 536. f. 15.

granatina. 21. Angular, with numerous muricated striæ; 1½ to 3 inches long. Jamaica, southern Europe. Lister, t. 534. f. 13.

vulgata. * 22. With about 14 obsolete angles, and dilated, acute, crenated margin; crown central; 2 inches high. Marine rocks of Europe and India, Britain. Lister, t. 5. f. 40.

oculus. 23. Oval, thick, rather shallow, with broad angulated ribs, and the margin unequally serrated. Isle of Cyprus. Martini, i. t. 10. f. 86.

chlorosticta. 24. Ovate, depressed, with 11 broad and intermediate narrower ribs; margin angulated. Jamaica. Martini, i. t. 10. f. 84. A. B.

tigrina. 25. Oval-oblong, with 7 depressed ribs and intermediate longitudinal striæ; margin sub-octangular and crenated. Martini, i. t. 9. f. 78.

ornata. 26. Longitudinally ribbed and ornamented with rays, which are alternately green and black, dotted with white; margin sub-angular and nearly entire. New Zealand. Chem. xi. t. 197. and 1914. and 15.

miniata. 27. Ovate, depressed, with irregular decussated striæ, and narrow longitudinal grooves; margin crenated. Africa and Isle of France. Lister, t. 538. t. 21.

ulyssiponensis. 28. Suboval, depressed, thin, with 9 broad rays, striated and slightly ribbed longitudinally; margin denticulated. Shores of Lisbon. Martini, i. t. 8. f. 62.

radiata. 29. Subovate, slightly striated, and stellated both inside and out, with white and blackish rays. Nicobar islands. Chem. xi. t. 197. f. 1916. and 17.

cærulea. * 30. Crenated, subangular; striæ numerous, unequal; beneath blue; blackish on the outside. Mediterranean and Britain. Born, t. 18. f. 2.

* 31. Very thin and transparent, oblong-oval, quite smooth, of a pale yellowish horny colour, and nearly the same inside; vertex near one end, marked with a dark purple spot, from which emanate from 3 to 7 dotted lines of bright shining azure blue. Britain, on the leaves and stalks of *fuci*. Don. t. 3. f. 1. *pellucida.*

32. Conic, tuberculated; tubercles white, in rows; slightly toothed; retuse behind. Gmelin. *tuberculata.*

33. Longitudinally ribbed and striated, with one end contracted like a scoop, and the summit acute; margin slightly angular. New Zealand. Knorr, ii. t. 26. f. 3. *cochlear.*

34. Oval, subpellucid; ribs 16 to 20; tuberculated and foliaceous on the outside; 1 to 3 inches long. Shores of Cyprus. Martini, i. t. 9. f. 79. *cypria.*

35. Angulated, with undulated, blunt, much elevated ribs, and transversely wrinkled; summit obtuse. Born, t. 18. f. 1. *plicata.*

36. Oblong, flattish; bay striated with white; within milk-white, with 11 elevated, unequal striæ; crown rounded, white. American islands. Martini, i. t. 9. f. 80. *monopis.*

37. Suboctangular, thick, depressed, with fine somewhat granulated striæ, and the spire acute. Provence. Lister, t. 538. lower figs. *angulosa.*

38. Whitish, obtusely pentangular; margin crenated, dilated; crown obtuse; bottom reddish. Born, t. 18. f. 4. and 5. *pentagona*

39. Oval, ochraceous, with elevated black striæ; within silvery, spotted; crown pointed, white, smooth, bottom with a straw-coloured spot. Martini, i. t. 8. f. 67. *melanogramma.*

40. Ferruginous, with angular or undulated russet lines and cinereous belts; within milk-white, with elevated, knotty striæ; crown pointed; margin plaited. Straits of Magellan. Martini, i. t. 28. f. 66. *ferruginea*

41. Thin, pellucid, striated, blackish, with olive rays; within glaucous or cinereous; crown pointed; margin crenated, bottom milk-white. Shores of Africa, Malaga, Lisbon. Martini, i. t. 8. f. 64. and 5. *crenata.*

42. Ovate, with annular striæ; black with elevated, unequal striæ; margin crenated; crown and bottom white. Provence and Cyprus. Martini, i. t. 8. f. 60. *lugubris.*

**** *With the summit pointed and recurved.*

* 43. Entire, conic, pointed, striated, with a hooked, revolute crown; 2 inches high. America, Mediterranean, and Asiatic seas; shores of Britain. Don. t. 21. f. 1. *ungarica.*

44. Conical, with fine cancellated striæ, and the summit obliquely recurved; margin entire. Barbadoes. Lister, t. 544. f. 32. *militaris.*

45. Subconical, with concentric imbricated wrinkles, and the summit slightly recurved. Barbadoes. Lister, t. 544. f. 30. and 31. *antiquata.*

46. With distant strong longitudinal ribs, and the summit recurved; base ovate, and margin sinuated. South Sea. Chem. xi. t. 197. f. 1919. and 20. *cochleata.*

47. Entire; ribs somewhat imbricated; crown hooked; margin sinuated. North America. Martyn's Univer. Con. i. t. 18. *calyptra.*

48. Convex, with longitudinal striæ, which are alternately larger, and armed with vaulted scales; summit recurved; base ovate. America and Falkland islands. Martini, i. t. 12. f. 115. *intorta.*

cassida. 49. Convex, longitudinally ribbed, and striated transversely, with the summit recurved; base roundish, and the margin crenated. Isle of France. Martini, i. t. 12. f. 116.

tranquebarica. 50. Ovate, thin, pellucid, with fine crowded striæ; chesnut with white scales, within milk-white; with a brown spot at the bottom, and azure spot on the crown. Tranquebar. Lister, t. 530. f. 8.

mammilaris. 51. Conical, subpellucid, finely striated longitudinally, and the summit reflected; base oblong, and the margin entire. Mediterranean. Lister, t. 537. f. 17.

leucopleura. 52. Striated, entire, alternately black and white: 1 inch long. West Indies. Lister, t. 539. f. 22.

tricarinata. 53. Substriated, with 3 ribs on the forepart; 2½ inches high. New Zealand. Born, t. 18. f. 6.

pectinata. 54. Entire, ovate, with wrinkled, slightly branched striæ; crown nearly central; 2 inches long. Mediterranean. Einl. ii. t. 5. f. 3.

fusco-lutea 55. Convex, oval-oblong, submembranaceous, with longitudinal striæ, which are alternately larger, and wrinkled transversely; summit reflected. Born, t. 18. f. 8.

lutea. 56. Entire, oval, convex, striated, with a submarginal, reflected, mucronate crown; size of a melon seed. India. Martini, i. t. 17. f. 154. and 5.

perversa. 57. Oblong, horny, very thin, pellucid, glabrous, with a ferruginous base. Africa. Martini, i. t. 12. f. 114. A. and B.

lacustris. * 58. Entire, oval, membranaceous, with a central, mucronate, reflected crown; 1½ to 2½ lines long. Fresh waters of Europe, Britain. Don. t. 147.

oblonga. * 59. Membranaceous, brittle, slightly contracted in the middle, with the summit pointed and obliquely reflected; base oblong. Britain and other parts of Europe. Don. t. 150.

***** *With the summit obtuse, and the margin entire.*

lævis. 60. Subconical, smooth, and diverging longitudinal lines, and the summit nearly marginal; base subovate. England. Montagu, t. 13. f. 8.

radians. 61. Oval, pellucid, much depressed, striated longitudinally, and radiate with blackish spots. New Zealand. Chem. x. t. 168. f. 1618.

areolata. 62. Pyramidal, reddish gray, with thin, circular striæ crossed by longitudinal ones; crown violet. Straits of Magellan. Martini, i. t. 5. f. 41.

flammea. 63. Ovate, with fine annulated striæ, reddish grey, with undulated brown rays; crown acute, central; white in the middle. Falkland islands. Martini, i. t. 5. f. 42.

indica. 64. Reddish grey, with radiated striæ, glabrous, narrower on one side; crown acute, smooth, surrounded with a reddish ring; 3½ inches long. India. Martini, i. t. 7. f. 49.

surinamensis. 65. Thick, subovate, yellowish, with black rays, and longitudinal, unequal striæ; and surrounded with knotty belts; crown obtuse, smooth, white. Surinam. Martini, i. t. 7. f. 50.

vitellina. 66. Ovate, yellow; base unequally striated; crown whitish, obtuse. Martini, i. t. 7. f. 51.

lævigata. 67. Ovate, yellow, within bluish white, with oblique flattened striæ, alternately thicker and thinner; crown white, smooth, polished. Martini, i. t. 7. f. 54.

punctulata 68. Rounded, white, with many coloured dots, radiated towards the base, and surrounded with 2 brown rings. Martini, i. t. 7. f. 55.

69. Roundish, with longitudinal reddish stripes, radiated in pairs, and the margin yellowish. W. Indies. Chem. x. t. 168. f. 1619. *rota.*

70. Entire, acute, smooth, glabrous. Indian and North seas. Martini, i. t. 6. f. 45 to 48. *testudinaria.*

71. Entire, ovate, striated; crown obtuse, nearly central; 14 lines long. Greenland seas. Chem. x. t. 168. f. 1614 and 1615. *testudinalis.*

72. Entire, oval, oblong, striated, smooth; compressed on the back; 14 inches long. India. Lister, t. 541. f. 25. *compressa*

73. Conical, elevated, with about 100 narrow longitudinal ribs; summit obtuse, glabrous, and central. Island of Goree. Martini, i. t. 5. f. 34. *afra.*

74. Entire, conic, with 50 obtuse striæ; 3 inches long. Portugal. Lister, t. 537. f. 20. *rustica.*

75. Conical, convex towards the base, with longitudinal striæ, and distant transverse ridges; base roundish. Jamaica. Martini, i. t. 5. f. 37. *jamaicensis.*

76. Oval, entire, striated; black brown radiated with white; within silvery. Friendly islands and New Zealand. Chem. x. t. 168. f. 1617. *stellifera.*

77. Entire, ovate, obtuse, with 39 cinereous, filiform, elevated striæ. Straits of Magellan. Martini, i. t. 5. f. 40. *fusca.*

78. Depressed, thick, with remote decussated striæ towards the base, and the summit smooth and central; base nearly oval; inside yellow. Surinam. Martini, i. t. 7. f. 50. *surinamensis.*

79. Entire, striated, with a submucronate, erect crown; within white, with a black, heart-shaped spot, white in the middle; minute. Mediterranean. Chem. x. vig. 25. f. c and d. *notata.*

80. Entire, oval, subconvex; brown, with a white cross; 1 inch long. Schroeter, ii. t. 5. f. 7. *cruciata.*

81. Entire, conic, compressed, with reticulated veins. Mediterranean. Schroeter, ii. t. 5. f. 7. *reticulata.*

82. Oval, with crowded longitudinal elevated dotted striæ, and the summit acute and erect. Drobach in Norway. Muller Zool. Don. i. t. 12. f. 1 to 3. *cæca.*

* 83. Oval, very entire, with pale purplish longitudinal rays, and the summit nearly marginal. Britain and Norway. Don. t. 21. f. 2. *virginea.*

84. Oblong-oval; very entire; finely striated longitudinally, whitish, tesselated with red spots. Norway. Muller Zool. Don. i. t. 12. f. 6 and 7. *tesselata.*

85. Oval-oblong, with minute, somewhat decussated striæ, and the spire nearly marginal. Bay of Drobach in Norway. Muller Zool. Don. i. t. 24. f. 1 to 3. *fulva.*

86. Oblong, depressed, with the posterior margin rounded, and the anterior truncated; summit nearly marginal. New Holland. Chem. xi. t. 197. f. 1918. *ambigua.*

87. Entire, oval, pellucid, depressed, striated, horny, and radiated with black spots. New Zealand. Chem. x. t. 168. f. 1618. *radians.*

88. Entire, roundish, diaphanous; depressed, with yellowish rays within; crown pale yellow; margin very acute; 4 inches long. Indian ocean. Chem. x. t. 169. f. 1645. *umbellata.*

****** *With a marginal fissure.*

* 89. Oval, conic, with reticulated striæ; cleft on the fore-part; crown recurved; ½ inch long. European and *fissura.*

and Barbary coasts, Devonshire. Martini, i. t. 12. f. 109 and 110.

incisa. 90. Oval, rather depressed, cancellated, with a broad marginal fissure, and the summit recurved. Falkland islands. Chem. xi. t. 197. f. 1925 and 1926.

fissurata. 91. Oval, depressed, with crowded longitudinal striæ, and a short marginal fissure. New Zealand. Chem. xi. t. 197. f. 1929 and 1930.

******* *With a perforated summit.*

noachina. * 92. Conical, longitudinally striated, and the summit recurved, with a rhomboidal perforation, extending towards the anterior margin. Norway and Britain. Montagu, t. 13. f. 10.

pustula. 93. Oval, gibbous, convex, with reticulated striæ; margin crenated; perforation near the posterior margin. Mediterranean and Indian seas. Lister, t. 528. f. 30.

græca. * 94. Ovate, convex, reticulated; crown not much elevated; perforation oblong; margin crenulated; length ½ inch. Foreign specimens 1½ inch. European seas, Sandwich. Don. i. t. 21. f. 3.

atricapilla 95. Ovate, cancellated, with the longitudinal ribs nodulous and alternately smaller; summit somewhat lateral, and the inner margin entire. Barbadoes. Lister, t. 528. f. 5.

nodosa. 96. Oval, subconical, with elevated, strongly tuberculated ribs, and the summit nearly central; margin crenated. Barbadoes. Lister, t. 528. f. 6.

perforata. 97. A little convex, transversely wrinkled; brownish, with straw-coloured rays and spots; striæ longitudinal, and alternately larger and scaly; 1½ inch long. Barbadoes. Lister, t. 528. f. 7.

caffra. 98. Ovate, compressed, striated; finely annulated, and radiated with black; bottom milk-white; perforation nearly central. Cape of Good Hope. Martini, i. t. 11. f. 95.

pileolus. 99. Oblong, with longitudinal striæ, and the sides compressed; perforation circular and submarginal. Chem. xi. t. 197. f. 1922.

scutellum. 100. Repand on each side, compressed; perforation radiated with grooves; from 1 to 1½ inch long. Falkland islands. Schroeter, ii. t. 6. f. 11.

picta. 101. Ovate, with concentrical elevated belts, and alternately white and violet longitudinal rays; perforation oval. Magellan straits. Martini, i. t. 11. f. 90.

nimbosa. 102. Ovate, striated, rugged, brown; perforation oblong; 2 inches long. Mediterranean and Atlantic. America. Martini, i. t. 11. f. 91 and 92.

nubecula. 103. Subovate, rugged, white radiated with red; slightly striated; perforation ovate. Mediterranean. Lister, t. 529. f. 22.

porphyrozonias. 104. Oblong, compressed, unequally striated; white, with 5 purple, interrupted belts; greenish white within; perforation minute, surrounded on the inside with a red circle. North America. Martini, i. t. 12. f. 102 and 103.

macrochisma. 105. Ovate-oblong, slightly striated, and the sides somewhat compressed; perforation very long, and widened at the posterior end. Japan. Chem. xi. t. 197. f. 1923 and 1924.

61 Dentalium.

Gen. 33. Dentalium, *Tooth-shell.*

Gen. Char.—The animal a terebella; shell univalve, tubular, straight or slightly curved, with an undivided cavity, open at both ends.

Species.

1. With 10 ribs, slightly curved and striated; 4 inches long. Indian and European seas. Lister, t. 547. upper f. 1. *elephantinum.*

2. Straight, doubly or triply striated, and annulated. E. Indies. Martini, i. t. 1. f. 4. A. *rectum.*

3. With 10 ribs, smooth, and slightly curved. Indian seas. Martini, i. t. 1. f. 4. B. *aprinum.*

4. With 8 ribs and 8 striæ, pointed; green, tipped with white. Sicilian seas. Lister, t. 547. lower fig. *striatum.*

5. With 20 striæ, slightly curved, interrupted; red, tipt with white. Mediterranean. Rumphius, t. 41. f. 6. *dentalis.*

* 6. Round, slightly curved; smooth, glossy, tapering to a small point; pervious; 1½ inch long. Indian and European shores; western coasts of England. Don. ii. t. 48. *entalis.*

7. Round, slightly curved, interrupted, opaque; 1½ inch long. African ocean. Schroeter, ii. t. 6. f. 16. *corneum.*

8. Round, slightly curved, continued, with crowded, annular striæ; 1½ inch long. Indian and European seas. Martini, i. t. 1. f. 3. A. *politum.*

9. White, smooth, round, slightly curved, with remote rings. India. Gmelin. *eburneum.*

10. Finely striated, slightly curved; grey, with darker bands; thickness of a crow quill. Sicily. Martini, i. t. 1. f. 3. B. *fasciatum.*

* 11. Subpellucid, subarcuated, tapering to a small point; pervious, contracting a little towards the larger end; white, glossy, and smooth. British channel; called by the mariners *hake's tooth.* It is frequently brought up with the sounding line. Montagu, t. 14. f. 7. *gadus.*

* 12. White, opaque, transversely striated and imperforated; minute. Sandwich, Falmouth harbour. Adams's Microscope, t. 14. f. 8. *imperforatum.*

* 13. Subcylindrical, arcuated, marked with regular, strong, transverse striæ; aperture round, tapering to the other extremity, which is closed; ⅛ inch long; resembles the trachea of an animal. Milton, Devonshire. Rare. Montagu, t. 14. f. 10. *trachea.*

* 14. Round, straightish, smooth, minute; not larger than a bristle. Mediterranean and Britain. *minutum.*

15. Horny, flexile, straightish, round and smooth; 2½ inches long. North seas. Schroeter, t. 6. f. 17. *pellucidum.*

* 16. Cylindric, arcuated, smooth, glossy, without striæ or wrinkles; aperture orbicular; the other end closed, rounded; length one line. Devonshire coast. Montagu, Test. Brit. p. 497. *glabrum.*

62 Serpula.

Gen. 34. Serpula, *Worm-Shell.*

Gen. Char.—The animal a terebella: shell, univalve, tubular, generally adhering to other substances; often separated internally by entire divisions at unequal distances.

Species.

1. Suborbicular; umbilicated; convex, with radiated wrinkles. Greenland, on Sertularia. *stellaris.*

2. Regular, oval, loose, glabrous, not larger than *seminulum.*

a grain of sand. Adriatic and Red seas; and is sometimes found fossil. Martini, i. t. 3. f. 22. a. and b.

incurvata. * 3. Straight, with 3 close whirls at the smaller end; minute. Sandwich. Walker, f. 12.

planorbis. 4. Orbicular, regular, flat, equal; resembles a round scale; adheres to shells.

cereolus. 5. Long, narrow, round, smooth, yellowish; many times twisted. America. Martini, i. t. 3. f. 20. E.

spirillum. * 6. Regular, spiral, orbicular; whirls round, gradually decreasing. Found in the ocean, on zoophytes, on the *corallina officinalis* from Milton rocks, Devonshire. Martini, i. t. 3. f. 20. C. and D.

minuta. 7. Regular, spiral, orbicular, with the whirls reversed; taper, and transversely wrinkled. Britain. Montagu, p. 505.

spirorbis. * 8. Regular, spiral, orbicular; whirls slightly channelled above and inwardly, and diminishing gradually towards the centre. Found in most seas, adhering to *fuci*. Shores of Britain. Don. t. 9.

triquetra. * 9. Strong, opaque, irregularly twisted and contorted; triangular; $\frac{1}{2}$ to 1 inch long. Found in the ocean, adhering to marine substances, stones, and the bottoms of ships. Coasts of Britain. Don. t. 95.

intricata. * 10. Filiform, rough, and intricately twisted; greenish white, a little rugged and coarse. European and Indian seas; shores of Britain, on shells.

carinata. * 11. Regular, spiral, with the outer whirl rising into a carinated ridge on the top. Salcombe Bay, Devonshire.

granulata. * 12. Round, spiral, glomerated; 3 elevated ribs on the upper side; size of a coriander seed. North seas, in masses adhering to shells and stones. Britain. Don. t. 100.

cancellata. 13. Spiral, glomerated, with three grooves, the lower interrupted by transverse ribs; aperture 2-toothed. Greenland seas.

heterostropha. * 14. Taper, spiral, with three elevated ribs on the upper side, and the whirls reversed. Devonshire. Montagu.

corrugata. * 15. Regular, spiral, transversely wrinkled, and umbilicated. Devonshire.

lucida. * 16. Taper, spiral, very smooth and glossy; whirls reversed. Britain. Linn. Tr. v. t. 1. f. 31.

vitrea. * 17. Round, regular, spiral, orbicular, wrinkled, with a thickened aperture. Greenland seas; shores of Britain.

contortuplicata. * 18. Angular, rugged, and irregularly entwined; transversely striated; 3 to 4 inches long. European and American seas, shores of Britain. Martini, i. t. 3. f. 24. A.

nebulosa. 19. Thick, wrinkled, and much twisted; aperture large and indented. America. Favanne, t. 6. f. 1.

goreensis. 20. Round, cancellated, yellow, within horny; 8 to 9 inches long. Goree. Favanne, i. t. 6. f. 812.

glomerata. 21. Round, glomerated, with decussated wrinkles. European and Atlantic sea. Martini, i. t. 3. f. 23.

lumbricalis. 22. Round, flexuous, with a spiral, acute tip; transversely ribbed, and longitudinally wrinkled; 3 to 5 inches long. Atlantic and Indian seas, in large masses. Lister, t. 548. f. 1.

conica. 23. Subcylindrical, flexuous; spiral at the base. America. Martini, i. t. 2. f. 15.

arenaria. 24. Jointed, entire, distinct, flattish beneath. India and Africa. Martini, i. t. 3. f. 19. A, B, and C.

afra. 25. Substriated, yellowish brown, round, twisted into 3 whirls, with a central tip. Goree. Martini, i. t. 3. f. 20. A. B.

volvox. 26. Suboctangular, cancellated, and irregularly spiral. E. Indies. Martini, i. t. 2. f. 14.

anguina. 27. Roundish, somewhat spiral, with a longitudinal, jointed cleft. Indian ocean. Lister, t. 548. f. 2.

muricata. 28. Angular, muricated, with a longitudinal, subarticulated fissure. Indian ocean. Martini, i. t. 2. f. 8.

annularis. 29. Subcylindrical, with annular contractions, and an obsolete longitudinal fissure. Martini, i. t. 2. f. 10.

cornucopiæ. 30. Conic, spirally twisted, yellowish, with brown bands; the middle round and twisted; aperture orbicular. Mauritius island. Chem. xi. t. 211. f. 202 and 203.

decussata. 31. Round, with decussated striæ, slightly wrinkled, flexuous, red; within smooth, white. Barbadoes. Lister, t. 547. f. 4.

vermicularis. * 32. Round, tapering, curved, wrinkled; 2 to 3 inches long. European seas, coasts of Britain. Don. t. 95. The animal which inhabits this shell is of a bright scarlet colour, and is furnished with elegant feathered tentacula, from the midst of which arises a trumpet-shaped tube, and a lesser simple one.

tubularia. * 33. Taper, subulated, and flexuous, with the larger end detached and ascending. Devonshire and Shetland islands.

denticulata. 34. White, round, subulate, straight, and toothed at the sides; with a longitudinal glabrous rib in the middle; tip glabrous, a little incurved; $\frac{1}{2}$ inch long. Found in the lepas tintinnabulum. West Indies. Schroeter, ii. t. 6. f. 18.

aquaria. 35. *Watering-pot*; round, straight, taper, with a dilated, radiated, larger extremity; the disc is covered with cylindrical pores; 3 to 5 inches long. Indian ocean. Lister, t. 548. f. 3.

ocrea. 36. Brown, roundish, striated. Indian ocean, adhering to corals. Martini, i. t. 1. f. 9.

proboscidea. 37. Smooth, white, the broader part straight, and transversely plaited; 2 to 4 inches long. Martini, i. t. 2. f. 18. A and B.

protensa. 38. Polished, smoothish, with annulated plaits, a little tapering towards the end; size of a quill. Indian and American seas. Martini, i. t. 2. f. 12. A.

gigantea. 39. Somewhat triangular, and a little flexuous, gradually tapering, violet; within smooth and pale yellow; aperture white, with undulated striæ, and armed with a conic tooth; a foot high, and as thick as the little finger. Africa and America. Pallas, t. 10. f. 2 to 10.

sulcata. * 40. Whirls 2, deeply and spirally grooved; greenish; minute. Coast of Pembrokeshire, on the roots of fucus digitalis.

ovalis. * 41. Suboval, with 2 bends, imperforated; minute. Found at Denbigh.

reflexa. * 42. Regular, rounded; margin reflected at the aperture; minute. Pembrokeshire sands.

cornea. * 43. Regular, rounded, pellucid, with three whirls; horny. Pembrokeshire coast.

bicornis. * 44. Semilunar, ventricose, white, opaque, glossy; minute. Sandwich and Reculver.

perforata. * 45. White, opaque, glossy; semilunar and perforated; minute. Sandwich. Rare.

lactea. * 46. Oval, thin, smooth, pellucid, with milky veins; minute. Sandwich. Very rare.

* 47.

composed of minute particles of sand; $\frac{1}{8}$ inch long. Rivulets of Thuringia. Schroeter, t. 11. f. 1.

stagnalis. 9. Straight, tapering, open at both ends; smooth, with a margined aperture, composed of very minute particles of sand. Rivers of Thuringia. Schroeter, t. 11. f. 13.

conica. 10. Narrow, conic, smooth, straight, cinereous; with a blackish open tip, composed of very minute particles of sand; not $\frac{1}{2}$ inch long. Schroeter, t. 11. f. 14.

uncinata. 11. Smooth, round, tapering, with an open hooked tip; $\frac{1}{2}$ inch long. Rivers of Thuringia. Schroeter, t. 11. f. D. f. 8.

sabulosa. 12. Cylindrical, closed at the tip, subclavated, perforated, and composed of larger grains of sand; not an inch long. Thuringia and Belgium. Schroeter, t. 11. f. 4.

vegetabilis 13. Depressed, composed of fragments of twigs, stems, and bark, and broken pieces of the tellina cornea; an inch long. Waters of Thuringia. Schroeter, t. 11. f. 9.

ammoniata. 14. Polygono-cylindrical, within smooth, composed of fragments of cornu ammonis. Rivers. Schroeter, t. 11. f. 10.

helicina. 15. Round, within smooth, composed of fragments of the helix pusilla; an inch long. Stagnant waters of Thuringia. Schroeter, t. 11. f. 11.

dimidiata. 16. One part of the shell composed of sand or gravel, the other thicker, clavated, and composed of fragments of shells. Waters of Thuringia. Schroeter, t. 11. f. 3. D.

fixa. 17. Composed of small stones; tapering towards the tip; an inch long; affixed to stones in the water, and open at the side by which it is fixed. Thuringia. Schroeter, t. 11. f. 12.

clavata. 18. Composed of small stones; the open end clavated, and consisting of larger stones; solitary. Thuringia. Schroeter, t. 11. f. 2.

corticalis. 19. Composed of pieces of bark, towards the end of broken stems. Schroeter, t. 11. f. 5.

arundinacea. 20. Subconic, open at both ends, composed of fragments of the bark of reeds, placed on each other; an inch long. Schroeter, t. 11. f. 6.

aculeata. * 21. Composed of small twigs, the points of which project a little; an inch long. Thuringia, Britain. Schroeter, t. 11. f. 7.

marsupialis. 22. Black; open end cylindrical and narrower, the other part tinged and ovate; 2 inches long. Schroeter, 2. t. 6. f. 21.

norwegica 23. Roundish, open at both ends, brittle, membranaceous; composed of very minute grains of sand; 4 inches long. Norway. Schroeter, 2. p. 591. N° 20.

lumbricatis. 24. Coarse, creeping, fragile, open at both ends; the animal not furnished with tentacula at the mouth; body prickly, jointed. Deeps of the Greenland seas; fixed to stones. Fabr. fn. Groenl. p. 374. N° 369.

indica. 25. Cylindrical, composed of capillary, subcylindrical, agglutinated crystals of quartz. Indian ocean. Abildy Schr. Bell. Naturf. 9. p. 144. t. 4.

arenaria. * 26. Extremely fragile, cylindrical, composed of pure sand, slightly cemented together, without any internal membrane; size of a raven's quill; from 1 to 2 inches long. Dorsetshire coast. Montagu.

subcylindrica. * 27. Long, subcylindric, slender, fragile, composed of fine sand, and minute bits of broken shells, cemented together on a fine membrane; 3 inches long. Salcomb bay. Montagu.

letiformis. * 28. Long, slender, gradually tapering to the lower end, composed of fine fragments of shells, and minute flat bits of stones, cemented together at their edges; 3 to 4 inches long. Salcomb bay.—Some have been observed with a lateral branch near the smaller end, which is supposed to be a young one. Montagu.

curta. * 29. Small, short, composed of sand and minute bits of flat stones, agglutinated to a tough membrane; size of a crow quill; an inch long. Inlet near Kingsbridge. This sabella is gregarious, covering the whole surface of the shore, appearing like bits of straw covered with mud. Montagu,

compressa * 30. Short, broad, and very flat, composed of large fragments of flat, bivalve shells, placed with the concave side inwards; $1\frac{1}{2}$ inch long. Deeps at Torcross, Devonshire.

The animals included under the preceding genus, have for their coverings particles of sand agglutinated on the external membrane, and resemble rather the larvæ of certain *insects*, than the testaceous *vermes*. The latter form their calcareous integuments entirely from the secretions of their own surfaces, and are attached to these by cartilaginous processes, so as to render them essential and indispensable parts of their structure. The coverings of the sabellæ seem to be more of an adventitious nature, and may be considered rather as serving the purposes of habitations, than as being organized *integrals* of the contained animal. This genus, therefore, does not come under the class of testaceous animals; and indeed is by all physiologists of modern times rejected from the arrangement of testaceous vermes.

65 Enumeration of the species.

Number of species included under each order, in the preceding classification.

Multivalves	99
Bivalves	655
Univalves	1655
Total number of species exclusive of the sabellæ.	2409

CHAP. V. OF THE CONSTITUENT PARTS OF SHELLS, &c.

HAVING in the former chapter enumerated, under each genus, all the species of testaceous animals which have been hitherto discovered; and having given the characteristic marks by which each is distinguished, which marks are derived from the shell or testaceous covering; we now propose to inquire what is the nature of this substance; in what way it is produced by the animal, and how it is enlarged as the animal increases in size. These topics shall be the subject of the present chapter, which may be conveniently divided into the following sections. 1. Of the constituent parts of shells. 2. Of their formation. 3. Of the colours of shells. 4. Of the formation of the umbilicus and protuberances, &c. 5. Of the pearl.

Sect.

Of the Constituent Parts of Shells, &c.

Sect. I. *Of the Constituent Parts of Shells.*

Phil. Trans. 1799.

The nature and component parts of testaceous substances have been particularly investigated by Mr Hatchett, from whose paper we extract the following observations.

66 Divisions of shells from their component parts.

In his examination of marine shells, Mr Hatchett found, from the nature of the substance of which they are composed, that they might be arranged in two divisions. Under the first are included those which have a porcellaneous appearance and enamelled surface, and exhibit, when broken, something of a fibrous texture. The other division is distinguished, by having a strong epidermis or covering, under which is the shell, composed principally or entirely of mother-of-pearl. To the first division belong different species of voluta, cypræa, and others. The second comprehends the oyster, the river mussel, and some species of haliotis and turbo.

67 Porcellaneous.

Porcellaneous shells.—The shells of this description which were examined, were different species of voluta and cypræa. When they were exposed to a red heat for a quarter of an hour, they crackled, and lost the colours of their enamelled surface. No apparent smoke, and no smell, like that of burnt horn or cartilage, were emitted during the process. The figure remained the same, excepting a few flaws; and they became of an opaque white, partially tinged with pale grey. When they were dissolved in acids, after being burnt, they deposited a small quantity of animal coal, which proves that they contain some portion of gluten. Shells which had not been exposed to the fire, dissolved with great effervescence in the different acids; and the solution remained transparent and colourless; from which it appears, that the proportion of gluten is small, since it could not be traced in the solution of the unburnt shells.

In examining the different solutions of shells, whether burnt or unburnt, by chemical tests, it was found, that no trace of phosphate of lime, or of any other combination of phosphoric acid, existed in these substances. And it appeared from many experiments, that the component parts of porcellaneous shells, are carbonate of lime, cemented with a very small portion of animal gluten.

Some species of patella, which were brought from Madeira, were also subjected to chemical examination, by the same philosopher. When exposed to a red heat in a crucible, they emitted a perceptible smell of horn or feathers; and by farther examination, by solution, the proportion of carbonic matter deposited appeared to be greater, and the proportion of carbonate of lime less, than what was indicated by the result of the experiments on porcellaneous shells. When unburnt shells belonging to the same species, were immersed in nitric acid very much diluted, the epidermis separated, and the whole of the carbonate of lime was dissolved. A gelatinous substance, nearly in a liquid state, remained, but it did not retain the figure of the shell, and exhibited no appearance of a fibrous structure. These shells, therefore, contain a larger portion of gelatinous matter than the porcellaneous shells, but the other component part consists entirely of carbonate of lime.

68 Mother-of-pearl.

Shells composed of mother-of-pearl.—Shells of this description, were subjected to similar experiments with the former. When the common oyster was exposed to a red heat, the effects were the same as those which were produced by the same process on the species of patella from Madeira. The solution of the unburnt shell was also similar, excepting only that the gelatinous part was of a greater consistency. When the river mussel was burnt in a crucible, it emitted much smoke, with a strong smell of burnt horn or cartilage; the shell became of a dark grey colour, and exfoliated. By solution in the acids, the proportion of carbonic matter separated was greater, and that of carbonate of lime obtained was less, than from the other shells on which experiments were made.

When an unburnt shell of this description was immersed in diluted nitric acid, a rapid solution and effervescence took place; and at the end of two days, the whole of the carbonate of lime was nearly dissolved. A series of membranes now only remained, of which the epidermis constituted the first. These membranes still retained the figure of the shell. The carbonate of lime was at first readily dissolved, because the acid came easily in contact with it; but the process became slower, as it was more difficult for the acid to insinuate itself between the different membranes of which the shell is composed. The haliotis iris, and the turbo olearius, were found to resemble this mussel, except that the membranaceous parts were more compact and dense.

When these shells are deprived by an acid of the carbonate of lime, which gives them their hardness, they appear to be formed of different membranes, applied stratum super stratum. Each membrane is furnished with a corresponding coat or crust of carbonate of lime, and it is so situated, that it is always between every two membranes, beginning with the epidermis, and ending with the internal membrane, which has been last formed. The animals which inhabit these stratified shells, increase their habitation by the addition of a stratum of carbonate of lime, which is secured by a new membrane. And as every additional stratum exceeds in extent that which was previously formed, the shell becomes stronger in proportion as it is enlarged; and thus the growth and age of the animal may be denoted by the number of strata of which the shell is composed. Similar experiments were made on pieces of mother-of-pearl as they are imported from China, and with precisely the same results. They appeared to be composed of the same gelatinous matter and carbonate of lime. In all the shells of this description which were immersed in acids, the membranaceous parts retained the exact figure of the shell, and they appeared distinctly to be composed of fibres, arranged in a parallel direction, corresponding to the configuration of the shell.

Pearl.—The constituent parts of pearl appear to be similar to those of mother-of-pearl. They are composed of concentric coats of membrane and carbonate of lime, and resemble in structure the globular, calcareous concretions which are known by the name of *pisolithes*. The iridescence and undulated appearance of pearl and mother-of-pearl, evidently depend on their lamellated structure and semitransparency. 69 Pearl.

From these experiments it appears, that shells are composed of carbonate of lime and gluten. In some, as 70 Component parts.

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as in the porcellaneous shells, the proportion of carbonate of lime is great, while that of the animal matter is small; and these may be regarded as the beginning of the series; while shells that come under the description of mother-of-pearl are to be placed at the other extremity, having a smaller proportion of carbonate of lime, and a greater proportion of membranaceous substance. In the first the carbonate of lime is merely cemented by the animal matter; in the latter the carbonate of lime serves to harden the membranaceous substance. But between these two extremes, in the proportion of carbonate of lime and animal gluten, of which all testaceous substances are composed, there are no doubt numerous intermediate gradations, arising from the nature of the animal to which they form a covering, its peculiar habits, or mode of life.

Sect. II. *Of the Formation of Shells.*

The shell or covering of testaceous animals, has been considered as in some measure analogous to the bones of other animals, although its formation and growth are very different, since it serves as a base or support to the muscles, which are attached to its internal surface. The principal use of the shell, however, is to serve as a covering or defence to the animal.

71 Testaceous animals oviparous and viviparous.

Testaceous animals are not only extremely different in external form, but also in the mode of their production. Some are viviparous, as the most of those which inhabit bivalve shells, multivalves, and even some of the univalves; while the others, which form the far greater proportion, are oviparous. In one point, however, they all agree, that whatever be the mode of production, whether from an egg, or directly from the uterus of the mother, the shell is formed on the body of the young animal, and is proportioned to its bulk.

72 Reaumur's investigation.

The best observations which have yet been made, and the most elaborate investigation which has hitherto appeared, concerning the formation and developement of shells, are those of the celebrated Reaumur, which were published in the Memoirs of the Academy of Sciences for the year 1709. The same subject has been prosecuted by other authors, but their results have been nearly the same as those of this distinguished naturalist. Klein is almost the only author who has advanced a different opinion. In his dissertation concerning the formation of shells, he charges Reaumur with supporting the opinion, that testaceous animals, when they proceed from eggs, are not furnished with the shell, but that it is formed after being hatched. This opinion indeed has been ascribed to Reaumur by the historian of the academy, who, in the analysis of his excellent memoir on the formation of shells, has observed, "that hitherto the

73 His opinion mistaken.

curious have been struck with the prodigious variety, the exact regularity of structure, the singular beauty and splendour of colour of shells; but naturalists have been less attentive in studying and investigating the mode of their formation. They seem to have thought that although shells, as well as the covering of crustaceous animals, are bones placed externally to the animals which they cover, it was necessary to consider them as part of their bodies, and to include this inexplicable circumstance under that of the general formation of animals, which is incomprehensible to the human mind. They have therefore supposed that the animal and its shell proceeded from the same egg, and were developed together; and they have rested satisfied in admiring the economy of nature in providing so elaborate a covering for so low an order of animals. But this supposition, although probable, is not founded in truth. The animal only, not the shell, is produced from the egg. The discovery of this fact is owing to Reaumur."

It must seem very extraordinary, that such an error should have crept into the abstract of the memoir of this celebrated philosopher, who in the course of it has clearly expressed a contrary opinion. "I have frequently," says Reaumur, "compared the shells of snails which were just hatched, and even with those which I had taken from the eggs before they were hatched, with other shells of full grown snails of the same species, with which I had left only the same number of whirls of the spire with the small shells, and then they appeared in all respects the same." He farther observes, "that what has been said with regard to the increase of shells, renders it unnecessary to enter into the detail of their original formation; for it is easy to conceive, that when the body of a small embryo which is one day to fill a large shell, has arrived at a certain state, in which the different teguments in which it is included have sufficient consistence to secrete from their pores the peculiar fluid which is destined to the formation of the shell, this fluid may be 74
deposited on the surface, may thicken, and at last become firm and solid. And thus commences the formation of the shell, in the same way as its increase is continued. Snails do not proceed from the egg without being previously furnished with this shell, which then has one turn and a little more of the spire.

All testaceous animals furnished with the shell before being hatched.

When the eggs of testaceous animals are hatched, the young appears with its shell already formed, and according to the observation of Reaumur, it has then one complete turn of the spire and a little more; but at that period the shell is extremely thin. It seems probable that the formation of the shell is posterior to that of the principal organs of the animal, as the bones in the fœtus of other animals are formed after the brain and heart.

Reaumur has suspected that the shell is the last 75
formed, and if proofs are wanting to establish this fact, it is certain that at particular periods, if the eggs of testaceous animals are opened, the external parts of the embryo are found already developed, without any appearance of the shell. But whatever may be the period of the formation of the shell, it may be received as an established fact, that the animal is furnished with it at the time it leaves the egg. Leeuwenhoek first observed this fact with regard to oysters; the same observation was afterwards made by Lister, and extended to others, both land and river shells. This observation has been confirmed by other naturalists, and particularly by Rumphius, Swammerdam, Reaumur, and Adanson. From the investigations of the latter it appears, that although there are many of the marine testaceous animals which are viviparous, they resemble those which are oviparous, in being furnished with the shell when they are separated from the parent.

Shell last formed.

Since then it appears, that the shell of testaceous 76
animals is completely formed previous to the developement of the animal, and that it may be considered as an

Two opinions of the formation of shells.

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an essential part of its organization, let us now inquire into the mode by which its growth is effected. According to the decisive experiments of Reaumur, the enlargement of shells is owing to juxta-position, or successive additions of earthy and animal matter, independent of any organized structure. Klein has supported a contrary opinion, and supposes that the growth of shells is effected by intus-susception, or a kind of circulation. The opinion of Reaumur, however, has most generally prevailed. Excepting Bonnet, few naturalists have adopted that of Klein; and it will appear that this celebrated naturalist was led to entertain this opinion concerning the mode of the formation of shells, by the experiments of Herissant on the generation of bone and shell. From these experiments it was clearly demonstrated, that shells are composed of two substances, the one a membranaceous or animal substance, and the other an earthy matter; but no such conclusion can be drawn from them in support of the opinion, that the shell is a continuation of the body of the animal, or that it is so closely connected as the bones in the bodies of other animals; or even that this connexion is formed by means of fibres of the ligament which attaches the animal to its shell: for it has been shown, that these muscular or ligamentous fibres, in all descriptions of testaceous animals, are successively separated, in proportion to the increase or enlargement of the shell. This could not possibly take place, if the evolution and formation of the shell, according to the opinion of Herissant, depended on an internal circulation, analogous to what happens in the body of the animal. In this case the vessels which proceed from its body, having no longer a communication with those which are supposed to exist in the shell, it would be deprived of nourishment, and consequently could not increase in size. And it is found, that this separation takes place in all shells. It is gradually completed as the growth of the shell advances.

77 Bodies organized or inorganized.

A body may increase in volume in two different ways. Either the particles of which it is composed pass through that body by means of circulation, and undergo certain changes by which they are prepared to form part of the body; or the particles of which a body is composed, may unite with it by juxta-position, without any previous circulation or preparation within the body, to the increase of which they are destined. It is in the first way that the growth of vegetables and animals is accomplished; the second is the mode by which shells receive new additions of matter, and enlarge in size. The first is the mode of increase peculiar to living, organized substances; by the second, inorganized substances receive new additions of matter, and increase in volume. These indeed afford sufficient characteristic marks for a natural division of bodies into two classes, namely organized and inorganized substances.

78 Reaumur's experiments.

The experiments of Reaumur have decisively proved, that the growth of shells is owing to the latter mode of increase. These experiments were made, not only on sea-shells, but also on land and river shells; on univalves and bivalves; and, in all, the result was invariably the same. In conducting these experiments, he inclosed the shells, on the progress of which he made his observations, in boxes pierced with small holes, so as to admit the water, but so small as to prevent the egress of the animal. These boxes were sunk into the sea, or the river, and in this way he was enabled to watch the process of the growth of the shell. He first observed, that when the animal which exactly filled its shell, began to increase its size, the shell in a short time, not being sufficiently large to cover its whole body, part of it was naked or unprotected. This part of the animal must always be towards the opening of the shell, because the shell being previously completely filled, it cannot extend in any other direction. All animals, which inhabit shells of a spiral form, such as the snail and volute, can only extend at the head, or the opening of the shell; whereas the animals in bivalve shells, such as the mussel and the oyster, may enlarge in their whole circumference. In all the species of testaceous animals, it is this part which appears by the increase of the animal when it enlarges the shell. This increase takes place, according to Reaumur, by the following mechanism.

79 Process of the formation of shell.

It is a necessary effect of the laws of motion, when liquids run in canals, that the small particles of these fluids, or the small foreign bodies mixed with them, which on account of their figure, or their less degree of solidity in proportion to their surface, move slower than the others, fly off from the centre of motion, and approach towards the sides of these canals. It even frequently happens, that these small particles attach themselves to the internal surface of these canals or tubes, and form concretions of different degrees of thickness. It is besides certain, that the fluids which circulate in these tubes, press against their sides on every point of their interior surface; so that if they were pierced with a number of small holes of sufficient diameter to give passage to the small particles of matter floating in these fluids, these particles would be deposited on the external surface, where a crust would be formed, similar to that in the inside; with this difference, that it would become thicker and more solid, being less exposed to the friction of the fluid, than that which is deposited in the interior of the tube.

80 By secretion from the animal.

To a similar mechanism Reaumur ascribes the increase of shells. The external surface of that part of the body of the animal which has extended beyond the limits of the old shell, is furnished with a great number of canals, in which circulate the necessary fluids for the nutrition of the animal. A great many small particles of a viscid and earthy matter are mixed with these fluids. Now, as these particles are less fluid than those of which the liquids themselves are composed, they approach the sides of the vessels, which are themselves furnished on that side of the external surface of the body of the animal, with a great number of pores, which allow them to escape from the vessels, so that they are deposited on the external surface of these tubes, or rather in that of the body of the animal itself, which is uncovered by the shell.

These particles of earthy and viscid matter having reached the surface of the body of the animal, readily unite with each other, and with the extremity of the old shell, especially when the excess of moisture is dissipated; and thus by their union they compose a small solid body, which is the first layer of the new addition. Other particles of similar matter continuing to escape in the same way from the excretory vessels of the animal, form a second layer under the first; afterwards a third

third, and a fourth, or more, till the new part of the shell has acquired sufficient consistence and thickness. It is, however, observed to continue thinner for a certain time than the former opening, till the increase of the animal requires another enlargement of its covering.

When a testaceous animal is going to enlarge its shell, as for instance the common snail, the body projects from the opening. It is then seen to attach itself to a wall or some other solid substance, and the portion of its body which is unprotected by the shell, is soon covered with the fluids which are excreted from its surface. The pellicle which they produce when the fluid dries, is at first thin and elastic, but gradually assumes more consistence, and becomes at last similar to the old part of the shell. If in this stage of the process a bit of the shell is broken and removed, without injuring the body of the snail, the skin of the animal is soon covered with a fluid, which gradually thickens,

81 Time necessary to form shell.

and becomes solid. Twenty-four hours after the operation, a fine crust may be observed, which constitutes the first and external layer, for repairing the breach which was made. At the end of some days this layer has become thicker, and in 10 or 12 days, the new piece of shell which is formed, has acquired the same thickness as that which was removed. In making this experiment, certain precautions are necessary, otherwise there is some risk of its failure. If, after the broken piece of the shell has been removed, and particularly if the fracture is made near the edge of the opening, the animal is not supplied with a sufficient quantity of nourishment, its volume or bulk is soon diminished; and now finding that what remains of the shell is a complete covering to its diminished body, no excretion takes place for the production of a new portion. In removing snails from a wall to which they had attached themselves, for the purpose of observing the progress of the formation of the shell, some days will elapse after they are placed in the box, before the process commences, because the testaceous matter which had been already expended after fixing on the wall, must be fully supplied before any new portion can be again formed.

This experiment shows clearly, that shells are only enlarged by receiving new additions of matter, after it has been excreted from the body of the animal, and not by *intus-susception*, or a circulation through the body of the shell itself. If this were the case, the production of new matter to fill up the breach made in the shell, would first appear all round the edge of the opening, and forming a kind of callus, similar to what happens in the reproduction of bony matter in other animals, it would gradually extend till the whole breach is filled up. But, on the contrary, this matter first appears on the body of the animal from which it has exuded, and the whole extent of the opening is closed at once by the fluid which has been directly secreted from the surface of the body. Nor can it be supposed, that the liquid has insensibly exuded from the shell, and falling on the body of the animal, is there collected in sufficient quantity for the formation of the new piece of shell. This is fully demonstrated by the two following experiments of the same naturalist.

Reaumur broke several shells of snails; and, having made a very large hole about the middle of the shell, and about an equal distance between its summit and opening, he introduced between the body of the animal and its shell, through the hole, a piece of skin which was extremely fine, but of a very close tex-

82 Other experiments of Reaumur.

ture. He glued this skin to the internal surface of the shell, so that it shut up accurately the artificial opening which he had made. It must then be obvious, that if the reproduction of the piece of shell which was removed, depended on the excretion of a fluid from the shell itself, and not on that which proceeds from the surface of the animal's body, the new piece of shell would be formed on the external surface of the piece of skin which was introduced; and it is not possible that it could be formed between the skin and the body of the animal. But the contrary of this has always happened. The new testaceous matter is always deposited on the internal surface of the skin; that is, on the side which is in contact with the animal's body; and no matter whatever was deposited on the other surface. This experiment has been repeated by others, and has been invariably attended with the same result.

The second experiment made by Reaumur is not less decisive than the first. He took a number of snails, and broke the shells, so that he diminished the number of the turns of the spire about $\frac{1}{7}$ part. Having in this way rendered the shells too small to cover the body entirely, they were nearly in the same situation as when an increase of the animal's body requires an augmentation of the shell. He then took a bit of skin, as in the former experiment, sufficiently large for the opening of the shell, and introduced one of its edges between the body of the animal and the shell, to the interior surface of which he glued it; after which having folded back the other extremity of the skin on the external surface of the shell, he glued it in like manner, so that the whole external opening was completely covered with the skin. The results were exactly the same as before. The shell grew, the skin remained in its place, and that part of it which was attached to the interior surface was fixed between the new piece and the old shell, which consequently could not contribute to its formation.

83 Layers of shells seen by burning.

From these experiments, which may be easily repeated, it appears that the increase of shells is owing to the secretion of an earthy and viscid animal matter which is prepared in the body of the animal, and which is successively formed by layers from the interior part of the shell to the external surface. This formation is determined by the previous enlargement of the animal. The different strata or layers of which shells are composed, can be easily demonstrated by exposing them to the action of fire, and removing them before their structure is entirely destroyed. By this process the animal matter is consumed, and the earthy substance remains, exhibiting a laminated structure. The same structure may be demonstrated, as has been already observed, in detailing Mr Hatchett's experiments, by immersing a shell of the description of mother-of-pearl in a diluted acid. The earthy matter in this case is dissolved by the acid, and the layers of animal matter which are interposed, resisting the action of the acid, remain unchanged, and still retain the original figure of the shell.

It

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84 Turns of the spire increased.

It is a necessary consequence of the mode in which the shells of snails are increased, that they cannot enlarge in volume, but by the augmentation of the turns of the spire, and that the length of each turn of the shell already formed, remains always the same. This may be easily put to the test of experiment, by reducing the shell of a snail which has reached its full size to the same number of turns with those of younger shells of the same species. The two shells do not then exhibit any other difference than in their thickness; and it would be the same, by comparing the youngest shells, those which have been just separated from the egg, with the first turns of those of the same species which have been reduced by breaking them to an equal diameter. The number of turns or whirls of which the spire of a shell is composed, increases very considerably the size of the shell in univalves, and one turn more or less makes a great difference in their volume. According to Reaumur, the diameter of each turn of the spire is in the snail nearly double that of the preceding one, and ½ of that which follows; but in many other shells, both marine and river, the last whirls of the spire, compared with the preceding ones, greatly exceed this proportion. In some, the external opening is 12 times greater than the preceding one, and in others, it is not more than eight times. This depends entirely on the increase of the animal's body, and the proportion of that increase. The growth of some is lengthwise, and in them the increase of diameter is proportionally less; while others increase more in thickness than in length. Those testaceous animals which have only a few turns in the spire of the shell, are of this description. To the former belong such as have a greater number of turns in the spire.

85 The animal is detached from the shell in many cases.

Those who have adopted the opinion of Klein with regard to the formation of shells, have denied the separation of the animal from the shell, which successively takes place near the tip in univalves. It is indeed on this circumstance of the connexion of the animal with the shell, that the truth of this theory depends. According to it, the animal is attached to the internal surface of the tip of the shell in univalves, and on this connexion depend the increase of the shell, and even the life of the animal. But it is a certain fact, that the posterior part of the body of the animal is entirely detached from the tip of the shell; and this holds, not only with regard to all land and sea shells which have lost the first turns of the spire, and consequently those of the tip; but also in a great number of other marine testaceous animals. It seems not only certain, but even necessary, that this separation between the animal and the shell should also take place in bivalve shells, if we take a distinct and rational view of their growth. Whether this separation is suddenly effected, or by a gradual process, which is most probable, it seems to be sufficiently obvious, by examining the internal surface of the valves. This is still more strongly confirmed by sawing univalve shells, particularly those which are considerably elongated, and have a great number of turns in the spire, in a direction perpendicular to their axis. In old shells, several of the first turns of the spire will be found completely filled up with testaceous matter, so that the tip of the shell has become quite solid, or at least it will appear to have been long unoccupied by any part of the body of the animal. But in transparent shells, as in some species of helix, it is seen that this attachment does not exist; and the H. planorbis can be preserved alive, although the tip of the spire is broken off.

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Sect. III. *Of the Colours of Shells.*

86 Inquiry curious.

The infinite variety of the colours of shells is one of the most striking parts of their history; and it becomes a curious and interesting object of investigation to inquire, whether these colours are uniform and constant in the species, and from what proceed this regularity and uniformity. The experiments and observations of Reaumur will assist us in this investigation. When a hole is made in a shell, nearly at an equal distance between its tip and opening, the new piece of shell which is formed to shut up the hole is usually of a white colour, and often very different from that of the rest of the shell. It would appear at first that the new piece is of a different nature, and that it is not formed in the same way as the rest of the shell. To meet this difficulty, it will be necessary to explain on what depends the regular variety of the colours of certain shells: the same experiments which lead to the discovery of the cause of the one, will serve to unfold the other.

87 Colours vary from particular circumstances.

This remarkable variety of colour is in no shell more remarkable than in the *helix nemoralis*. The ground of this shell is white, citron or yellow, or a compound of different shades of these colours. Different coloured rays are traced on this ground, turning spirally with the shell; in some they are black, in others brown, and sometimes reddish. The breadth of each of these rays gradually increases as they approach to the opening of the shell. It even sometimes happens, that two of these bands are so much extended in breadth, that they meet together and form one. Some individuals have five or six of these bands, while others have three or four, and even two, and sometimes only one. Others again have none at all, although of the same species; and among the individuals which are marked with coloured bands, they are not always of the same breadth in the same parts of the shell; from which it appears, that no certain specific characters can be derived from the colour, since it is subject to so much variety. According to Reaumur, the viscid and earthy matter of which the shell is composed is secreted from the surface of the animal's body; but in certain places of the surface, particles which produce a different colour are separated; and whether this depends on a peculiar organization of those places, or on the form of the particles themselves, it appears that these particles, either of a different nature or of a different figure, by uniting, form bodies which reflect different rays of light; that is to say, form parts of the shell of different colours.

88 Colouring matter secreted from the neck.

This seems to be a necessary consequence of the mode in which the growth of shells is accomplished. The whole external layer of the shell is formed by the neck of the animal, because it is that part which is nearest to the head, and consequently as the animal increases in size, that part ceases to be covered with the old shell. It, therefore, depends on this part of the animal to extend the shell, and for this purpose it is sufficient that the neck be furnished with glands for secreting the different fluids, to form a shell of different

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another, and thus produce irregular marks on the shell. But besides, if there are secretory organs situated on the neck of the animal, which prepare fluids of different colours; if the animal moves, or is disturbed by any means, when these fluids are excreted on the surface, the colours will appear in a different place from their original distribution, or be mixed and blended together, and thus occasion that irregularity which is observed in those parts of shells which have been last produced, or renewed.

94 Motion of the animal during the deposition of the matter.

95 Secretory organs enlarge with the animal.

But it will be necessary to have recourse to the first of these causes, namely to the change of structure in the secretory organs of the neck, to explain the regular distribution of the round spots, or of those of a square or rectangular figure, with which certain shells are marked, and to suppose that those vessels which are arranged in a square or rectangular manner, which furnish peculiar fluids, are shut or open at different periods. It may happen that the developement of a great part of the animal, occasioned by a more vigorous growth in certain species than in others, may, in some cases, be the only cause of those regular spots, sometimes white on a coloured ground, and sometimes coloured on a white ground, which the shell exhibits, if the glands which secrete the colouring matter correspond in their distribution, to that of the divisions on the shell, and if they occupy a greater space on the neck than is usual in other species. In this way may be accounted for, the regularity of these marks, and the increase of their size, which is usually proportioned to that of the turns of the spire, from the consideration of the secretory organs of the animal enlarging in the same proportion as the other parts of its body; and their effects in the formation of the shell corresponding to the developement of these parts. Hence it follows, that the largest marks are observed on the external convolutions of the shell.

96 Last formed layer usually white.

According to Reaumur, the last layer of the shell which is formed from a fluid secreted from that part of the surface of the animal's body which does not reach the neck, should be white, and this is most generally the case. In those shells which are internally coloured, the fluids secreted from the body of the animal are of the same colour, and they take the place of those which are usually white, or of a pearly nature, as is observed in many others. The nature of these internal layers is always obvious; for if they are not white, they exhibit everywhere a uniform colour, and never variegated, like what appears externally. By removing with a file any part of the external surface of the shell, the layers which appear immediately under the surface, are those which have been furnished by the body of the animal, while those on the surface itself, usually more variegated than the rest, owe their formation to the vessels about the neck, and have been formed in the way already described.

97 Formation of striæ.

The growth of shells, being proportioned to that of the inhabitant, proceeds almost imperceptibly. In most shells, however, it is easy to distinguish the different additions which they have received; for they are marked on their convex surface with different eminences which are parallel to each other, similar to lines of different degrees of depth, which give the shell a fibrous structure. These elevations are called *striæ*, may be traced through the whole of the shell in bivalves, and in the longitudinal direction of those which have a spiral form. From the slightest observation of the manner in which shells are formed, it is easy to see that they can receive no addition, without leaving, in a greater or less degree, some trace of these inequalities; for every small addition of testaceous matter which is made, must be attached to the old part of the shell, which consequently must be more elevated than the former, whatever be its thickness, when the enlargement of the animal requires the formation of the latter. Thus, the shell will be marked with a great number of these striæ, parallel to each other, which may be distinctly seen on many different species.

98 Growth interrupted.

Every shell has usually some of these eminences at greater distances, and more elevated than the others. By these the different periods when the shell ceased to increase, or rather those when its growth was interrupted, are marked; and they have some degree of analogy with the different shoots from the branch of a tree. The heat of summer or the cold of winter interrupting the growth of the animal, at least among such as are testaceous, which live on the land, or inhabit rivers in temperate regions, the shell is not enlarged in extent during these seasons. It is otherwise, however, with regard to its thickness, for there is continually exuded from the body of the animal, small quantities of fluid, which increase its thickness. Hence it is when the shell begins to increase in extent, the edge to which the new portion is cemented, is much thicker than when the growth was gradual and imperceptible, and consequently the place at which the growth commences, after a long interruption, is distinguished by a more elevated ridge, than in the continued progressive additions which it receives. The numerous instances of this interruption in the growth of shells, will occur to the attentive conchologist in the progress of his researches. We have at present in our possession, a fine illustration of the same thing, in a specimen of *murex ramosus*. The animal, it would appear from the original part of the shell, had been for some time in a sickly or unhealthy state; for it has undergone many of the changes to which dead shells are subject. It has lost its enamel; it seems to have undergone some degree of decomposition, and some species of *serpula* and other parasitical animals had made it their abode; but from this sickly state it seems to have recovered, and acquired great vigour; for the next addition which is made to the shell, is equal to its original bulk. It is clean, entire, and in perfect preservation, forming a singular contrast with the old shell.

99 Example of this.

100 Distinguished by the difference of colour.

The place at which shells begin to increase, after the growth has been for some time interrupted, may be distinguished by a difference of colour in the stripes with which the shell is usually marked. In these places, black or brown stripes exhibit more vivid colours, and sometimes even little different from those on the rest of the superior surface of the shell. The cause of this change is not difficult to trace, if we recollect that the secretory organs which prepare the colouring matter, at least in the *helix nemoralis*, have their origin at some distance from the extremity of the neck, from which we have seen that the first layer of shell which is traced to the extremity itself, should be of a different colour from that of the stripes; but as the increase of the animal occasions the stripes to be formed

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formed under this first shell, during which it is still very thin, and consequently transparent, it does not prevent the shell produced under it, of a black colour, to appear so. But when the animal has ceased to grow for some time, it then increases the thickness of the shell last formed, so that the shell which is next produced from the colouring matter, when the animal begins to grow, being laid on one part of the old shell much thicker and less transparent, the colour of these stripes must appear less bright, and therefore different in those places, from the other parts of the shell.

101 Colours owing to the glands about the neck.

In taking a review of what has been said concerning the production of the colours of shells, it must appear that these rays or coloured lines are owing to glands which secrete the colouring fluid, and which are arranged on the anterior edge of the neck, while the posterior part furnishes only a fluid of a different colour, and usually less deep than the first. By means of this principle it is not difficult to account for the arrangement of the different colours which are so splendidly exhibited among this class of natural objects. These colours may be reduced to one or more, which are more vivid on a lighter ground; to coloured, circular bands on a ground of a less vivid colour, or pure white; to longitudinal lines, round or square spots, and in a regular, or irregular, zig-zag form. All these may be easily explained, according to the principles which have been laid down, the application of which, from what has been said, will not, we hope, be found difficult.

102 Colours of porcelain shells.

But from this mode, which is the most general in the production of the colours of shells, there are certain deviations. In that division of shells which is made by some naturalists, and which is distinguished by the name of *porcelain shells*, on account of the fine enamel with which they are covered, there are two sets of colours, which are disposed in a parallel direction to each other. The external range of these colours is owing to a peculiarity of structure in the animals which inhabit them, different from that of other testaceous animals, and to an operation which does not take place in other shells. In these shells, the colouring matter seems to be deposited in two different ways, and at two different periods. In the first process, when the body of the shell is formed, the colouring matter is excreted from the glands, in the same way as in other testaceous animals; and it is arranged according to the disposition of the glands on the body of the animals. At this period of the process, the shell is only of a moderate thickness, and much less than what it afterwards acquires, when completely formed. On the external surface of the shell first formed, another layer is deposited, which is more compact than the first, in some places thicker, and usually variegated with different colours. The external surface of the shell being thus completely covered with this second layer, the original colours are concealed; and if the same shell were examined at different periods of its formation, it would appear like two distinct species. The organs which are employed by the animal in the production of this second layer of shell, and set of colours, are two soft, membranaceous wings, which being protruded from the opening of the shell, completely cover the whole of its external, convex surface. These two wings, which are quite distinct from the glandular structure about the neck of the animal, which is situated a little lower, are also provided with glands, which furnish colouring matter, usually different from that which is furnished by the glands of the neck; and it is the upper surface of the wings, which is alone provided with this glandular structure. This surface, when this part of the animal is protruded from the shell, and extended over it, comes in contact with the external surface of the latter. Hence it is, that these membranaceous organs deposit on the first formed and coloured layers of the shell, new layers of testaceous matter, which is differently coloured, and diversified with entire spots, either circular, or in a waved direction, which are sometimes of a more vivid tint than that of the ground, or white upon a dark ground, or brown upon a yellow ground; or are composed of straight lines, or curved, or interlaced with each other, reddish, brown, yellow or white, on different coloured grounds, or in dots or points, whose shades and arrangement are not less diversified.

103 An external layer formed.

104 Proved.

This mode of the formation of the external layer of porcelain shells, has been proved by the actual observation of some naturalists. In some species, a longitudinal line of a paler colour is observed on the convex surface of the shell. This is ascribed to the junction of the two wings of the animal, where a smaller quantity of colouring matter has been deposited, or where the shell has been less completely covered with the protruded part of the animal. But the existence of this second layer is still more distinctly proved by mechanical means. The external layer may be removed by means of a file, and the shell restored to its original state; and then the colours which it first received are brought into view. This circumstance is still farther demonstrated by an attentive examination of different species of shells, and particularly the *cypræa argus*. In examining this shell, there are observed under the external layer, which is of a yellow colour, some slight traces of four transverse bands of a brown colour, which surround the shell, and which must have been formed previous to the more superficial yellow layer. By a more minute examination, it will appear that the circular spots with which the external yellow layer is marked, have been posteriorly formed to this layer; and finally, on the four turns of the spire forming a slight projection at the base of the shell, there are some brown, circular spots, which are quite superficial, and which sometimes include two turns of the spire, which could not happen if the yellow colour had not been prior in its formation to these circular spots. If the colouring matter of which these spots are composed had been deposited at the time that the different parts of the spire were formed, one spot could not have included two turns of the spire at the same time.

105 Shell becomes thicker from the same cause.

This effect of communicating a new set of colours to the external surface of the shell, is not the only one which is produced by the membranaceous structure of the animal which inhabits the porcelain and other shells. The form of the shell is also changed in a remarkable manner, a great quantity of testaceous matter being deposited on the surface of the opening, which then assumes a considerable thickness. The turns of the spire are incrusted, and sometimes disappear on the outside of the shell; and wrinkles, furrows, and even tubercles, which exist on the surface of some species, are also formed

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formed. The surface of *cypræa pediculus* exhibits circular striæ which did not originally exist, and which owe their formation to this cause. In other species, the surface is marked with projecting points or tubercles, which are produced in the same manner as the circular striæ of the former, and which also depend on the structure of the membranaceous wings of the animal, and the testaceous substance which is secreted and deposited from their surface. Thus, it appears that porcelain shells, and those of some other species, are formed at two distinct periods. It is during the second period of the process that the colour of the complete shell is formed. In farther illustration of this point, of the formation of shells of this description at two different periods, one or two examples may be given of the difference which takes place, when the last layer formed is

106 External layer removed, different colours appear.

removed. In the *cypræa exanthema*, the shell is ferruginous, with whitish round spots and eyes, but when the outer coat is worn off, it becomes barred or tesselated with brown or blue. The *cypræa arabica*, as its name imports, exhibits characters on its surface, having some resemblance to Arabic letters. The ground on which these characters, which are of a brown colour, are placed, is whitish or bluish; yet when the outer coat is worn down, the shell is sometimes bluish with brown bands, or pale with darker angular spots and lines; brown, mixed with violet, or reddish blue.

107 Effects of light on shells.

But besides the causes which have been mentioned concerning the production and variety of the colours of shells, arising from the difference of structure in the organs which secrete the colouring matter, and the changes to which these organs are subjected in the growth of the animal, the effects of light and heat, altogether independent of the animal itself, are probably very considerable. Two individuals of the same species, the one from the Mediterranean or European seas, and the other from the tropical regions, exhibit very different shades of colour. The colours of the inhabitant of the torrid zone are always more bright and vivid than those of the native of more temperate climates. The two shells, although similar in form, size, and other characters, are uniformly different in the intensity of their colours. These differences, which have led conchologists to increase the number of species, obviously depend on the action of the climate, and particularly of light, on nourishment, and other circumstances which have hitherto eluded the observation of naturalists, and are uniform and constant, as long as the causes which operate in their production, continue to act. At first sight it might be supposed that the difference of temperature is the cause of the difference in the intensity of colour, in shells produced in different climates. It might be supposed too, that the different depths at which shells are found in the ocean, the medium in which they live being thus very different, would occasion great diversity in the colour. Near the surface, where the heat is greatest, if the operation of this cause were considerable, the colours of shells should be expected to be most vivid, and as the depth increased, at least to a certain extent, the intensity of colour should be diminish-

108 Lower valve colourless.

ed. But it has been observed in bivalve shells which are found at great depths, such as some species of oyster and spondylus, that the lower valve, which is attached to the rock, is almost always white or colourless, while the upper valve often exhibits bright and vivid colours; but this difference cannot be ascribed to the difference of temperature, for in both valves it must be the same; the matter secreted for their formation is prepared by the same organs, and is deposited in a similar manner; and indeed they are altogether placed in the same circumstances, and have been exposed in their production and growth to the operation of the same causes, excepting that the upper valve is exposed to the rays of light, and is therefore coloured, while the lower valve is removed from the action of this cause, and is colourless.

109 and shells included in other bodies.

The same difference is observed in the valves of other shells, which are produced in similar circumstances. The different species of pholas which make their abode in calcareous or coral rocks, and the *teredo navalis* or ship-worm, which pierces wood, and makes it its habitation, are usually colourless. Those testaceous animals too, which live at great depths in the ocean, and are thus far removed from the influence of light, are also distinguished by very white colours, or are entirely white.

Sect. IV. *Of the Formation of the Umbilicus, Protuberances, &c.*

We have hitherto considered only the general formation of shells. In the present section we shall treat of some other circumstances which produce variations in their external figure. Such, for instance, is the formation of the umbilicus, of spines, tubercles, ribs, and other protuberances.

110 Four classes of spiral shells.

Umbilicus. Univalve shells, which are furnished with a regular spire, may be divided, with regard to their form, into four classes; namely, shells having a disc, cylindrical shells, turbinated, and ovoid or egg-shaped shells. These four forms are the most common which spiral univalve shells assume, and they depend on the manner in which the turns of the spire are applied to the common axis, and the difference of their arrangement. They derive their primitive figure from the small shell while it is yet included in the egg, and probably from that of the external organs of the animal, which is contained in it. But although all univalve shells may be referred to one or other of these four principal forms, they exhibit a great variety of slighter shades of difference. Let us now see in what way it may be conceived that the bodies of the animals which inhabit univalve shells, give them a spiral form. If we can suppose that from the first production of

111 Owe their shape to the form of the animal.

these animals, when they begin to be developed, the fibres of one part of the body, such as those of the external surface, are longer than those of the opposite surface, it is obvious that the body of the animal continuing to increase, according to this original tendency, will assume a curved form, the concave part of which will be on that side where the fibres are shortest; and if the long fibres on the external surface, and the short fibres on the internal surface, continue to increase in the same proportion, this must give the body a spiral form; but in this case, the different convolutions of which the animal is composed, will be in the same plane, and can only apply to a small number of shells included in the first division, namely, those which are characterized with having a disc.

The convolutions of the spire which are described by the

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vessels secreting the fluids in which they are formed: By this diseased action producing a superabundance of the matter which enters into the composition of the concretion; or this matter in the fluid state meeting with some solid body, which becomes a nucleus, is attracted by it, and deposited in concentric layers, till the concretion acquires a larger or smaller size, according to the duration and quantity of the secretion and deposition. In the same way, it seems extremely probable the pearl may be frequently formed; the matter of which it is composed being constantly secreted by the animal for the production of the new part of the shell. If then this matter should at any time be produced in greater quantity than what is necessary to form the inner layers of the shell, and particularly if it should meet with a solid particle of any body, it will be attracted by it, and thus constitute the rudiments of a pearl, which will receive constant additions of concentric layers, and increase in size in proportion to the age of the animal and the quantity of matter deposited. Pearls, it is said, have been found within the body of the animal. If this be true, the pearly matter, in its passage through the vessels of the body, must have met with some nucleus, around which the concentric layers have been formed. In most cases, however, the pearl is found loose in the shell, entirely detached from the animal. It must then have been formed of the matter which was thrown out of the body; but it is not unlikely that pearls are formed both ways, or that the same pearl may be partly formed within the body of the animal, and be afterwards excluded, and arrive at its utmost size, while it remains loose in the shell.

122 or formed from external injury.

But, according to others, the pearl owes its formation to some external injury. The following seems to be a pretty distinct view of this opinion. When Faujas de St Fond visited Loch Tay, he was led to make some inquiries concerning the pearl-fishery, which had been carried on in several parts of the river Tay for some years. Shells were brought to him; and in these shells the fishermen pretended to find pearls, which they expected to sell at a higher rate, as they were found in the presence of the traveller. But he informs us, that they attempted to impose on him, by introducing a pearl secretly into the shells as they opened them. Observing this circumstance, he told them that he could know at once, by examining the outside of the shell, before opening it, whether it contained any pearl. He mentions this to introduce some speculations concerning its formation. When no perforation or callosity appeared on the outside, he concluded that there was no pearl in the shell. The pearl-fish, he supposes, is attacked by two classes of enemies. One is what he calls the *auger-worm*, which penetrates into the inside near the edge of the valve, by making a longitudinal passage between the layers of the shell. The length of the channel is one inch, or one inch and a half when it doubles back in a line parallel to the first. At the inner extremity there is a small circular portion, formed by the worm in turning round. These excavations are in the pearly part of the shell. The pearly juice, extravasating, forms protuberances in the same direction; and the cylindrical bodies which are thus formed, may be considered as elongated pearls adhering to the internal surface. When several worms of this kind unite their labours by penetrating near each other, the result is a kind of pearly wen with irregular protuberances.

Another sea-worm, which he says belongs to the multivalves, a species of pholas, also attacks the pearl shells. The shell of this species of pholas has a hinge in the form of a crooked bill, as he saw in some species of oyster, which he examined, from the coast of Guinea. The hole was of the shape of a pear. Pearls of this shape have been found, and have been held in great estimation. Observing this circumstance, artificial perforations are made in the shell, and this forces the animal to produce pearls. In some shells brought from China, this artificial hole has been observed filled up with brass wire, rivetted on the outside like a nail, and the inner extremity of the wire was covered with a well-formed pearl, which seemed as if soldered to its extremity *.

* Trav. vol. ii.

Pearls are also produced by another artificial process. The shell is opened with great care to avoid injuring the animal, and a small portion of the internal surface of the shell is scraped off. In its place is inserted a spherical piece of mother-of-pearl, about the size of a small grain of lead shot. This serves as a nucleus, on which is deposited the pearly fluid, and in time forms a pearl. Experiments of this kind have been made in Finland, and have been repeated in other countries.

123 Discovery of Linnæus.

A remarkable discovery has been ascribed to Linnæus respecting the generation of pearls. This was a method which he found out, of putting the pearl-mussel (*mya margaritifera*) into a state of producing pearls at his pleasure. It was some years before the final effect could take place; but in five or six years after the operation, the pearl, it is said, had acquired the size of a vetch. But it does not seem to be known in what this operation consisted. Whether it consisted in imitating the process of insects, by wounding the shell from the outside, or by following the other process, by scraping away part of the inner layer; nor is it much known what have been the effects of this operation, or whether it has turned to any account, or indeed is at all practised in Sweden or any of the northern states, where it must have been originally known. For this discovery, however, the Swedish naturalist, it is said, was raised to the rank of nobility, and otherwise liberally rewarded by the states of the kingdom.

The value which is put on the pearl depends on its size, colour, shape, and purity. The largest pearls are always held in the highest estimation, when their other qualities are in any degree of perfection. The finest shape of the pearl must be quite globular; it must be of a clear brilliant white, smooth and glossy, and entirely free from spot or stain. Pearls were greatly esteemed and much sought after by the Romans. Servilia, the mother of Marcus Brutus, we are informed, presented a pearl to Cæsar, which was valued at 50,000l. sterling; and Cleopatra dissolved one, which is said to have been worth 250,000l. sterling, in vinegar, which she drank at a supper with Mark Antony.

CHAP.

Of the Habitation of Shells, &c.

CHAP. VI. OF THE HABITATION OF TESTACEOUS ANIMALS, METHODS OF FISHING, COLLECTING, &c.

TO the detailed account which we have now given of the natural history of testaceous animals, and particularly of the formation and growth of the shell, we have only to add a few observations concerning their habitation, the methods of fishing, collecting, and preserving them. These topics shall be the subject of the following sections.

Sect. I. *Of the Habitation of Testaceous Animals.*

124 Found on every part of the globe.

Testaceous animals are found on every part of the surface of the globe. Some are inhabitants of the land, while others only frequent rivers and lakes, and a third and numerous class live in the ocean. From this a classification of shells has been formed, and they have been divided into land, fresh-water, and sea shells. But whatever difference might exist in the habits and economy of testaceous animals which are produced in places so different, it affords few marks of discrimination for the purpose of classification.

125 Land shells very numerous.

Land shells are spread over the whole surface of the earth, and although more accessible, are perhaps less known than those which inhabit the ocean. From the small number of land shells which have been collected, it would appear at first sight that they are less numerous than marine shells. This, however, seems not to be the case, with regard to the number of species; and it is well known, that the number of individuals of land shells, in some instances, far exceeds that of sea shells. The sea shells of the Mediterranean have been observed by naturalists, to be nearly the same from the straits of Gibraltar to the island of Sicily; but the land shells of Languedoc are different from those of Provence, of Dauphiny, Piedmont, and different parts of Italy. Some are found in Spain, in Corsica, in Sardinia and Sicily, which are not to be met with in other places; and from the great variety and number of land shells, it seems probable that many of them are yet unknown. But let us now take a general view of those places of the world where different testaceous animals are most frequently found.

126 Shells most beautiful within the tropics.

It has been already observed, that light and heat have very considerable influence in adding to the splendour of the colours of shells. The most beautiful shells are found in countries between the tropics, where they are more immediately subject to the direct rays of the sun, and a higher temperature. From these causes, the shells produced in these countries have a lustre and brilliancy, which those of colder climates never possess.

127 Shells found in Asia.

The shores of Asia furnish us with the pearl oysters and scallops in great perfection. About Amboyna are found the most beautiful specimens of the cabbage-shell, the arrosoir, the ducal mantle, and the coral-oysters, or echinated oysters. Here also are found a great variety of extremely beautiful mussels, tellinæ, and volutæ; some fine buccinums, and the shell called the *Ethiopian crown*, in its greatest perfection. The dolia, the murices, and the cassandræ, are also found on these coasts in great beauty. Many elegant snails and screw-shells are also brought from thence; and finally, the scorpion and spider shells. The Maldive and Philippine islands, Bengal, and the coast of Malabar, abound with the most elegant of all the species of snails, and furnish many other kinds of shells in great abundance and perfection. China abounds in the finest species of porcelain shells, and has also a great variety of beautiful snails. Japan furnishes us with all the thicker and larger bivalves; and the isle of Cyprus is famous above all other parts of the world for the beauty and variety of the patella or limpet found there.

128 In America.

America affords many very elegant shells, but neither in so great abundance nor beauty as the shores of Asia. Panama is famous for the cylinders or rhombi, and we have beside, from the same place, some good porcelains, and a very fine species of *dolium*, or *concha globosa*, called from this place the *Panama purple shell*. One of the most beautiful of the cylinders is also known among our naturalists under the name of the *Panama shell*. About Brasil, and in the gulf of Mexico, there are found murices and dolia of extreme beauty; and also a great variety of porcelains, purpuræ, pectens, neritæ, bucardiæ or heart-shells, and elegant limpets. The isle of Cayenne affords one of the most beautiful of the buccinum kind, and the Midas ear is found principally about this place. Jamaica and the island of Barbadoes have their shores covered with porcelain, chamæ, and buccina; and at St Domingo there are found almost all the same species of shells that we have from the East Indies; only they are less beautiful, and the colours more pale and dead. The pearl-oyster is found also on this coast, but smaller than in the Persian gulf. At Martinico there are found in general the same shells as at St Domingo, but yet less beautiful. About Canada are found the violet chamæ; and the lakes of that country abound with mussels of very elegant pale blue and pale red colours. Some species of these are remarkably light and thin; others are very thick and heavy. The Great Bank of Newfoundland is very barren in shells; the principal kind found there are mussels of several species, some of which are of considerable beauty. About Carthagena there are many mother-of-pearl shells, but they are not of so brilliant colours as those of the Persian gulf. The island of Magellan, at the southern point of America, furnishes us with a very remarkable species of mussel called by its name; and several very elegant species of limpets are found there, particularly the pyramidal.

129 In Africa.

In Africa, on the coast of Guinea, there is a prodigious quantity of that small species of porcelain which is used there as money; and there is another species of porcelain on the same coast which is all over white: the women make bracelets of the latter, and the people of the Levant adorn their hair with them. The coast of Zanguebar is very rich in shells: we find there a vast variety of the large porcelains, many of them of great beauty; and the *nux maris* or sea-nut is very frequent there.

Of the Habitation of Shells, &c. there. Beside these, and many other shells, there are found on this coast all the species of nautili, many of which are very beautiful. The Canary isles abound with a vast variety of the murices, and some other good shells; and we have from Madeira great variety of the echini or sea-eggs, different from those of the European seas. Several species of mussels are also common there, and the sea-ears are nowhere more abundant. The Red sea is beyond all other parts of the world abundant in shells: scarcely any kind is wanting there; but what we principally have from thence are the purpuræ, porcelains, and echini marini.

130 In the Mediterranean. The Mediterranean and Northern ocean contain a great variety of shells, and many of very remarkable elegance and beauty; they are upon the whole, however, greatly inferior to those of the East Indies. The Mediterranean abounds much more in shells than the ocean. The gulf of Tarentum affords great variety of purpuræ, of porcelains, nautili, and elegant oysters; the coasts of Naples and Sardinia afford also the same, and with them a vast number of the solens of all the known species. The island of Sicily is famous for a very elegant kind of oyster which is entirely white; pinnæ marinæ and porcelains are also found in great plenty there, with tellinæ and chamæ of many species, and a great variety of other beautiful shells. Corsica is famous, beyond all other places, for vast quantities of the pinnæ marinæ; and many other very beautiful shells are found there. About Syracuse are found the gondola shell, the alated murex, and a great variety of elegant snails, with some of the dolia and neritæ. The Adriatic sea, or gulf of Venice, is less furnished with shells than almost any of the seas thereabout. Mussels and oysters of several species are however found there, and some of the cordiform or heart shells; there are also some tellinæ. About Ancona there are vast numbers of the pholades buried in stone; and the sea-ears are particularly frequent about Puzzoli. (*Bonani Recreat. Ment. et Ocul.*).

131 On the coast of France. The ports of Marseilles, Toulon, and Antibes, are full of pinnæ marinæ, mussels, tellinæ, and chamæ. The coasts of Bretagne afford great numbers of the conchæ anatiferæ and pousse-pieds; they are found on old rotten boards, on sea substances, and among clusters of sponges. The other ports of France, as Rochelle, Dunkirk, Brest, St Maloes, and others, furnish oysters excellent for the table, but of the common kind, and of no beauty in their shells: great numbers of mussels are also found there; and the common tellinæ, the onion-peel oysters, the solens, and conchæ anatiferæ, are also frequent there. At Granville, in Lower Normandy, there are found very beautiful pectens, and some of the cordiform or heart-shells.

132 of Britain, Our own English coasts are not the least fruitful in shells, though they do not produce such elegantly painted ones as the Indies. About Plymouth are found oysters, mussels, and solens, in great abundance; and there, and on most of our shores, are numbers of the aures marinæ and dentalia, with pectens, which are excellent food; and many elegant species of the chamæ and tellinæ are fished up in the sea about Scarborough and other places. Ireland affords us great numbers of mussels, and some very elegant scallop-shells in great abundance, and the pholades are frequent on most of our shores. We have also great variety of the buccina and cochleæ, some volutæ; and, on the Guernsey coast, a peculiarly beautiful snail, called thence the *Guernsey-snail*.

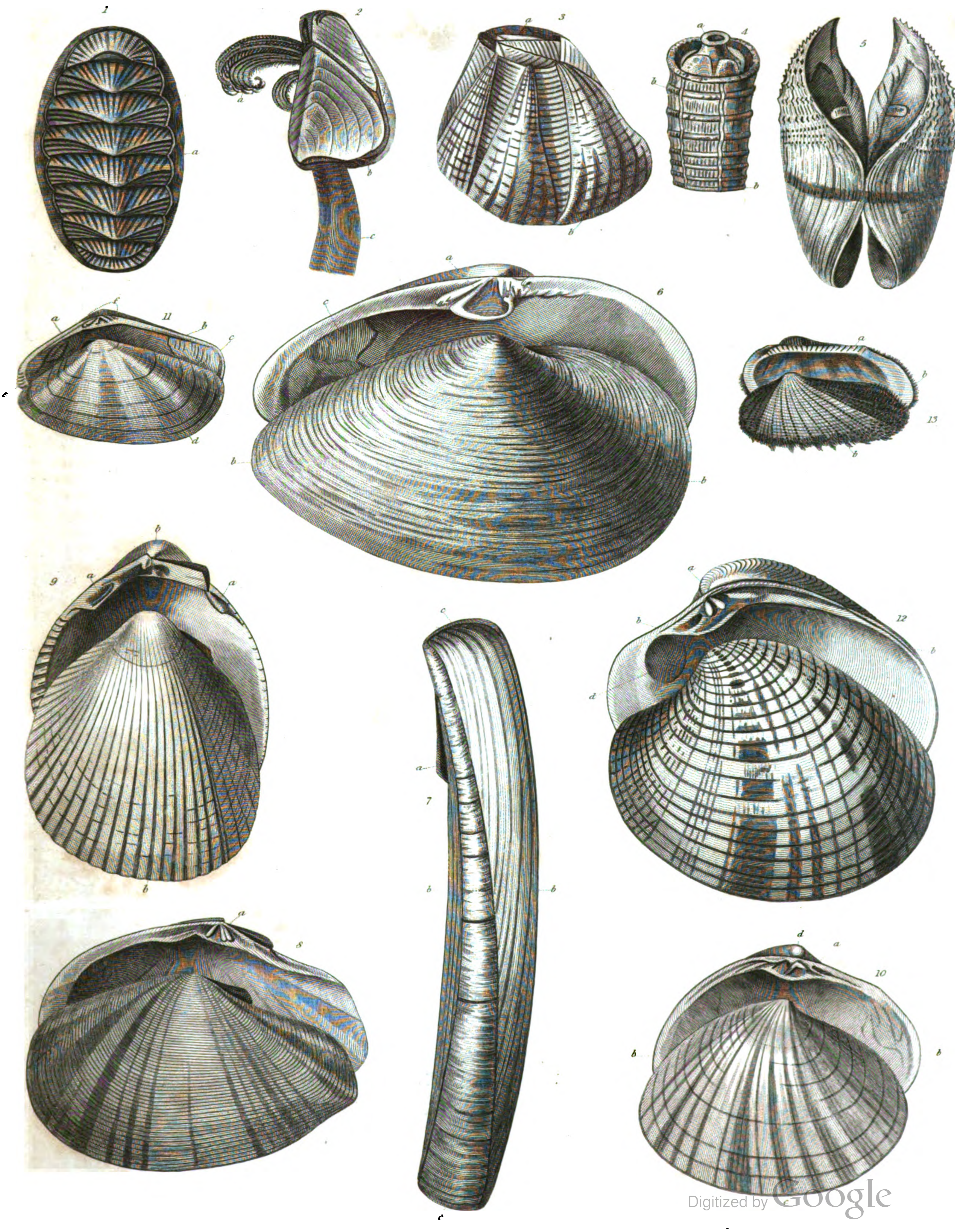
133 of Spain and Portugal, &c. The coasts of Spain and Portugal afford much the same species of shells with the East Indies, but they are of much fainter colours, and greatly inferior in beauty. There are, according to Tavernier and others, some rivers in Bavaria in which there are found pearls of a fine water. About Cadiz there are found very large pinnæ marinæ, and some fine buccina. The isles of Majorca and Minorca afford great variety of extremely elegant shells. The pinnæ marinæ are also very numerous there, and their silk is wrought into gloves, stockings, and other things. The Baltic affords a great many beautiful species, but particularly an orange-coloured pecten, or scallop shell, which is not found in any other part of the world.

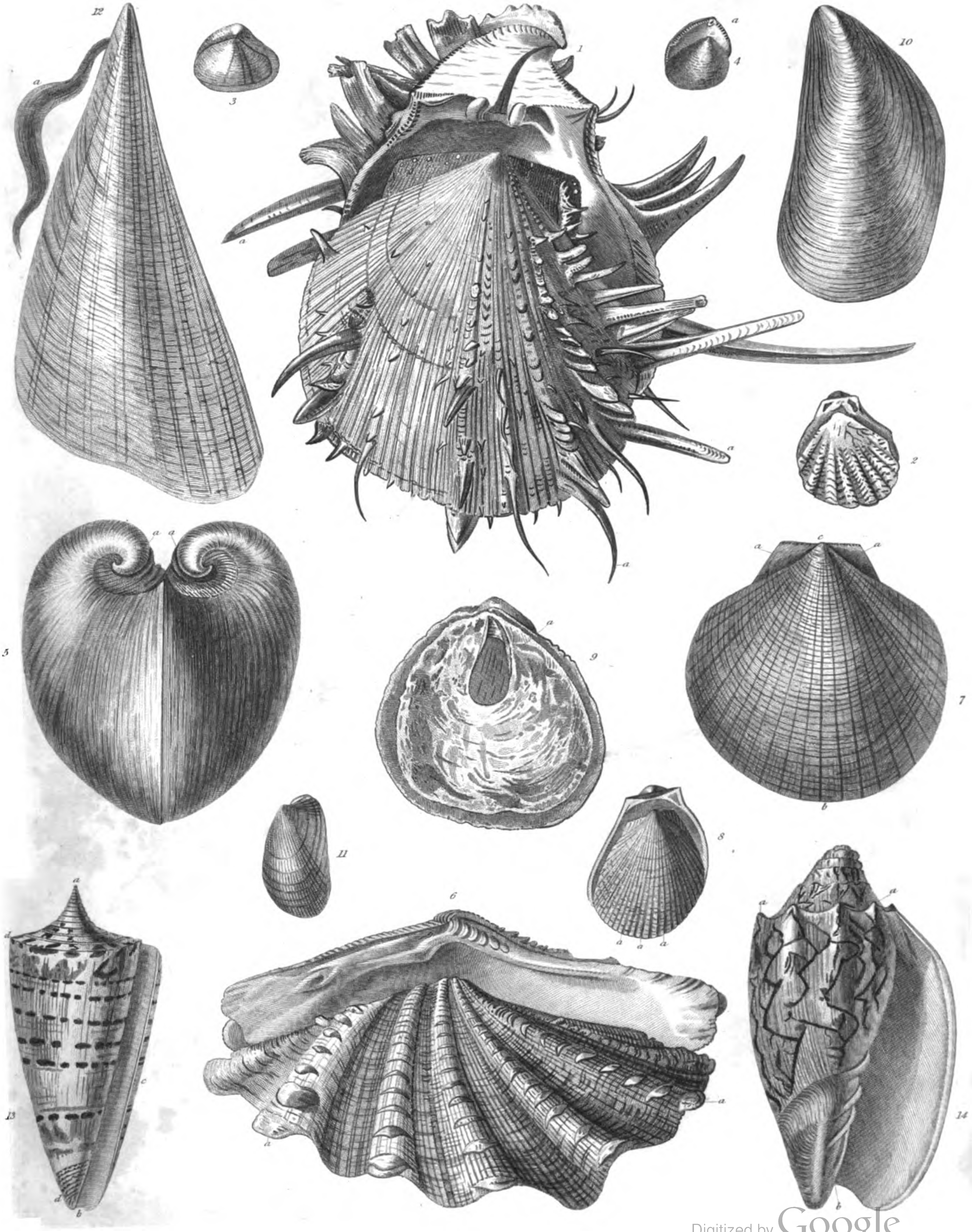
134 Fresh-water shells. The fresh-water shells are found much more frequently, and in much greater plenty than the sea-kinds; there is scarce a pond, a ditch, or a river of fresh water in any part of the world, in which there are not found vast numbers of these shells with the fish living in them. All these shells are small, and they are of very little beauty, being usually of a plain grayish or brownish colour. Our ditches afford us chamæ, buccina, neritæ, and some patellæ; but the Nile, and some other rivers, furnished the ancients with a species of tellina which was large and eatable, and so much superior to the common sea tellina in flavour, that it is commonly known by the name of *tellina regia*, "the royal tellina." We have a small species of buccinum common in our fresh waters, which is very elegant, and always has its operculum in the manner of the larger buccina; a small kind of mussel is also very common, which is so extremely thin and tender, that it can hardly be handled without breaking to pieces. The large fresh-water mussel, commonly called in England the *horse-mussel*, *mya margaritifera*, is too well known to need a description; and the size sufficiently distinguishes it from all other fresh-water shells.

Sect. II. *Of the Methods of Fishing and Collecting Shells.*

135 Land shells. Land shells are immediately within the reach of the hand of the collector, as well as many sea and river shells, which inhabit shallow waters, or attach themselves to rocks or marine plants on the shores of the ocean. Those shells which are at moderate depths in the sea, are to be collected by dredging. But in whatever way shells are found, those are always to be preferred which still contain the living animal; for then, not only some information may be obtained with regard to its structure and natural history, but the shells themselves are in all their natural beauty, and the full glow of their colours. Those shells too should be preferred, which are procured from the deeper parts of the ocean, because they have then arrived at the largest size, and are in the greatest perfection. But these are beyond the reach of man, and are only accidentally found on the shores after storms, or attached to sea-weeds which have been torn from the rocks by the agitation of the waves. 136 Sea shells.

When shells are found with the animal alive; the method

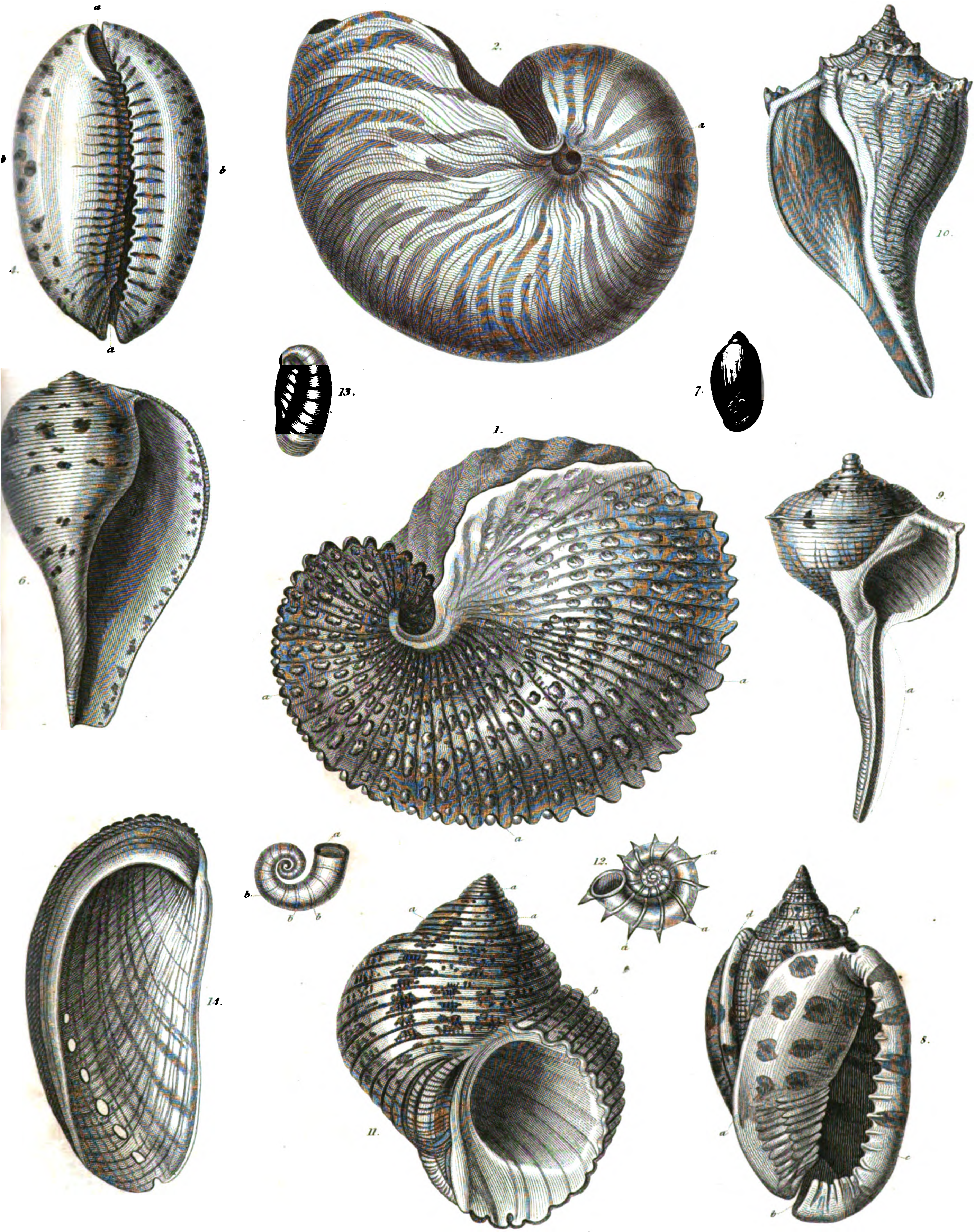


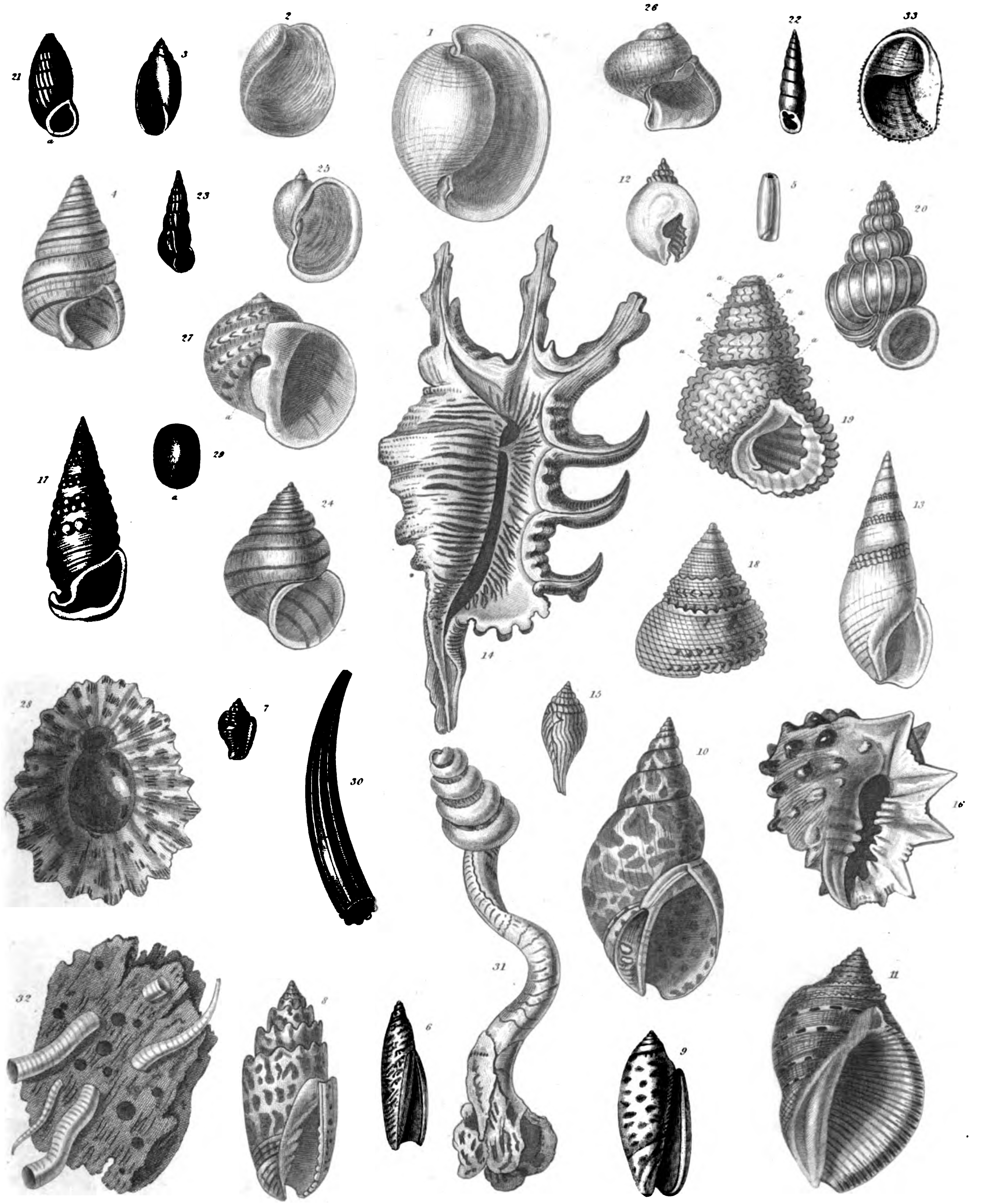


Drawn by Capt. Brown

Published by A. Constable & Co. Edinr. 1820.

A. Wilson Sculpt.





Drawn by Capⁿ Brown

Published by A Constable & Cº Edinʳ

Engᵈ by Wᵐ Archibald Edinʳ

method recommended to destroy it and separate it entirely from the shell, is to boil it in water for a very short time, and after allowing it to cool gradually, to lay it in cold water till it is cleaned. By this process,

137 Method of killing the animal.

the attachment between the shell and animal is destroyed, and the latter, which has become hard and contracted, is easily picked out from its covering. The shell, after this treatment, is ready to be placed in the cabinet, or to be polished in the way we shall presently describe, according to the state in which it is found, or the views of the collector.

138 Pearl-fishery

As the pearl has been held in high estimation in all ages of the world, and as it is an important object of commerce in many parts of it, the history of the pearl fishery, or of those shell fish which produce the pearl, connot fail to be interesting.

139 in Britain.

In different parts of Britain the pearl-fishery has been carried on to a considerable extent; and in some places it has been reckoned of such value, that government have granted the right of fishing to individuals by patent. By a grant of this kind, Sir John Hawkins obtained the privilege of fishing for pearls in the river Irt in Cumberland; and Buchan of Auchmacoy seems to have held, by a similar right, the sole privilege of the pearl fishery near the mouth of the river Ythan in Aberdeenshire; for it appears that this grant was resumed by government in 1633, in the first parliament of Charles I. In the same river, at the distance of 10 miles from the sea, a successful fishery of pearls has been frequently carried on; and a few years ago, in the river Cluny in the same county, a Jew employed a number of people to collect the mussels which contained them, and some large and valuable pearls were found. Some years ago, in the river Teath in Perthshire, the pearls which were got brought about 100l. sterling to those employed in searching for them, in the course of one season. It was observed, that those mussels only which were crooked and distorted, yielded pearls. The method which has been practised in this river for fishing the pearl mussel, is the following. The fisherman provides himself with an instrument formed of two iron plates or spoons, having something of the shape of the mussel. Each of these is attached to an elastic handle of the same metal, terminating in an open tube, which is fixed to the end of a long wooden handle. The concave sides of the plates approach other, and are kept in close contact by the elasticity of the handles. With this instrument the fisherman enters the water, and directs his course to those places which he supposes are resorted to by the mussels. These he discovers with his feet, and having found one, he presses the instrument upon it, the plates or valves of which, in consequence of the elasticity of the handles, separate, and then grasp it firmly. In this way he can detach it from the place to which it adheres, and bring it to the surface of the water. The pearl-mussel is a native of many other of the rivers of Scotland, as of the Esk in Forfarshire, where a pearl was found of the size of a pistol bullet, and sold for 4l. sterling; of the Devon in Clackmannanshire, the Clyde, and of Loch Ken in Galloway, where it is said great numbers of pearls are fished in dry summers, many of which sell from one shilling to one guinea. But the greatest pearl-fishery which has ever been established in Scotland, of which there is any record, is that of the river Tay, about 30 years ago. The pearl-mussel is found in every part of this river, from its source in Loch Tay, to its junction with the sea. In different parts of the river, but particularly in the vicinity of Perth, we are informed, that not less than 11,000l. worth of pearls were sent to London between the years 1761 and 1764. They were sold from 10s. to 1l. 16s. per ounce. About this time one pearl was found which weighed 33 grs. This fishery, however, as well as the pearl-fishery in the other rivers of Scotland, seems to be greatly exhausted, and very probably, as it has been supposed, from the improvident avarice of the undertakers, not allowing the animal to arrive at that age which seems to be necessary for the production of pearl.

But the pearl-fishery of the warmer climates, in different places of the East Indies, in the gulf of Persia, and the Red sea, and particularly that which is annually carried on in the bay of Condatchy, in the island of Ceylon, is by far the most extensive and most important of any in the world. The latter, of which we have given a detailed account in the description of CEYLON, and to which we refer our readers, has been under the inspection of government since it fell into the hands of the British, as it was under that of the Portuguese and Dutch, its former masters. To the Dutch, it is said, while they were in possession of the island, this fishery brought an annual tribute of 20,000l. To the account which has been already given of this fishery, we may add the following, from the Asiatic Annual Register for the year 1800. 140 in Ceylon.

"The person who farmed the pearl-fishery at Ceylon, last year, was a Tamu merchant, who for the privilege of fishing with more than the usual number of donies or boats, paid between two and three hundred thousand Porto Novo pagodas (D), a sum nearly double the usual rent. His excellency the honourable Mr North, by the last ships from Ceylon, has transmitted a very minute detail of the fishery in all its stages, some of which are truly singular and remarkable. It appears that the fear of sharks is the cause of a great deal of interruption to the fishery, the divers being extremely timid and superstitious; every one of them, even the most expert, entertain a dread of sharks, and will not on any account descend until the conjuror has performed his ceremonies. This prejudice is so deeply rooted in their minds, that the government was obliged to keep two such conjurors in their pay, to remove the fears of the divers. The manner of enchanting consists of a number of prayers learned by heart, that nobody, probably not even the conjuror himself, understands, which he, standing on the shore, continues muttering and grumbling from sunrise until the boats return. During this period, they are obliged to abstain from food and sleep, otherwise their prayers

(D) Perhaps near 100,000l. sterling. The pagoda is from 7s. to 8s. 6d. sterling.

Of the Habitation of Shells, &c.

prayers would be of no avail; they are, however, allowed to drink, which privilege they indulge in a high degree, and are frequently so giddy as to be rendered very unfit for devotion. Some of these conjurors accompany the divers in their boats, which pleases them very much, as they have their protectors near at hand. Nevertheless. I was told, said Mr North, that in one of the preceding fisheries, a diver lost his leg by a shark; and when the head conjuror was called to an account for the accident, he replied, that an old witch had just come from the coast, who, from envy and malice, had caused this disaster by a counter-conjuration, which made fruitless his skill, and which he was informed of too late; but he afterwards shewed his superiority, by enchanting the sharks so effectually, that, though they appeared to most of the divers, they were unable to open their months. During my stay, continues Mr North, at Condatchy, no accident of this kind happened. If a shark is seen, the divers instantly make a signal, which on perceiving all the boats return immediately. A diver who trod upon a hammer oyster, and was somewhat wounded, thought he was bit by a shark; consequently made the usual signal, which caused all the boats to return; for which mistake he was afterwards punished. The largest and most perfect pearl taken last season, was about the size of a small pistol bullet."

Sect. III. *Of the Methods of Polishing Shells.*

The art of polishing shells has but lately reached its present state of perfection; and as the admiration of sea shells has become so general, it may be expected that we should give some instructions in the means of adding to their natural beauty.

Among the immense variety of shells with which we are acquainted, some are taken up out of the sea, or found on its shores, in all their perfection and beauty; their colours being all disposed by nature upon the surface, and their natural polish superior to any thing that art could give. Where nature is in herself thus perfect, it were madness to attempt to add any thing to her charms: but in others, where the beauties are latent and covered with a coarser outer skin, art is to be called in; and the outer veil being taken off, all the internal beauties appear.

141 Methods employed.

Among the shells which are found naturally polished are the porcelains, or cowries; the cassanders; the dolia, or conchæ globosæ, or tuns; some buccina, the volutes and the cylinders, or olives, or, as they are generally though improperly called, the *rhombi;* excepting only two or three, as the tiara, the plumb, and the butter-tub rhombus, where there is an unpromising film on the surface, hiding a very great share of beauty within. Though the generality of the shells of these genera are taken out of the sea in all their beauty, and in their utmost natural polish, there are several other genera, in which all or most of the species are taken up naturally rough and foul, and covered with an epidermis, or coarse outer skin, which is in many rough and downy or hairy. The tellinæ, the mussels, the cochleæ, and many others, are of this kind. The more nice collectors, as naturalists, insist upon having all their shells in their native and genuine appearance, as they are found when living at sea; but others who make collections, hate the disagreeable outsides, and will have all such polished. It would be very advisable, however, for both kinds of collectors to have the same shells in different specimens both rough and polished: the naturalist would by this means, besides knowing the outside of the shell, be better acquainted with its internal characters than he otherwise could be; while those who wish to have them polished, might compare the beauties of the shell, in its wrought state, to its coarse appearance as nature gives it. How many elegancies in this part of the creation must be wholly lost to us, if it were not for the assistance of an art of this kind! Many shells in their native state are like rough diamonds; and we can form no just idea of their beauties till they have been polished and wrought into form. The safest way of removing the epidermis or outer skin from shells, is by a simple process discovered by our friend William Nicol Esq. Lecturer on Natural Philosophy. The shell from which the epidermis is wished to be removed, should be put into a vessel of water, with a quantity of quicklime, and boiled for some time. The skin of the common muscle requires only three hours boiling, while that of the mya margaritifera, or river mya, requires from twelve to fourteen hours. When the shells have boiled the proper time, they should be washed over with diluted muriatic acid, when the skin may be easily removed by rubbing it off with the fingers.

Though the art of polishing shells is a very valuable one, yet it is very dangerous to the shells; for without the utmost care, the means used to polish and beautify a shell often wholly destroy it. When a shell is to be polished, the first thing to be examined, is whether it have naturally a smooth surface, or be covered with tubercles and prominences.

A shell which has a smooth surface, and a natural dull polish, need only be rubbed with the hand, or with a piece of chamoy leather, with some tripoli, or fine rotten stone, and it will become of a perfectly bright and fine polish. Emery is not to be used on this occasion, because it wears away too much of the shell. This operation requires the hand of an experienced person, that knows how superficial the work must be, and where he is to stop; for in many of these shells the lines are only on the surface, and the wearing away ever so little of the shell defaces them. A shell that is rough, foul, and crusty, or covered with a tartareous coat, must be left a whole day steeping in hot water: when it has imbibed a large quantity of this, it is to be rubbed with rough emery on a stick, or with the blade of a knife, in order to get off the coat. We have found different kinds of engraving instruments, of much service in removing the crust and extraneous matter from shells, particularly the parasitic species of shells which adhere to them, such as serpulæ and balanæ. If done with caution, it will be found by far the best mode; and indeed, where there are spines, they cannot be removed by any other means, as, by applying acids, they are often completely destroyed. After this, it may be dipped in diluted aquafortis, spirit of salt, or any other acid; and after remaining a few moments in it, be again plunged into common water. This will add greatly to the speed of the work. After this it is to be well rubbed

142 With leather.

Of the Habitation of Shells, &c.

rubbed with linen cloths, impregnated with common soap; and when by these several means it is made perfectly clean, the polishing is to be finished with fine emery and a hair-brush. If after this the shell when dry appears not to have so good a polish as was desired, it must be rubbed over with a solution of gum arabic; and this will add greatly to its gloss, without doing it the smallest injury. The gum-water must not be too thick, and then it gives no sensible coat, only heightening the colours. The white of an egg answers this purpose also very well; but it is subject to turn yellow. If the shell has an epidermis, which will by no means admit the polishing of it, it is to be dipped several times in diluted aquafortis, that this may be eaten off; and then the shell is to be polished in the usual way with putty, fine emery, or tripoli, on the hair of a fine brush. When it is only a pellicle that hides the colours, the shell must be steeped in hot water, and after that the skin worked off by degrees with an old file. This is the case with several of the cylinders, which have not the natural polish of the rest.

When a shell is covered with a thick and fatty epidermis, as is the case with several of the mussels and tellinæ; in this case aquafortis will do no service, as it
143 With pumice-stone. will not touch the skin: then a rough brush and coarse emery are to be used; and if this does not succeed, seal-skin, or, as the workmen call it, *fish-skin*, and *pumice-stone*, are to be employed.

When a shell has a thick crust, which will not give way to any of these means, the only way left is to plunge it several times into strong aquafortis, till the stubborn crust is wholly eroded. The limpets, auris marina, the helmet-shells, and several other species of this kind, must have this sort of management; but as the design is to shew the hidden beauties under the crust, and not to destroy the natural beauty and polish of the inside of the shell, the aquafortis must be used in this manner: A long piece of wax must be provided, and one end of it made perfectly to cover the whole mouth of the shell; the other end will then serve as a handle, and the mouth being stopped by the wax, the liquor cannot get into the inside to spoil it; then there must be placed on a table, a vessel full of aquafortis, and another full of common water.

144 With acids, &c. The shell is to be plunged into the aquafortis; and after remaining a few minutes in it, is to be taken out, and plunged into the common water. The progress the aquafortis makes in eroding the surface is thus to be carefully observed every time it is taken out: the point of the shell, and any other tender parts, are to be covered with wax, to prevent the aquafortis from eating them away; and if there be any wormholes, they also must be stopped up with wax, otherwise the aquafortis would soon eat through in those places. When the repeated dippings into the aquafortis show that the coat is sufficiently eaten away, then the shell is to be wrought carefully with fine emery and a brush; and when it is polished as high as can be by this means, it must be wiped clean, and rubbed over with gum-water or the white of an egg. In this sort of work the operator must always have the caution to wear gloves; otherwise the least touch of the aquafortis will burn the fingers, and turn them yellow; and often, if it be not regarded, will eat off the skin and the nails.

These are the methods to be used with shells which require but a moderate quantity of the surface to be taken off; but there are others which require to have a larger quantity removed and to be uncovered deeper: this is called entirely scaling a shell. This is done by means of a horizontal wheel of lead or tin impregnated with rough emery; and the shell is wrought down in the same manner in which stones are wrought by the lapidary. Nothing is more difficult, however, than the performing this work with nicety: very often shells are cut down too far by it, and wholly spoiled; and to avoid this, a coarse vein must be often left standing in some place, and taken down afterwards with the file, when the cutting it down at the wheel would have spoiled the adjacent parts.

After the shell is thus cut down to a proper degree, it is to be polished with fine emery, tripoli, or rotten stone, with a wooden wheel turned by the same machine as a leaden one, or by the common method of working with the hand with the same ingredients. When a shell is full of tubercles or protuberances which must be preserved, it is then impossible to use the wheel: and if the common way of dipping into aquafortis be attempted, the tubercles being harder than the rest of the shell, will be corroded before the rest is sufficiently scaled, and the shell will be spoiled. In this case, industry and patience are the only means of effecting a polish. A camels-hair pencil must be dipped in aquafortis; and with this the intermediate parts of the shell must be wetted, leaving the protuberances dry: this is to be often repeated; and after a few moments the shell is always to be plunged into water to stop the erosion of the acid, which would otherwise eat too deep, and destroy the beauty of the shell. When this has sufficiently taken off the foulness of the shell, it is to be polished with emery of the finest kind, or with tripoli, by means of a small stick; or the common polishing-stone used by the goldsmiths may be used.

This is a very tedious and troublesome thing, especially when the echinated oysters and murices, and some other such shells, are to be wrought: and what is worst of all is, that when all this labour has been employed, the business is not well done; for there still remain several places which could not be reached by any instrument, so that the shell must necessarily be rubbed over with gum-water or the white of an egg afterwards, in order to bring out the colours and give a gloss; in some cases it is even necessary to give a coat of varnish.

These are the means used by artists to brighten the colours and add to the beauty of shells; and the changes produced by polishing in this manner are so great, that the shell can scarcely be known afterwards to be the same it was; and hence we hear of new shells in the cabinets of collectors, which have no real existence as separate species, but are shells well known, disguised by polishing. To caution the reader against errors of this kind, it may be proper to add the most remarkable species thus usually altered. 145 Some shells are disguised by polishing, such as

The onyx-shell or volute, called the *purple* or *violet-tip*, which in its natural state is of a simple pale brown, 146 the onyx-shell.

when

Of the Habitation of Shells, &c.

when it is wrought slightly, or polished with just the superfices taken off, is of a fine bright yellow; and when it is eaten away deeper, it appears of a fine milk-white, with the lower part bluish: it is in this state that it is called the *onyx-shell*; and it is preserved in many cabinets in its rough state, and in its yellow appearance, as different species of shells.

147 Violet shells.

The *violet shell*, so common among the curious, is a species of porcelain, or common cowry, which does not appear in that elegance till it has been polished; and the common sea-ear shows itself in two or three different forms, as it is more or less deeply wrought. In its rough state it is dusky and coarse, of a pale brown on the outside, and pearly within; when it is eaten down a little way below the surface, it shows variegations of black and green; and when still farther eroded, it appears of a fine pearly hue within and without.

148 Nautilus.

The *nautilus*, when it is polished down, appears all over of a fine pearly colour; but when it is eaten away but to a small depth, it appears of a fine yellowish colour with dusky hairs. The burgau, when entirely cleared of its coat, is of the most beautiful pearl colour: but when slightly eroded, it appears of a variegated mixture of green and red; whence it has been called the *parroquet shell*. The common helmet-shell, when wrought, is of the colour of the finest agate; and the mussels, in general, though very plain shells in their common appearance, become very beautiful when polished, and show large veins of the most elegant colours. The Persian shell, in its natural state, is all over white, and covered with tubercles; but when it has been ground down on a wheel, and polished, it appears of a gray colour, with spots and veins of a very bright and highly polished white. The limpets, in general, become very different, when polished, most of them showing very elegant colours; among these the tortoise-shell limpet is the principal; it does not appear at all of that colour or transparence till it has been wrought.

149 Jonquil-chama.

That elegant species of shell called the *jonquil chama*, which has deceived so many judges of these things into an opinion of its being a new species, is only a white chama with a reticulated surface; but when this is polished, it loses at once its reticular work and its colour, and becomes perfectly smooth, and of a fine bright yellow. The violet-coloured chama of New England, when worked down and polished, is of a fine milk-white, with a great number of blue veins, disposed like the variegations in agates.

150 The asses-ear shell.

The *asses-ear shell*, or *haliotis asinina* of Linnæus, when polished after working it down with the file, becomes extremely glossy, and obtains a fine rose-colour all about the mouth. These are some of the most frequent among an endless variety of changes wrought on shells by polishing; and we find there are many of the very greatest beauties of this part of the creation, which must have been lost but for this method of searching deep in the substance of the shell for them.

151 Dutch method of polishing shells.

The Dutch are very fond of shells, and are very nice in their manner of working them: they are under no restraint, however, in their works; but use the most violent methods, so as often to destroy all the beauty of the shell. They file them down on all sides, and often take them to the wheel, when it must destroy the very characters of the species. Nor do they stop here: but determined to have beauty at any rate, they are for improving upon nature, and frequently add some lines and colours with a pencil, afterwards covering them with a fine coat of varnish, so that they seem the natural lineations of the shell: the Dutch cabinets are by these means made very beautiful, but they are by no means to be regarded as instructors in natural history. There are some artificers of this nation who have a way of covering shells all over with a different tinge from that which nature gives them; and the curious are often enticed by these tricks to purchase them for new species.

There is another kind of work bestowed on certain species of shells, particularly the nautilus; namely, the engraving on it lines and circles, and figures of stars, and other things. This is too obvious a work of art to suffer any one to suppose it natural. Buonani has figured several of these wrought shells at the end of his work; but this was applying his labour to very little purpose; the shells are spoiled as objects of natural history by it.—They are principally done in the East Indies.

152 Imperfections of shells natural and accidental.

Shells are subject to several imperfections; some of which are natural and others accidental. The natural defects are the effect of age, or sickness in the fish. The greatest mischief happens to shells by the fish dying in them. The curious in these things pretend to be always able to distinguish a shell taken up with the fish alive from one found on the shores: they call the first a *living*, the second a *dead* shell; and say that the colours are always much fainter in the dead shells. When the shells have lain long dead on the shores, they are subject to many injuries, of which the being eaten by sea-worms is not the least; age renders the finest shells livid or dead in their colours.

Besides the imperfections arising from age and sickness in the fish, shells are subject to other deformities, such as morbid cavities, or protuberances, in parts where there should be none. When the shell is valuable, these faults may be hid, and much added to the beauty of the specimen, without at all injuring it as an object of natural history, which should always be the great end of collecting these things. The cavities may be filled up with mastic, dissolved in spirit of wine, or with isinglas: these substances must be either coloured to the tinge of the shell, or else a pencil dipped in water-colours must finish them up to the resemblance of the rest; and then the whole shell being rubbed over with gum-water, or with the white of an egg, scarce any eye can perceive the artifice; the same substances may also be used to repair the battered edge of a shell, provided the pieces chipped off be not too large. And when the excrescences of a shell are faulty, they are to be taken down with a fine file. If the lip of a shell be so battered that it will not admit of repairing by any cement, the whole must be filed down or ground on the wheel till it become even.

EXPLANATION

EXPLANATION OF THE PLATES.

Plate CLII. Multivalve Shells.

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Fig. 5. *Pholas crispatus*. Page 404, N° 11.

Bivalve Shells.

Fig. 6. *Mya arenaria*; *a*, projecting tooth; *b*, *b*, the breadth of the shell; *c*, cicatrix, or tongue.

Fig. 7. *Solen ensis*; *a*, the ligament; *b*, *b*, length of the shell; *c*, *c*, the breadth. Page 406, N° 5.

Fig. 8. *Tellina virgata*; *a*, primary tooth. Page 406, N° 5.

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Univalve Shells.

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CONCHYLIA, a general name for all petrified shells, as limpets, cochleæ, nautili, conchæ, lepades, &c.

CONCIATOR, in the glass art, is, for the crystal-glass, what the founder is at the green-glass houses. He is the person that weighs and proportions the salt on ashes and sand; and works them with a strong fire till they run into lumps and become white; and if the metal be too hard, and consequently brittle, he adds salt or ashes, and if too soft, sand; still mixing them to a fit temper, which is only known by the working.

CONCINNOUS INTERVALS, in *Music*, are such as are fit for music, next to, and in combination with, concords; being neither very agreeable nor disagreeable in themselves; but having a good effect, as by their opposition they heighten the more essential principles of pleasure: or as, by their mixture and combination with them, they produce a variety necessary to our being better pleased.

Concinnous System, in *Music*. A system is said to be concinnous, or divided concinnously, when its parts, considered as simple intervals, are concinnous; and are besides placed in such an order between the extremes, as that the succession of sounds, from one extreme to the other, may have an agreeable effect.

CONCLAMATIO, in antiquity, a shout raised by those present at burning the dead, before they set fire to the funeral pile. See SHOUT. The word was also applied to the signal given to the Roman soldiers to decamp, whence the expression *conclamare vasa; conclamare arma*, was a signal for battle. It was likewise used for a practice of calling to a person deceased three times by his name; and when no reply was returned, they thus expressed his decease, *conclamatum est*. Whence the same term was afterwards applied to the cessation of the Roman empire.

CONCLAVE, the place in which the cardinals of the Romish church meet, and are shut up, for the election of a pope.

The conclave is a range of small cells, 10 feet square, made of wainscot: these are numbered, and drawn for by lot. They stand in a line along the galleries and hall of the Vatican, with a small space between each. Every cell has the arms of the cardinal over it. The conclave is not fixed to any one determinate place, for the constitutions of the church allow the cardinals to make choice of such a place for the conclave as they think most convenient; yet it is generally held in the Vatican.

The conclave is very strictly guarded by troops; neither the cardinals, nor any person shut up in the conclave, are spoken to, but at the hours allowed of, and then in Italian or Latin: even the provisions for the conclave are examined, that no letters be conveyed by that means from the ministers of foreign powers, or other persons who may have an interest in the election of the pontiff.

CONCLAVE is also used for the assembly, or meeting, of the cardinals shut up for the election of a pope.

CONCLUSION, in *Logic*, the consequences or judgment drawn from what was asserted in the premises; or the previous judgments in reasoning, gained from combining the extreme ideas between themselves.

CONCOCTION, in *Medicine*, the change which the food undergoes in the stomach, &c. to become chyle. See CHYLE.

CONCOMITANT, something that accompanies or goes along with another.

CONCORD, in *Grammar*, that part of construction called *syntax*, in which the words of a sentence agree; that is, in which nouns are put in the same gender, number, and case; and verbs in the same number and person with nouns and pronouns. See GRAMMAR.

CONCORD, in *Music*, the relation of two sounds that are always agreeable to the ear, whether applied in succession or consonance.

Form of CONCORD, in ecclesiastical history, a standard book among the Lutherans, composed at Torgaw, in 1576, and thence called the book of Torgaw, and reviewed at Berg by six Lutheran doctors of Germany, the principal of whom was James Andreæ. This book contains, in two parts, a system of doctrine, the subscription of which was a condition of communion, and a formal and very severe condemnation of all who differed from the compilers of it, particularly with respect to the majesty and omnipresence of Christ's body, and the real manducation of his flesh and blood in the eucharist. It was first imposed on the Saxons by Augustus, and occasioned great opposition and disturbance. The dispute about it was revived in Switzerland in 1718, when the magistrates of Berne published an order for adopting it as the rule of fath; the consequence of which was a contest, that reduced its credit and authority.

CONCORDANCE, a dictionary or index to the Bible, wherein all the leading words, used in the course of the inspired writings, are ranged alphabetically; and the various places where they occur referred to; to assist in finding out passages and comparing the several significations of the same word.

Cardinal Hugo de St Charo, is said to have employed 500 monks at the same time in compiling a Latin concordance; besides which, we have several other concordances in the same language; one, in particular, called the *concordance* of England, compiled by J. Darlington, of the order of Predicants; another more accurate one, by the Jesuit de Zamora.

R. Mordecai Nathan has furnished us with a Hebrew concordance, first printed at Venice in 1523, containing all the Hebrew roots branched into their various significations, and under each signification all the places in scripture where it occurs: but the best and most useful Hebrew concordance is that of Buxtorf, printed at Basil in 1632.

Dr Taylor published, in 1754, a Hebrew concordance in two volumes folio, adapted to the English Bible, and disposed after the manner of Buxtorf.

The Greek concordances are only for the New Testament: indeed we have one of Conr. Kircher's on the Old; but this is rather a concordantial dictionary than a concordance; containing all the Hebrew words in an alphabetical order; and underneath all the interpretations or senses the LXX. give them; and in each interpretation all the places where they occur in that version.

In 1718, Trommius published his Greek concordance for the Septuagint at Amsterdam, in two volumes folio;

folio; and Schmidius improving on a similar work of H. Stephen, has given an excellent Greek concordance for the New Testament, the best edition of which is that of Leipsic, an. 1717.

Calasius, an Italian Cordelier, has given us concordances of the Hebrew, Latin, and Greek, in two columns; the first, which is Hebrew, is that of R. Mordecai Nathan, word for word, and according to the order of the books and chapters: in the other column is a Latin interpretation of each passage of Scripture quoted by R. Mordecai; this interpretation is Calasius's own; but in the margin he adds that of the LXX. and the Vulgate, when different from his. The work is in 4 vols folio, printed at Rome in 1621.

We have several very copious concordances in English, as Newmann's, &c. but the last and best esteemed is that in 4to by Alexander Cruden.

CONCORDANT VERSES, such as have several words in common; but which, by the addition of other words, convey an opposite, at least a different meaning. Such are those.

Et $\left\{\begin{matrix} \textit{canis} \\ \textit{lupus} \end{matrix}\right\}$ *in silva* $\left\{\begin{matrix} \textit{venatur} \\ \textit{nutritur} \end{matrix}\right\}$ *et omnia* $\left\{\begin{matrix} \textit{servat.} \\ \textit{vastat.} \end{matrix}\right.$

CONCORDAT, in the canon law, denotes a covenant or agreement concerning some beneficiary matter, as a resignation, permutation, promotion, or the like.

The council of Trent, sess. vi. *de reform.* cap. 4. speaking of concordats made without the authority and approbation of the pope, calls them *concordias quæ tantum suos obligant auctores, non successores.* And the congregation of cardinals, who have explained this decree, declares also that a concordat cannot be valid so as to bind successors, unless confirmed by the pope.

CONCORDAT is also used, absolutely, among the French, for an agreement concluded at Bologna in 1516, between Pope Leo X. and Francis I. of France, for regulating the manner of nominating to benefices.

The concordat serves in lieu of the pragmatic sanction, which has been abrogated; or rather, it is the pragmatic sanction softened and reformed. The concordat between the pope and the republic of Venice resembles the former.

There is also a German concordat, made between the emperor Frederic III. and the princes of Germany, in 1448, relating to beneficiary matters, confirmed by Pope Nicholas V.

CONCORDIA, a town of Italy, in the duchy of Mirandola; seated on the river Sechia, 5 miles west of Mirandola, and 15 miles south-east of Mantua; subject to the house of Austria. E. Long. 11. 13. N. Lat. 44. 52.

CONCORDIA, in *Ancient Geography*, a town of the Veneti, situated at the confluence of the rivers Romatinus Major and Minor, 31 miles to the west of Aquileia, (Pliny, Ptolemy, Antonine); a colony surnamed *Julia.* Its ruins still go by the name of *Concordia.*— Another Concordia (Ptolemy), of Lusitania, to the north-west of Trajan's bridge, on the Tagus.—A third of the Nemetes, in Belgica, on the west side of the Rhine; a Roman fortress, situated between Brocomagus and Noviomagus. Now Drusenheim, in Alsace: E. Long. 8. N. Lat. 48. 40.

CONCORDIA, a Pagan divinity of the Romans. She had a temple on the declivity of the Capitol; another in the Portico of Livia; and a third on Mount Palatine, built of brass by Cn. Flavius, on account of a vow made for reconciling the senate and people. She was pictured with a cup in her right hand; in her left was sometimes a sceptre, and sometimes a *cornucopiæ.* Her symbols were two hands joined, as is seen in a coin of Aurelius Verus, and another of Nero; also two serpents twisting about a caduceus. She was addressed to promote the peace and union of families and citizens.

CONCOU, in *Botany*, a name given by the people of Guinea to an herb, which is in great esteem among them for killing that troublesome sort of worm called the *Guinea-worm*, that breeds in their flesh. They bruise the leaves, and mixing them with oil apply them in form of a cataplasm.

CONCRETE, in the school-philosophy, an assemblage or compound.

CONCRETE, in *Natural Philosophy* and *Chemistry*, signifies a body made up of different principles, or any mixed body: thus, soap is a factitious concrete, mixed together by art; and antimony is a natural concrete, or a mixed body compounded in the bowels of the earth.

CONCRETION, the uniting several small particles of a natural body into sensible masses or concretes, whereby it becomes so and so figured and determined, and is endued with such and such properties.

CONCRETION is also the act whereby soft bodies are rendered hard: or an insensible motion of the particles of a fluid or soft body, whereby they come to a consistence. It is indifferently used for induration, condensation, congelation, and coagulation.

CONCUBINAGE sometimes expresses a criminal or prohibited commerce between the two sexes; in which sense it comprehends adultery, incest, and simple fornication.

In its more restrained sense, concubinage is used for a man's and a woman's cohabiting together in the way of marriage, without having passed the ceremony thereof.

Concubinage was anciently tolerated: the Roman law calls it an allowed custom, *licita consuetudo.* When this expression occurs in the constitutions of the Christian emperors, it signifies what we now call a *marriage in conscience.*

The concubinage tolerated among the Romans in the time of the republic, and of the heathen emperors, was that between persons not capable of contracting marriage together; nor did they even refuse to let inheritances descend to children which sprung from such a tolerated cohabitance. Concubinage between such persons they looked on as a kind of marriage, and even allowed it several privileges: but then this concubinage was confined to a single person, and was of perpetual obligation as much as marriage itself. Hottoman observes, that the Roman laws had allowed of concubinage long before Julius Cæsar made that law whereby every one was allowed to marry as many wives as he pleased. The emperor Valentinian, Socrates tells us, allowed every man two.

CONCUBINAGE is also used for a marriage performed with less solemnity than the formal marriage: or a marriage

marriage with a woman of inferior condition, and to whom the husband does not convey his rank or quality. Cujas observes, that the ancient laws allowed a man to espouse, under the title of *concubine*, certain persons, such as were esteemed unequal to him, on account of the want of some qualities requisite to sustain the full honour of marriage. He adds, that though concubinage was beneath marriage, both as to dignity and civil effects; yet was concubine a reputable title, very different from that of mistress among us. The commerce was esteemed so lawful, that the concubine might be accused of adultery in the same manner as a wife.

This kind of concubinage is still in use in some countries, particularly in Germany, under the title of *a half marriage, morgengabic marriage*, or *marriage with the left-hand;* alluding to the manner of its being contracted, viz. by the man's giving the woman his left hand instead of the right. This is a real marriage, though without solemnity: the parties are both bound for ever: though the woman be thus excluded from the common rights of a wife for want of quality or fortune.

The children of concubines were not reputed either legitimate or bastards, but natural children, and were capable only of donations. They were deemed to retain the low rank of the mother; and were on this ground unqualified for inheriting the effects of the father.

CONCUBINAGE, in a legal sense, is used as an exception against her that sueth for dower, alleging thereby, that she was not a wife lawfully married to the party, in whose lands she seeks to be endowed, but his concubine.

CONCUBINE, a woman whom a person takes to cohabit with him, in the manner, and under the character, of a wife, without being authorized thereto by a legal marriage.

CONCUBINE is also used for a real, legitimate, and only wife, distinguished by no other circumstance but a disparity of birth or condition between her and the husband. Du Cange observes, that one may gather from several passages in the epistles of the popes, that they anciently allowed of such concubines. The seventeenth canon of the first council of Toledo declares, that he who, with a faithful wife, keeps a concubine, is excommunicated; but that if the concubine served him as a wife, so that he had only one woman, under the title of concubine, he should not be rejected from communion: which shows that there were legitimate wives under the title of concubines.

In effect, the Roman laws did not allow a man to espouse whom he pleased; there was required a kind of parity, or proportion, between the conditions of the contracting parties; but a woman of inferior condition, who could not be espoused as a wife, might be kept as a concubine; and the laws allowed of it, provided the man had no other wife.

It is certain the patriarchs had a great number of wives, and that these did not all hold the same rank; some being subaltern to the principal wife; which were what we call *concubines* or half-wives. The Romans prohibited a plurality of concubines, and only had regard to the children issuing from a single concubine, because she might become a legitimate wife. Solomon had 700 wives and 300 concubines; the emperor of China has sometimes two or three thousand concubines in his palace. Q. Curtius observes, that Darius was followed in his army by 365 concubines, all in the equipage of queens.

CONCUPISCENCE, according to divines, an irregular appetite, or lust after carnal things, inherent in the nature of man ever since the fall.

COND, CON, or CONN, in sea language, signifies to guide or conduct a ship in her right course. He that cons her, stands aloft with a compass before him, and gives the word of direction to the man at the helm how he is to steer. If the ship go before the wind, or, as they call it, betwixt the sheets, the word is either Starboard, or Port the helm; according as the conder would have the helm put to the right or left side of the ship, upon which the ship always goes the contrary way. If he says, Helm a midship, he would have the ship to go right before the wind, or directly between her two sheets. If the ship sail by a wind, or on a quarter wind, the word is, Aloof, keep your luff, fall not off, veer no more, keep her to, touch the wind, have a care of the lee-latch: all which expressions are of the same import, and imply that the steersman should keep the ship near the wind. On the contrary, if he would have her sail move large, or more before the wind, the word is, Ease the helm, no near, bear up. If he cries Steady, it means, keep her from going in and out, or making yaws (as they call it), howsoever she sails, whether large or before a wind: and when he would have her go just as she does, he cries, Keep her thus, thus, &c.

CONDAMINE, CHARLES M. DE LA, a French traveller, and man of science. See SUPPLEMENT.

CONDATE, in *Ancient Geography*, a town of Armorica in Gaul: called *Civitas Rhedonum*, in the Notitia; afterwards *Redonæ;* Redonica Regio, the district. Hence the modern name *Rennes*, in Brittany. W. Long. 1. 45. Lat. 48. 5. Another Condate of Britain (Antonine); now thought to be Congleton in Yorkshire; others say in Lancashire.

CONDE, LEWIS DE BOURBON, PRINCE OF, was born at Paris Sept. 7. 1621. He was styled Duke d'Enguien, till he succeeded to the title of Prince of Conde by his father's death in 1646. As he was of a tender and delicate constitution, the prince sent him to the castle of Montrond in Berry, that he might breathe a more pure and salutary air. Here he was educated in his infancy by some experienced and prudent citizens wives, When he was of a proper age, the prince took upon himself the task of governor, and appointed for his assistant M. de la Boussieres, a private gentleman, a man of honour, fidelity, and good nature, and who made it a rule to observe inviolably the orders that were given him. Two Jesuits distinguished for their genius and knowledge were also given him for preceptors. He formed him a household of 15 or 20 officers, all men of the greatest virtue and discretion.

With these attendants the duke d'Enguien went to settle at Bourges, where he frequented the college of Jesuits. Here, besides the ordinary studies, he was taught ancient and modern history, mathematics, geography, declamation; also riding and dancing, in which last he soon excelled. He made such a surprising progress, that before the age of 13 he defended in public some questions in philosophy with incredible applause.

Conde. applause. At his return from Montrond, he had for his tutor M. de Merille; a man deeply versed in the knowledge of common law, of ancient and modern laws, of the holy scriptures, and of the mathematics. Under his direction the duke went through that new course with prodigious success. He acquired a critical taste in the arts and sciences, which he retained all his life; he never suffered a day to pass without dedicating two or three hours at least to reading; his thirst for knowledge was universal, and he endeavoured to search every thing to the bottom. His chief inclination, however, lay towards the military art; and at the age of 18 he obtained permission to make his first campaign as a volunteer in the army commanded by M. de la Meilleraye. This campaign was unfortunate; and the duke d'Enguien was only a witness of the marshal's imprudence and disgrace. Nevertheless, in this campaign he laid the foundation of that renown which made him afterwards considered as the greatest general of his age.

On his return to Paris, the duke waited upon Cardinal Richelieu at Ruel. The minister was so pleased with his conversation, that he soon after made proposals of an alliance with the prince of Conde, by marrying the duke d'Enguien to Claire Clemence de Maille Breza, the cardinal's niece. The duke consented to this match out of obedience to his father; but the force he put upon himself by yielding to it was so great, that he fell dangerously ill. It was long before he got the better of his distemper; but at length he not only recovered, but became so strong as afterwards to bear the greatest fatigues with ease.

The duke made two more campaigns as a volunteer; the one under the marshal de la Meilleraye, the other in the army of Louis XIII. which conquered Roussillon. In 1643, at the age of 22, he obtained from the king, at the persuasion of Cardinal Mazarin, the command of the army destined to cover Champagne and Picardy; which command was confirmed to him after the king's death by the queen regent, Anne of Austria, to whose interest he was strongly devoted. In this station, though he had never been present at any battle, he soon gave such a specimen of his abilities as crowned him with glory. The Spaniards, who threatened France with an invasion, were defeated by him at Rocroi; and this signal victory made him from that time considered as the guardian genius of his country. He next formed the project of besieging Thionville, and proposed it to the council of regency. They consented with fear and distrust; but the duke carried it into execution with such skill, activity, and courage, that he became justly the subject of general admiration. In two months time Thionville surrendered. At length, having covered Alsace and Lorrain from the enterprises of the Imperialists, the duke returned to Paris, where he obtained the government of Champagne, and of the city of Stenai.

The three following years were little more than a series of military operations. The three battles of Fribourg, in which the duke d'Enguien triumphed over Velt Marshal Count de Mercy, the greatest general in all Germany; the taking of Philipsbourg, and a great number of other places, which rendered him master of the palatina..., and of the whole course of the Rhine; the victory of Nortlingue, by which he revenged the viscount du Turenne's defeat at Mariendal; the siege and conquest of Dunkirk; the good and bad success of his arms in Catalonia, where, though he was forced to raise the siege of Lerida, he kept the Spaniards in awe, and cut to pieces their rear guard; these are the principal events which distinguish the campaigns of 1644, 1645, and 1646.

The victories of the duke d'Enguien, his great reputation and esteem with the people, began now to give umbrage to Mazarin. The cardinal's dislike to him appeared on the death of the duke de Breze, admiral of France. The prince of Conde earnestly demanded for his son the duke de Breze's places. But Mazarin, afraid of increasing the wealth and power of a prince, whom his victories and the love and confidence of the people and the army had already rendered too formidable to him, evaded his request, by persuading the queen to take the admiralty to herself. On the death of his father, the minister's dislike to the young prince of Conde became still more apparent. By the minister's persuasion he had accepted of the command of the army in Catalonia; but, on his arrival at Barcelona, he found neither troops, money, artillery, provisions, nor ammunition. Enraged at this deception, he vented his resentment in bitter complaints and severe threats: but by the resources that he found in this dilemma, the prince added new lustre to his glory.

The campaign of 1648 was as glorious to Conde as those which preceded it had been. To disconcert at once the projects of the archduke Leopold, the prince resolved to attack him even in the heart of the Low Countries; and notwithstanding the considerable difficulties which he had to surmount, he besieged the important city of Ypres, and took it in sight of all the enemy's forces.

Notwithstanding this success, Conde saw himself at the point of experiencing the greatest reverse of fortune. His army was a prey to scarcity, to nakedness, contagious distempers, and desertion. For eight months it received no supply from the minister, but half a muster. Every thing was supplied by the prince himself; he lavished his money, and borrowed more to supply his troops. When it was represented to him that he was in danger of ruining himself by such an enormous expence, he replied, that "since he every day ventured his life for the service of his country, he could very well sacrifice his fortune to it. Let but the government exist (added he), and I shall want for nothing."

The French army having been reinforced by 4000 of the troops of Weimar, Conde attacked the Spaniards advantageously encamped near Lens, and gained a complete victory over them, which disabled them from attempting any thing more, and even from supporting themselves. Afterwards he besieged Furnes, the garrison of which, 500 men, surrendered themselves prisoners of war. But the prince was wounded there in the trenches by a musket-shot above the right hip; and the contusion was so great, that he was forced to submit to several incisions.

The French court, animated with the victory at Lens, thought this a proper time to take vengeance on on the factions which for some time had violently agitated the kingdom; and accordingly imprisoned Broussel and Blancmenil, two of the principal leaders of the country party. This vigorous proceeding, however, occasioned a general revolt. Two hundred thousand men took arms in Paris, barricaded the streets, invested the palais-royal, and demanded the prisoners. It was necessary to release them; but from that time the regal authority was annihilated; the queen was exposed to a thousand insults, and Mazarin dared no longer venture out of the palais-royal. In this embarrassment the queen recalled the prince of Conde, as the only one from whom she could hope for support. He retired to Ruel, whither the regent had gone with the young king and Mazarin. Anne of Austria proposed to him the reducing of Paris by force of arms: but he calmed the resentments of that princess; and instead of being accessory to her vengeance, he directed all his views to pacify the kingdom, and at length brought about an accommodation between the parties, who desired it with equal ardour. But new incidents soon rekindled the combustion. The treachery of Mazarin, and the artifices of the leaders of the country party, occasioned new cabals and fresh troubles. Conde was caressed by the leaders of both parties; but at last, enraged at the arrogance of the malecontents, who every day formed new pretensions. he took part openly with the court, though he thought it ungrateful, and protected the minister, though he did not esteem him.

The royal family, the duke of Orleans, Conde, and Mazarin, left Paris privately in the night between the 5th and 6th of January 1646, and went to St Germains. The parliament sent deputies to learn from the queen herself the reasons of her departure, and to beg her to name the citizens whom she suspected, that they might be tried. Mazarin had the imprudence to dismiss them without any answer. Exasperated at this, the people again took up arms in order to defend themselves against the enterprises of the court, who had determined to block up and to starve the capital, in order to suppress the party of malecontents. With 7000 or 8000 men, the broken relics of the last campaign, the prince of Conde formed a design of reducing above 500,000 intrenched behind walls. He had neither money nor magazines; he saw himself in the depth of a most severe winter; nevertheless he triumphed over Paris, and this great success completed his glory. It did him so much the more honour, as during the siege he constantly defeated the troops of the malecontents; he prevailed on the army that marched to their assistance under Turenne, to abandon that general; he stopped the progress of the duke de Longueville, who had caused an insurrection in Normandy; and got the start of the Spaniards, who were advancing to give him battle.

Condi de Retz, coadjutor of Paris, and afterwards cardinal, was the life and soul of the revolters, and directed all their motions. He had taken Catiline for his model; and was equally intrepid and capable of the greatest actions; of an exalted genius, but governed by his ambition. He distinguished his hatred to Mazarin by arming the malecontents; and he himself raised at his own expence a regiment which he called the regiment of *Corinth;* as soon as this corps took the field during the blockade of Paris, it was defeated and dispersed. This check was called *the first to the Corinthians.* The peace was signed at St Germains; but neither party carried its point, and scarce any one but Conde acquired glory by this war. After the conclusion of the treaty, the prince repaired to the capital, and traversed all the streets in his coach alone. All persons of any consequence paid their compliments to him, and the parliament sent a solemn deputation to thank him for the peace to which he had so powerfully contributed. The people, however, made loud complaints on account of the king's absence (for the court was not yet returned to Paris), and the malecontents gave reason to apprehend a new insurrection. Conde encouraged the king and queen to return; and at length brought them to Paris, amidst the acclamations and blessings of the public.

The important service which Conde had just done the court entitled him to the acknowledgments of the queen, and especially of Mazarin; but the dark soul of that cardinal only remembered it to punish a too fortunate and too powerful protector. He privately swore the prince's destruction; at least that he should give the whole kingdom a pattern of submission and dependence on his will. However, not to excite the public indignation, he still kept up appearances with the prince, while he secretly spread about him disgusts, suspicions, snares of every kind, and the most heinous calumnies. The ungrateful minister deceived the prince by making him the most flattering proposals; and with the most alluring promises, which he always found means to avoid fulfilling. The enraged prince despised the minister, and treated him with disdain. After this they were reconciled again only to be again at variance. Each of them in their turn courted the country party, in order to make it subservient to their designs. At last Mazarin thought of an expedient, which but too effectually answered his purpose, of making an irreconcileable quarrel between that party and the prince. Among the malecontents, the marquis de la Boulaie, a man of an infamous character, had obtained the confidence of the party by false appearances of hatred to the cardinal, but secretly kept up a correspondence with him. It is pretended that he made him an offer of privately killing Conde. Mazarin was charmed with the proposal; yet he only required Boulaie to exhibit all the proofs of an assassination, and to act in such a manner that every thing might concur to render the country party suspected of that crime. He was punctually obeyed; the coach was stopped; some pistols were fired at it, by which two of the footmen were dangerously wounded; and after that shameful exploit, la Boulaie took refuge in the hotel of the duke of Beaufort, who was the hero of the party, in order no doubt to countenance the prince's suspicion of the malecontents. Luckily Conde was not in his coach when it was stopped; the cardinal had spread the report of his intended assassination; and in concert with the queen and the prince he had prevailed to have the coach sent away empty, to prove the reality of the attempt. Mazarin counterfeited a zeal for the prince's life; he furiously declaimed against the malecontents, who, he pretended, had made an attempt on a life so precious to the state; and he inflamed Conde's resentment against the duke of Beaufort ceived him in; and a peace ensued soon after. His hatred of the cardinal, however, made him quit Paris, and take refuge among the Spaniards, who made him generalissimo of their forces; and he took Rocroi. The peace of the Pyrenees restored him to his country; and he again signalized himself at the head of the king's armies. Being afflicted with the gout, he refused the command of the army in 1676, and retired to Chantilly, where he was as much esteemed for the virtues of peace, as he had been before for his military talents. He died in 1686, at Fontainbleau.

CONDE, a town of the French Netherlands, in the department of the North, with the title of a principality, and has 5000 inhabitants. It is one of the strongest towns in this country, and seated near the confluence of the rivers Haisne and Scheldt. It was taken by the allies in 1793, and retaken by the French in 1794. Its name by the convention was changed to Nord Libre. E. Long. 3. 39. N. Lat. 50. 27.

CONDE, a town of France, in the department of Calvados, which carries on a considerable trade; seated on the river Nereau, 15 miles west of Paris. W. Long. 0. 37. N. Lat. 48. 50.

CONDEMNATION, the act of giving judgment, passing or pronouncing sentence against a person, who is thus subjected to some penalty or punishment, either in respect of life, reputation, or fortune.

CONDENSATION, the act whereby a body is rendered more dense, compact, and heavy. The word is commonly applied to the conversion of vapour into water, by distillation, or naturally in the clouds. The way in which vapour commonly condenses, is by the application of some cold substance. On touching it, the vapour parts with its heat which it had before absorbed; and on doing so, it immediately loses the proper characteristics of vapour, and becomes water. But though this is the most common and usual way in which we observe vapour to be condensed, nature certainly proceeds after another method; since we often observe the vapours most plentifully condensed when the weather is really warmer than at other times. See the articles CLOUD, EVAPORATION, &c.

CONDENSER, a pneumatic engine, or syringe, with which a greater quantity of air may be crowded into a given space; so that sometimes ten atmospheres, or ten times as much air as there is at the same time in the same space, under the usual pressure, may be thrown in by means of it, and its egress prevented by valves properly disposed.

It consists of a brass cylinder, wherein is a moveable piston; which being drawn out, the air rushes into the cylinder through a hole provided on purpose; and when the piston is again forced into the cylinder, the air is driven into the receiver through an orifice, furnished with a valve to hinder its getting out.

The receiver or vessel containing the condensed air, should be made very strong, to bear the force of the air's spring thus increased; for which reason they are generally made of brass; its orifice is fitted with a female screw to receive the male screw at the end of the condenser.

CONDENSER of Electricity, an apparatus for collecting small quantities of the electric fluid. This instrument was invented by Volta, and is described in the 72d vol. of the Phil. Trans. See ELECTRICITY.

CONDILLAC, ETIENNE BONNOT DE, an eminent French writer on metaphysics. See SUPPLEMENT.

CONDITION, in the civil law, a cause of obligation stipulated as an article of a treaty or a contract; or in a donation of a testament, legacy, &c. in which last case a donee does not lose his donative if it be charged with any dishonest or impossible conditions.

CONDITIONAL, something not absolute, but subject to conditions.

CONDITIONAL Conjunctions, in *Grammar*, are those which serve to make propositions conditional; as *if*, *unless*, *provided*, &c.

CONDITIONAL Propositions, in *Logic*, such as consist of two parts connected together by a conditional particle.

CONDITIONAL Syllogism, a syllogism where the major is a conditional proposition. Thus,

If there is a God, he ought to be worshipped.
But there is a God;
Therefore he ought to be worshipped.

CONDIVICNUM, in *Ancient Geography*, the capital of the Namnetes, in Armorica. Now Nantes in Brittany, on the Loire, from its name *Civitas Namnetum*. W. Long. 1. 30. Lat. 47. 15.

CONDOM, a town of Gascony in France, capital of the Condomois, with a bishop's see. It is but a poor place, and the trade is very small. It is seated on the river Gelisse, in E. Long. 0. 22. N. Lat. 44.

CONDOR, or CONTOR. See VULTURE, ORNITHOLOGY *Index*.

CONDORCET, JOHN-ANTONY NICHOLAS CARITAT, marquis of, a French writer, and political character of considerable eminence, descended from an ancient family from the principality of Orange, and born at Ribemont in Picardy, in 1743. He received his education at the college of Navarre, where he was distinguished at an early period of life for his strong attachment to the study of physics and mathematics. On his entrance into public life, he established a friendly intercourse with Voltaire, D'Alembert, and other literary characters, who professed opinions analogous to his own, and formed a very powerful party among the French literati, whose united efforts to propagate their ideas of religion and politics, have been applauded or condemned, according to the principles of their different judges. Condorcet first attracted the attention of the public as a mathematician, obtaining their approbation for his treatise on integral calculations, which he composed at the age of 22. In the year 1767, his solution of the problem of the Three Bodies made its appearance, and in the following year the first part of his "Essays on Analysis." In the year 1769 he was received a member of the Academy of Sciences, the memoirs of which were greatly enriched by him with different papers on the most abstruse branches of mathematical science. His justly merited reputation pointed him out as a fit person to co-operate with D'Alembert and Bossut, in assisting M. Turgot, that celebrated minister and able financier, with arithmetical calculations. In the mean time he laboured indefatigably in the study of politics and metaphysics, and defended, in an anonymous publication, the sect of philosophers to which he had attached himself, from an an attack made upon them in the Trois Siecles; and replied to M. Necker's essay on Corn Laws. He was appointed secretary to the Academy of Sciences in the year 1773, when he employed much of his time in writing eulogies on such of its deceased members as Fontenelle had passed over in silence. Like D'Alembert and some others, Condorcet having united in himself the characters of an elegant writer and a man of profound research, was admitted into the French academy in 1783, when he pronounced an oration on the influence of philosophy, which was ordered to be printed. From the time of D'Alembert's death, which happened this year, he filled the station of secretary to that academy, rendering his name conspicuous by the publication of eulogies on different eminent characters. His panegyric on D'Alembert, to whom he was most sincerely attached, is a very elaborate performance, notwithstanding of which it is esteemed by judges as a candid account of the genuine merits of that great philosopher. His encomium bestowed on that very able mathematician Euler, furnished him with a favourable opportunity of giving a circumstantial account of the specific improvements and inventions conferred on a peculiar branch of science by the labours of an individual; a talent in a biographical writer which Condorcet appears to have possessed in an eminent degree. His eulogy on the minister Turgot was read with avidity, and admired by all those who approved of Turgot's plans of government and system of finance. In the year 1787 he gave the public his "Life of Voltaire," which was highly elaborate, and replete with lofty panegyric, on the merits of which mankind were consequently much divided, according to their sentiments of that author's philosophy. The last of his biographical works was an eulogy on the celebrated Dr Franklin, published in 1790, all of which will be read with some degree of prejudice by those who are inimical to the school of philosophy to which he belonged.

The memorable event of the French revolution, which the writings of Condorcet and his associates unquestionably accelerated, naturally interested his feelings, and called forth his exertions. But the conduct of the political parties and their leaders, during this tumultuous period, is painted in colours so diametrically opposite to each other, that a proper estimate of it is scarcely possible. In this part of Condorcet's life, therefore, we must confine ourselves to such facts as are universally acknowledged, leaving it to our readers to draw inferences for themselves.

At an early period he employed his talents to promote these reforms, (for such they appeared in his judgment) which were to pave the way to a new order of things. A work entitled *La Bibliotheque de l'Homme Public*, to contain an analysis of the writings of the most eminent politicians, was chiefly conducted by him, as was also a newspaper called *La Chronique de Paris*, filled with declamation against royalty. He had likewise a share in the *Journal de Paris*, a paper conducted on similar principles. About the time when the unfortunate king fled to Varennes he proposed a paper called *Le Republicain*, the obvious intention of which is clearly deducible from its title. He was an indefatigable member of the Jacobin club, and spoke frequently, though not forcibly, in it. He was chosen a representative for Paris when the constituent assembly was dissolved, and followed the general political course of the Brissotine party. A plan for public instruction was now to exercise his abilities, which he finished in two elaborate memoirs, allowed to contain some exalted and enlarged ideas, but perhaps rather extensive to be reduced to practice. He was likewise author of the manifesto addressed to the European powers by the people of France, on the approach of a war. He wrote a letter of expostulation to the king while he was president of the assembly, which some have considered as by far too severe, and destitute of that ceremony to which the sovereign was entitled. When the king was insulted by the populace at the Thuilleries, in being offered the red cap, it is said that he vindicated their proceedings. We are also informed, that while he was degrading royalty in this manner, he was secretly soliciting the office of tutor to the dauphin; a proposition which the king utterly rejected, on account of his avowed infidelity. Attempts have been made to fix upon his character the most abominable ingratitude, by making him accessory to the murder of the duke de la Rochefoucault, to whom he was under the strongest obligations, and from whose family he had received a most accomplished wife with a fortune; but we sincerely hope that this calumny entirely originated from the malevolence of party spirit. When the trial of the king came to be agitated, Condorcet gave it as his opinion that he could not be brought to judgment in a legal manner; yet it must be confessed that his conduct in regard to the sentence, was rather of an ambiguous nature, and betrayed that timidity and want of resolution which formed the most prominent features of his political career. The judgement of Madame Roland concerning the moral constitution of this wonderful man has all the air of impartiality. "The genius of Condorcet," says that lady, "is equal to the comprehension of the greatest truths; but he has no other characteristic besides fear. It may be said of his understanding, combined with his person, that it is a fine essence absorbed in cotton. The timidity which forms the basis of his character, and which he displays even in company, does not result from his frame alone, but seems to be inherent in his soul, and his talents furnish him with no means of subduing it. Thus, after having deduced a principle or demonstrated a fact in the assembly, he would give a vote decidedly opposite, overawed by the thunder of the tribunes, armed with insults, and lavish of menaces. The properest place for him was the secretaryship of the academy. Such men should be employed to write, but never permitted to act." The Gironde party, after the execution of the king, employed him to frame a new constitution, the plan of which was presented to the convention, and obtained their approbation. It was not thus esteemed by the people at large; and it has, perhaps not without reason, been considered as "a mass of metaphysical absurdities." During the violent struggle between the Gironde and Mountain parties, Condorcet took no decided part with either, which seems to have been owing to the native timidity of his mind, and his abhorrence of the state of public affairs. He was not comprehended among the number of those who were sacrificed with their leader Brissot; but having employed his pen against the victorious party,

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ty, he fell under the invincible displeasure of that inhuman, blood-thirsty tyrant Robespierre, who issued a decree of accusation against him in July 1793. He found means to effect his escape from the arrest, and during nine months concealed himself in Paris. Dreading at length that the tyrant would order a domiciliary visit for the purpose of discovering the place of his retreat, he passed through the barriers without being taken notice of, and went to the house of a person in whom he could confide, on the plain of Mont-Rouge, who unfortunately for Condorcet was at that time in the metropolis. He was of consequence under the necessity of passing two dreary nights in the open fields, a melancholy prey to hunger and cold. On the third day he obtained an interview with his friend, who unhappily durst not venture to afford him shelter under his roof, so that he was once more compelled to wander in the fields. Worn out at length by hunger and fatigue, and life being no longer supportable without sustenance, he applied at a public house for an omelette, which he devoured with greediness. His cadaverous appearance and uncommonly keen appetite, roused the suspicion of a municipal officer who happened to be present, and by whom he was interrogated. The ambiguity and hesitation which characterized his answers, made the officer conclude that it would be proper to apprehend him. He was accordingly consigned to a dungeon, to be next day conducted to Paris, but his melancholy fate rendered such a measure unnecessary. He was found dead in the morning; and as it was generally understood that he constantly carried with him a dose of poison, to this cause his melancholy exit was very properly ascribed. Thus terminated the career of Condorcet on the 28th of March, 1794, who for many years sustained a brilliant and honourable reputation in the republic of letters. His manners were replete with urbanity, and as well qualified to please in company as could be expected in a man who was conceived as destitute of a heart. He was certainly blessed with domestic felicity, and had one daughter by his wife. Soon after his death appeared his "Sketch of a Historical Draught of the Progress of the Human Mind," a methodical performance, and evincing the profoundest research, in which he strongly recommends his favourite idea of gradually bringing human nature to a state of perfection, by considering what man has been, now is, and may be. This treatise will no doubt be viewed by some as rather fanciful; but it is clearly the effort of a very superior genius, and must be peculiarly interesting to the feeling man, when it is known that it was composed while its author was in circumstances of danger and distress. The idea of man's progressive advancement towards perfection and happiness, inspired him with consolation under his complicated misfortunes. Besides the works which we have enumerated in this sketch of his life, he published "Letters to the King of Prussia," with whom he kept up a correspondence, as well as with Catherine empress of Russia. A treatise on calculation, and an elementary treatise on arithmetic, were left behind him in manuscript. Although he was an enemy to revealed religion, he was certainly a man of virtue and integrity; yet all his philosophy could never inspire him with that heroic fortitude and contempt of death in a just cause, for which the sincere votaries of Christianity have ever been conspicuous.

CONDORMIENTES, in church history, religious sectaries, who take their name from lying all together, men and women, young and old. They arose in the 13th century, near Cologne, where they are said to have worshipped an image of Lucifer, and to have received answers and oracles from him.

CONDRIEU, a town of Lyonnois in France, remarkable for its excellent wines. It is seated at the foot of a hill near the river Rhone. E. Long. 4. 33 N. Lat. 45. 28.

CONDRUSII, in *Ancient Geography*, a people of Belgica, originally Germans, dwelling about the Maese. Their country is now called *Condrotz*, in the bishopric of Liege, between Luxemburgh and the Maese.

CONDUCTOR, in *Surgery*, an instrument which serves to conduct the knife in the operation of cutting for the stone, and in laying up sinuses and fistulas.

CONDUCTORS, in electrical experiments, are those bodies that receive and communicate electricity; and those that repel it are called *non-conductors*. See ELECTRICITY.

CONDUIT, a canal or pipe for the conveyance of water, or other fluid.

There are several subterraneous conduits through which the waters pass that form springs. Artificial conduits for water are made of lead, stone, cast-iron, potter's earth, timber, &c.

CONDYLOID and CORONOID processes. See ANATOMY *Index*.

CONDYLONA, in *Medicine*, a tubercle, or callous eminence, which arises in the folds of the anus; or rather a swelling or hardening of the wrinkles of that part.

CONDYLUS, a name given by anatomists to a knot in any of the joints, formed by the epiphysis of a bone.

CONE, in *Geometry*, a solid figure, having a circle for its base, and its top terminated in a point or vertex. See CONIC SECTIONS.

Melting CONE, in *Chemistry*, is a hollow cone formed of copper or brass, with a handle, and with a flat bottom adjoining to the apex of the cone, upon which it is intended to rest. Its use is to receive a mass of one or more metals melted together, and cast into it. This mass, when cold, may be easily shaken out of the vessel, from its figure. Also, if a melted mass consisting of two or more metals, or other substances not combined together, be poured into this vessel, the conical figure facilitates the separation of these substances according to their respective densities. The cone ought to be well heated before the melted mass is thrown into it; that it may not contain any moisture, which would occasion a dangerous explosion. It ought also to be greased internally with tallow, to prevent the adhesion of the fluid matter.

CONE *of Rays*, in *Optics*, includes all the several rays which fall from any radiant point upon the surface of a glass.

CONE. See CONUS, BOTANY *Index*.

CONE-*Shell*. See CONUS, CONCHOLOGY *Index*.

or right in *esse*, from one man to another, whereby a voidable estate is made sure and unavoidable, or a particular estate is increased, or a possession made perfect.

CONFIRMATION, in *Theology*, the ceremony of laying on of hands, for the conveyance of the Holy Ghost.

The antiquity of this ceremony is, by all ancient writers, carried as high as the apostles, and founded upon their example and practice. In the primitive church, it used to be given the Christians immediately after baptism, if the bishop happened to be present at the solemnity. Among the Greeks, and throughout the East, it still accompanies baptism; but the Romanists make it a distinct independent sacrament. Seven years is the stated time for confirmation; however, they are sometimes confirmed before, and sometimes after, that age. The person to be confirmed has a godfather and godmother appointed him, as in baptism. The order of confirmation in the church of England does not determine the precise age of the persons to be confirmed.

CONFISCATION, in *Law*, the adjudication of goods or effects to the public treasury; as the bodies and effects of criminals, traitors, &c.

CONFLAGRATION, the general burning of a city or other considerable place.

This word is commonly applied to that grand period or catastrophe of our world, when the face of nature is to be changed by fire, as formerly it was by water. The ancient Pythagoreans, Platonists, Epicureans, and Stoics, appear to have had a notion of the conflagration; though whence they should derive it, unless from the sacred books, is difficult to conceive; except, perhaps, from the Phœnicians, who themselves had it from the Jews. Seneca says expressly, *Tempus advenerit quo sidera sideribus incurrent, et omni flagrante materia uno igne, quicquid nunc ex deposito lucet, ardebit.* This general dissolution the Stoics call ἐκπύρωσις, *ecpyrosis.* Mention of the conflagration is also made in the books of the Sibyls, Sophocles, Hystaspes, Ovid, Lucan, &c. Dr Burnet, after F. Tachard and others, relates that the Siamese believe that the earth will at last be parched up with heat; the mountains melted down; the earth's whole surface reduced to a level, and then consumed with fire. And the Bramins of Siam do not only hold that the world shall be destroyed by fire, but also that a new earth shall be made out of the cinders of the old.

Various are the sentiments of authors on the subject of the conflagration; the cause whence it is to arise, and the effects it is to produce. Divines ordinarily account for it metaphysically; and will have it take its rise from a miracle, as a fire from heaven. Philosophers contend for its being produced from natural causes; and will have it effected according to the laws of mechanics. Some think an eruption of the central fire sufficient for the purpose, and add, that this may be occasioned several ways, viz. either by having its intensity increased; which again may be effected either by being driven into less space by the encroachments of the superficial cold, or by an increase of the inflammability of the fuel whereon it is fed; or by having the resistance of the imprisoning earth weakened, which may happen either from the diminution of its matter, by the consumption of its central parts, or by weakening the cohesion of the constituent part of the mass by the excess or the defect of moisture. Others look for the cause of the conflagration in the atmosphere, and suppose, that some of the meteors there engendered in unusual quantities, and exploded with unusual vehemence, from the concurrence of various circumstances, may effect it, without seeking any further. The astrologers account for it from a conjunction of all the planets in the sign Cancer; as the deluge, say they, was occasioned by their conjunction in Capricorn. Lastly, others have recourse to a still more effectual and flaming machine, and conclude the world is to undergo its conflagration from the near approach of a comet in its return from the sun.

CONFLUENT, among physicians, &c. an appellation given to that kind of SMALL-POX wherein the pustules run into each other.

CONFLUENTES, in *Ancient Geography*, a place at the confluence of the Rhine and Moselle, supposed to be one of the 50 forts erected by Drusus on the Rhine, in Gallia Belgica: Now *Coblentz*, a town of Triers. E. Long. 7. 15. N. Lat. 50. 30.

CONFORMATION, the particular consistence and texture of the parts of any body, and their disposition to compose a whole.

CONFORMATION, in *Medicine*, that make and construction of the human body which is peculiar to every individual. Hence a *mala conformatio*, signifies some fault in the first rudiments; whereby a person comes into the world crooked, or with some of the viscera or cavities unduly framed or proportioned. Many are subject to incurable asthmas, from a too small capacity of the thorax, and the like vicious conformations.

CONFORMITY, in the schools, is the congruency or relation of agreement between one thing and another; as between the measure and the thing measured, the object and the understanding, the thing and the division thereof, &c.

CONFRONTATION, the act of bringing two persons in presence of each other, to discover the truth of some fact which they relate differently.

The word is chiefly used in criminal matters, where the witnesses are confronted with the accused, the accused with one another, or the witnesses with one another.

CONFUCIUS, or CONG-FU-TSE, the most eminent, and most justly venerated of all the philosophers of China, a descendant of the imperial family of the dynasty of Chang, was born in the kingdom of Lu, now called the province of Chang-tong, about 550 years before the commencement of the Christian era. This makes him to have been cotemporary with Pythagoras and Solon, and prior to the days of Socrates. He gave striking proofs of very uncommon talents at an early period of life, which were cultivated and improved with great assiduity under the tuition of the ablest masters. Scarcely had he attained to the years of maturity, when he evinced himself acquainted with all the literature of that period, possessing, in particular, a comprehensive knowledge of the canonical and classical books, ascribed to the legislators Yao and Chun, which the Chinese emphatically denominate *the five volumes*

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Confucius. as containing the essence of all their sciences and morality. Nature had bestowed upon him a most amiable temper, and his moral deportment was altogether unexceptionable. He acquired a distinguished reputation for humility, sincerity, the government of his appetites, a disinterested heart, and a sovereign contempt of wealth. These rare qualities pointed him out as a proper person to fill offices of importance and trust in the government of his country, which he did with honour to himself and advantage to the empire. These public stations afforded him excellent opportunities of estimating with accuracy the true state of morals among his countrymen, which at this time were dissolute and vicious in the extreme. He conceived the godlike idea of attempting a general reformation both in morals and in politics, and his efforts for some time were attended with such remarkable effects, that he inspired his countrymen with a just veneration for his excellent character, and gratitude for his exertions, being raised to a station of the last importance in the kingdom of Lu. Here his counsels and advice were productive of the most beneficial consequences, in establishing good order, the due exercise of justice, concord, and decorum, through the whole kingdom. As it thus very naturally became an object of admiration, so, likewise, neighbouring princes beheld with envy its growing happiness and prosperity; to destroy which they contrived a fatal and effectual expedient. The king of Tsi being apprehensive, that if the king of Lu continued to be directed by the wisdom and sound policy of Confucius, he would soon become by far too powerful, sent him and his nobility a present of the most beautiful young women, trained up from their infancy in all the arts of seduction, who were but too successful in plunging the whole court into voluptuousness and dissipation. This demolished, in a short time, the whole of that beautiful fabric which had been erected by Confucius. Finding it a hopeless attempt to stem the universal torrent of corruption and depravity, he resolved to exert his talents in some distant kingdom, in the philanthropic cause of moral reformation, in hopes of better success. But he had the mortification to discover, that vice was everywhere triumphant, while virtue, that darling of his soul, was compelled to hide her head. This induced him to adopt the more humble, although not the less interesting employment of a teacher of youth, in which he made great and rapid progress. About 600 of his scholars were sent into different parts of the empire, to carry on his favourite work of moral reformation. Among his disciples, 72 were remarkably distinguished above the rest for their mental acquisitions, and 10 others were deemed superior, even to these, as having a thorough comprehension of their master's whole system. These were divided by him into four classes: the first being destined to the study of the moral virtues; the second to the arts of logic and public speaking; the third class studied jurisprudence and the duties of the civil magistrate; and public speaking, or the delivery of popular discourses on moral topics. Indefatigable, however, as his labours were, the task was too mighty to be accomplished by human exertions. During his last illness, he declared to his pupils, that the grief of his mind occasioned by the profligacy of human nature was become insupportable; and with a melancholy voice, he exclaimed "Immense mountain, how art thou fallen! The grand machine is demolished, and the wise and the virtuous are no more. The kings will not follow my maxims: I am no longer useful on earth; it is, therefore, time that I should quit it." On uttering these words he was seized with a lethargy, which brought him to the grave. He finished his honourable career in the 72d year of his age, in his native kingdom, to which he had returned in company with his disciples. It is frequently the fate of illustrious characters, never to be properly valued till they are cut off by death; which was the case with Confucius. The whole empire of China bewailed the loss of him, and erected innumerable edifices to perpetuate his memory, adorned with such honourable inscriptions as the following: "To the great master;" "To the chief doctor;" "To the saint;" "To the wise king of literature;" "To the instructor of emperors and kings." All his descendants, even to the present day, enjoy the honourable title and office of mandarins, and are exempted from the payment of taxes to the emperor, as well as the princes of the blood. The man who applies for the title of doctor, must previously have made a present to a mandarin descended in a direct line from Confucius. The writings of this great man are esteemed by the Chinese as of the highest authority, next to the five volumes, to which he modestly acknowledges himself to have been much indebted. His works are, 1. The *Tay-hio;* "The Grand Science, or School of Adults," chiefly intended for the information of princes and magistrates, recommending the duties of self-government, and uniform obedience to the laws of right reason. 2. The *Chong-yong*, or "Immutable Medium," in which he shews its importance in the government of the passions by a variety of examples, and points out the method of arriving at perfection in virtue. 3. *Lung-yu*, or moral and sententious discourses, which exhibit a lively picture of the opinions, conduct, and maxims of Confucius and his followers. 4. *Meng-tsi*, the book of Mencius, which derived its name from one of that great philosopher's disciples. These are all deservedly esteemed by the Chinese, being held next in importance to the five volumes. 5. The *Hyau-king*, or dissertation on the duty and respect which children owe their parents; and, 6. The *Syan-hyo*, or science for children, being a judicious collection of moral sentences from ancient and modern writers.

If a fair and impartial estimate of the religion of Confucius be made, it cannot be viewed in any other light than as uncorrupted deism, although he has sometimes been accused of befriending and secretly propagating atheistical sentiments; but such an accusation is as cruel as it is unjust, since the purity of his moral precepts, and the acknowledged rectitude of his whole deportment, are utterly incompatible with such a supposition. He considered the Tyen or Deity as the purest and most perfect essence, principle and source of all things in the boundless universe; who is absolutely independent, omnipotent, the governor and guardian of every thing; possessed of infinite wisdom which nothing can deceive; holy, without partiality, of unlimited goodness and justice. We are at a loss to form any adequate opinion of his sentiments relative to the soul of man and the doctrine of futurity, having no well authenticated data, on which to proceed. His morality is in many instances superior to that of Greece and Rome, and

Congelation. commencement of the congelation might be perceived when the temperature of the air was as high as + 2. The results of all his experiments were, that with the above-mentioned frigorific mixtures, and once with rectified spirits and snow, when the natural cold was at 28°, he congealed the quicksilver, and discovered that it is a real metal which melts with a very small degree of heat. Not perceiving, however, the necessary consequence of its great contraction in freezing, he, in this work, as well as in the former, confounded its point of congelation with that of its greatest contraction in freezing, and thus marked the former a great deal too low; though the point of congelation was very uncertain according to him, various difficulties having occurred to his attempts of finding the greatest point of contraction while freezing.

4 Of Mr Blumenbach. The experiments of M. Braun were not repeated by any person till the year 1774, when Mr John Frederic Blumenbach, then a student of physic at Gottingen, performed them to more advantage than it appears M. Braun had ever done. He was encouraged to make the attempt by the excessive cold of the winter that year. "I put (says he), at five in the evening of January 11th, three drachms of quicksilver into a small sugar-glass, and covered it with a mixture of snow and Egyptian sal-ammoniac. This mixture was put loose into the glass, so that the quicksilver lay perfectly free, being only covered with it as by pieces of ice; the whole, together with the glass, weighed somewhat above an ounce. It was hung out at a window in such a position as to expose it freely to the north-west; and two drachms more of sal-ammoniac mixed with the snow on which it stood. The snow and sal-ammoniac, in the open air, soon froze into a mass like ice; no sensible change, however, appeared in the quicksilver that evening; but at one in the morning it was found frozen solid. It had divided into two large and four smaller pieces; one of the former was hemispherical, the other cylindrical, each seemingly rather above a drachm in weight; the four small bits might amount to half a scruple. They were all with their flat side frozen hard to the glass, and nowhere immediately touched by the mixture; their colour was a dull pale white with a bluish cast, like zinc, very different from the natural appearance of quicksilver. Next morning, about eleven o'clock, I found that the larger hemisphere began to melt, perhaps because it was most exposed to the air, and not so near as the others to the sal-ammoniac mixture which lay beneath. In this state it resembled an amalgam, sinking on that side to which the glass was inclined: but without quitting the surface of the glass, to which it was yet firmly congealed; the five other pieces had not yet undergone any alteration, but remained frozen hard. Toward eight o'clock the cylindrical piece began to soften in the same manner, and the other four soon followed. About eight they fell from the surface of the glass, and divided into many fluid shining globules, which were soon lost in the interstices of the frozen mixture, and reunited in part at the bottom, being now exactly like common quicksilver." At the time this experiment was made, the thermometer stood at —10° in the open air.

The circumstances attending this experiment are still unaccountable; for, in the first place, the natural cold was scarcely sufficient, along with that of the artificial mixture, which produces 32° more, to have congealed the quicksilver; which yet appears to have been very effectually done, by the length of time it continued solid. 2. It is not easy to account for the length of time required for congealing the quicksilver in this experiment, since other frigorific mixtures begin to act almost immediately; and, 3. There was not at last even the appearance of action, which consists in a solution of the snow, and not in its freezing into a mass. "The whole experiment (says Dr Blagden*) remains involved in such obscurity, that some persons have supposed the quicksilver itself was not frozen, but only covered over with ice; to which opinion, however, there are great objections. It is worthy of remark, that Gottingen, though situated in the same latitude as London, and enjoying a temperate climate in general, becomes subject at times to a great severity of cold. This of 11th of January 1774 is one instance: I find others there where the thermometer sunk to —12°, —16°, or —19°; and at Cattlenburg, a small town about two German miles distant, to —30°. By watching such extraordinary occasions, experiments on the freezing of quicksilver might easily be performed in many places, where the possibility of them is at present little suspected. The cold observed at Glasgow in 1780 would have been fully sufficient for that purpose."

* Phil. Trans. vol. iii.

In consequence of the publication of M. Braun's Experiments, the Royal Society desired their late secretary Dr Maty to make the necessary application to the Hudson's Bay Company, in order to repeat the experiment in that country. Mr Hutchins, who was then at London, and going out with a commission as governor of Albany fort, offered to undertake the experiments, and executed them very completely, freezing quicksilver twice in the months of January and February 1775. The account of his success was read before the Royal Society at the commencement of the severest winter that had been known for many years in Europe; and at this time the experiment was repeated by two gentlemen of different countries. One was Dr Lambert Bicker, secretary to the Batavian society at Rotterdam; who, on the 28th of January 1776, at eight in the morning, made an experiment to try how low he could bring the thermometer by artificial cold, the temperature of the atmosphere being then +2°. He could not however, bring it lower than —94°, at which point it stood immoveable; and on breaking the thermometer, part of the quicksilver was found to have lost its fluidity, and was thickened to the consistence of an amalgam. It fell out of the tube in little bits, which bore to be flattened by pressure, without running into globules like the inner fluid part. The experiment was repeated next day, when the thermometer stood at +8°, but the mercury would not then descend below —80°; and as the thermometer was not broken, it could not be known whether the mercury had congealed or not. All that could be inferred from these experiments therefore was, that the congealing point of mercury was not below —94° of Fahrenheit's thermometer. The other who attempted the congelation of this fluid was the late Dr Anthony Fothergill; but it could not be determined whether

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whether he succeeded or not. An account of his experiments is inserted in the Philosophical Transactions, vol. lxvi.

No other attempts were made to congeal quicksilver until the year 1781, when Mr Hutchins resumed the subject with great success, insomuch that from his experiments the freezing point of mercury is now almost as well settled as that of water. Preceding philosophers, indeed, had not been altogether inattentive to this subject. Professor Braun himself had taken great pains to investigate it; but for want of paying the requisite attention to the difference betwixt the contraction of the fluid mercury by cold, and that of the congealing metal by freezing, he could determine nothing certain concerning it. Others declared it as their opinion, that nothing certain could be determined by merely freezing mercury in a thermometer filled with that fluid. Mr Cavendish and Dr Black first suggested the proper method of obviating the difficulties on this subject.

5 Dr Black's directions for making the experiment.

Dr Black, in a letter to Mr Hutchins, dated October 5. 1779, gave the following directions for making the experiment with accuracy: "Provide a few wide and short tubes of thin glass, sealed at one end and open at the other: the wideness of these tubes may be from half to three quarters of an inch, and the length of them about three inches. Put an inch or an inch and a half depth of mercury into one of these tubes, and plunging the bulb of the thermometer into the mercury, set the tube with the mercury and the thermometer in it into a freezing mixture, which should be made for this purpose in a common tumbler or water glass: and, N. B. in making a freezing mixture with snow and nitric acid, the quantity of the acid should never be so great as to dissolve the whole of the snow, and only enough to reduce it to the consistence of panada. When the mercury in the wide tube is thus set in the freezing mixture, it must be stirred gently and frequently with the bulb of the thermometer; and if the cold be sufficiently strong, it will congeal by becoming thick like an amalgam. As soon as this is observed, the thermometer should be examined without lifting it out of the congealing mercury; and I have no doubt that in every experiment thus made, with the same mercury, the instrument will always point to the same degree, provided it has been made and graduated with accuracy.

6 Apparatus recommended by Mr Cavendish.

The apparatus recommended by Mr Cavendish, and which Mr Hutchins made use of, consisted of a small mercurial thermometer, the bulb of which reaches about $2\frac{1}{2}$ inches below the scale, and was inclosed in a glass cylinder swelled at the bottom into a ball, which when used was filled with quicksilver, so that the bulb of the thermometer was entirely covered with it. If this cylinder be immersed in a freezing mixture till great part of the quicksilver in it is frozen, it is evident that the degree shown at that time by the inclosed thermometer is the precise point at which mercury freezes; for as in this case the ball of the thermometer must be surrounded for some time with quicksilver, part of which is actually frozen, it seems impossible that the thermometer should be sensibly above that point; and while any of the quicksilver in the cylinder remains fluid, it is impossible that it should sink sensibly below it. The diameter of the bulb of the thermometer was rather less than a quarter of an inch, that of the swelled part of the cylinder two-thirds; and as it was easy to keep the thermometer constantly in the middle of the cylinder, the thickness of quicksilver betwixt it and the glass could never be much less than the sixth part of an inch. The bulb of the thermometer was purposely made as small as it conveniently could, in order to leave a sufficient space between it and the cylinder, without making the swelled part larger than necessary, which would have caused more difficulty in freezing the mercury in it.

The first experiment with this apparatus was made on the 15th of December 1781; the thermometer had stood the evening before at —18°. A bottle of spiritus nitri fortis was put on the house-top, in order to cool it to the same temperature. The thermometers made use of had been hung up in the open air for three weeks to compare their scales. On the morning of the experiment they were about 23° below 0.——In making it, the thermometer of the apparatus was suspended in the bulb of the cylinder by means of some red worsted wound about the upper part of its stem, to a sufficient thickness to fill the upper part of its orifice; and a space of near half an inch was left empty between the quicksilver and worsted.

The apparatus was placed in the open air, on the top of the fort, with only a few deer skins sewed together for a shelter; the snow lay 18 inches deep on the works, and the apparatus was stuck into the snow, in order to bring it the sooner to the temperature of the air. The instruments were afterwards placed in three fresh freezing mixtures, in hopes of being able by their means to produce a greater degree of cold, but without effect; nor was any greater cold produced by adding more nitric acid. The mercury, however, was very completely frozen, that in the thermometer descending to 448°. On plunging the mercury into the freezing mixture, it descended in less than one minute to 40° below 0.

The second experiment was made the day following; and the same quantity of quicksilver employed that had been used in the former. As too small a quantity of the freezing mixture, however, had been originally made, it was necessary to add more during the operation of congelation; by which means the spirit of nitre, in pouring it upon the snow, sometimes touched the bulb of the thermometer, and instantly raised it much higher; nor did the mercury ever descend below 206°, which was not half as far as it had done the day before, though the temperature of the atmosphere had been this day at —34° before the commencement of the operation. That in the apparatus, however, sunk to —95°. The apparatus was taken out of the mixture for half a minute, in order to examine whether the mercury was perfectly congealed or not, and during that time, it showed no sign of liquefaction.

The third experiment was made the same day, and with the freezing mixture used in the last. By it the point of congelation was determined to be not below 40°.

The fourth experiment was made January 7th 1782; and

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acid diluted in the above-mentioned proportion, I froze quicksilver in the thermometer called G (A) by Mr Hutchins, on the 26th of February 1782. I did not indeed break the thermometer to examine the state of the quicksilver therein; for, as it sunk to —110°, it certainly must have been in part frozen; but immediately took it out, and put the spirit thermometer in its room, in order to find the cold of the mixture. It sunk only to —30°; but by making allowance of the spirit in the tube being not so cold as that in the ball, it appears, that if it had not been for this cause, it would have sunk to —35° (B); which is 6° below the point of freezing, and is within one degree of as great a cold as that produced by Mr Hutchins.

"In this experiment the thermometer G sunk very rapidly; and as far as I could perceive, without stopping at any intermediate point till it came to the above-mentioned degree of —110°, where it stuck. The materials used in making the mixture were previously cooled, by means of salt and snow, to near 0; and the temperature of the air was between 20° and 25°; the quantity of acid used was $4\frac{1}{2}$ oz.; and the glass in which the mixture was made, was surrounded with wool, and placed in a wooden box, to prevent its losing its cold so fast as it would otherwise have done. Some weeks before this I made a freezing mixture with some spirit of nitre much stronger than that used in the foregoing experiment, though not quite so strong as the undiluted acid, in which the cold was less intense by $4\frac{1}{2}$°. It is true the temper of the air was much less cold, namely 35°, but the spirit of nitre was at least as cold, and the snow not much less so.

"The cold produced by mixing sulphuric acid, properly diluted with snow, is not so great as that produced by spirit of nitre, though it does not differ from it by so much as 8°; for a freezing mixture prepared with diluted sulphuric acid, whose specific gravity, at 60° of heat, was 1,5642, sunk in the thermometer G to —37°, the experiment being tried at the same time, and with the same precautions as the foregoing. It was previously found, by adding snow gradually to some of this acid, as was done by the nitrous acid, that it was a little, but not much stronger, than it ought to be, in order to produce the greatest effect."

The experiment made by Mr Walker, in which he congealed quicksilver by means of nitric acid and Glauber's salt, without any snow, concludes the history of the artificial congelation of mercury. It now remains that we say something of the congelation of it by the natural cold of the atmosphere.

8 Congelation of quicksilver by natural cold.

Dr Blagden, from whose paper in the Philosophical Transactions, vol. lxxiii. this account is taken, observes, that it was not till near the year 1730 that thermometers were made with any degree of accuracy; and in four or five years after this, the first observations were made which prove the freezing of quicksilver. On the accession of the empress Anne Ivanouna to the throne of Russia, three professors of the Imperial academy were chosen to explore and describe the different parts of her Asiatic dominions, and to inquire into the communication betwixt Asia and America. These were Dr John George Gmelin, in the department of natural history and chemistry; M. Gerard Frederic Muller, as general historiographer; and M. Louis de l'Isle de la Croyere, for the department of astronomy; draughtsmen and other proper assistants being appointed to attend them. They departed from Petersburgh in 1733; and such as survived did not return till ten years after. The thermometrical observations were communicated by Professor Gmelin, who first published them in his Flora Sibirica, and afterwards more fully in the Journal of his Travels. An abstract of them was likewise inserted in the Petersburgh Commentaries for the years 1756 and 1765, taken, after the professor's death, from his original dispatches in possession of the Imperial academy.

In the winter of 1734 and 1735, Mr Gmelin being at Yeneseisk in $58\frac{1}{2}$° N. Lat. and 92° E. Long. from Greenwich, first observed such a descent of the mercury, as we know must have been attended with congelation. "Here (says he) we first experienced the truth of what various travellers have related with respect to the extreme cold of Siberia; for, about the middle of December, such severe weather set in, as we were sure had never been known in our time at Petersburgh. The air seemed as if it were frozen, with the appearance of a fog, which did not suffer the smoke to ascend as it issued from the chimneys. Birds fell down out of the air as dead, and froze immediately, unless they were brought into a warm room. Whenever the door was opened, a fog suddenly formed round it. During the day, short as it was, parhelia and haloes round the sun were frequently seen; and in the night mock-moons, and haloes about the moon. Finally, our thermometer, not subject to the same deception as the senses, left us no doubt of the excessive cold; for the quicksilver in it was reduced on the 15th of January O. S. to —120° of Fahrenheit's scale, lower than it had ever hitherto been observed in nature." 9 Excessive cold of Siberia.

The next instance of congelation happened at Yakutsk, in N. Lat. 62. and E. Long. 130. The weather here was unusually mild for the climate, yet the thermometer fell to —72°; and one person informed the professor by a note, that the mercury in his barometer was frozen. He hastened immediately to his house to behold such a surprising phenomenon; but though he was witness to the fact, the prejudice he entertained against the possibility of the congelation, would not allow him to believe it. "Not feeling (says he), by the way, the same effects of cold as I had experienced at other times in less distances, I began before my arrival, to entertain suspicions about the congelation of his quicksilver. In fact, I saw that it did not continue in one column, but was divided in different places as into little cylinders, which appeared frozen; and, in some of these divisions between the quicksilver, I perceived like the appearance of frozen moisture.

(A) This was a small mercurial thermometer, made by Nairne and Blount, on an ivory scale, divided at every five degrees, and reaching from 215° above to 250° below the cipher.

(B) This is to be understood of a spirit thermometer, whose —29°=40° of Fahrenheit's mercurial.

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moisture. It immediately occurred to me, that the mercury might have been cleaned with vinegar and salt, and not sufficiently dried. The person acknowledged it had been purified in that manner. This same quicksilver, taken out of the barometer, and well dried, would not freeze again, though exposed to a much greater degree of cold, as shown by the thermometer."

Another set of observations, in the course of which the mercury frequently congealed, were made by Professor Gmelin at Kirenga fort in $57\frac{1}{2}$ N. Lat. 108. E. Long.; his thermometer, at different times, standing at —108°, —86°, —100°, —113°, and many other intermediate degrees. This happened in the winter of 1737 and 1738. On the 27th of November, after the thermometer had been standing for two days at —46°, he found it sunk at noon to 108°. Suspecting some mistake, after he had noted down the observation, he instantly ran back, and found it at 102°; but ascending with such rapidity, that in the space of half an hour it had risen to —19°. This phenomenon, which appeared so surprising, undoubtedly depended on the expansion of the mercury frozen in the bulb of the thermometer, and which now melting, forced upwards the small thread in the stem.

A similar appearance was observed at the same fort a few days after; and on the 29th of December, O. S. he found the mercury, which had been standing at —40° in the morning, sunk to —100° at four in the afternoon. At this time, he says, he "saw some air in the thermometer separating the quicksilver for the space of about six degrees." He had taken notice of a similar appearance the preceding evening, excepting that the *air*, as he supposed it to be, was not then collected into one place, but lay scattered in several.

These appearances undoubtedly proceeded from a congelation of the mercury, though the prejudice entertained against the possibility of this phenomenon would not allow the professor even to inquire into it at all. Several other observations were made; some of which were lost, and the rest contain no farther information.

The second instance where a natural congelation of mercury has certainly been observed, is recorded in the Transactions of the Royal Academy of Sciences at Stockholm. The weather, in January 1760, was remarkably cold in Lapland; so that on the 5th of that month, the thermometers fell to —76°, —128°, or lower; on the 23d and following days they fell to —58°, —79°, —92°, and below —238° entirely into the ball. This was observed at Tornea, Sombio, Jakasierf, and Utsioki, four places in Lapland, situated between the 65th and 78th degrees of N. Lat. and the 21st and 28th of E. Long. The person who observed them was M. Andrew Hellant, who makes the following remarks, of themselves sufficient to show that the quicksilver was frozen. "During the cold weather at Sombio (says he), as it was clear sunshine, though scarcely the whole body of the sun appeared above the low woods that covered our horizon, I took a thermometer which was hanging before in the shade, and exposed it to the rising sun about eleven in the forenoon, to see whether when that luminary was so low, it would have any effect upon the instrument. But to my great surprise, upon looking at it about noon, I found that the mercury had entirely subsided into the ball, though it was standing as high as —61° at 11 o'clock, and the scale reached down to 238° below 0." On bringing the instrument near a fire, it presently rose to its usual height; and the reason of its subsiding before was its being somewhat warmed by the rays of the sun; which, feeble as they were, had yet sufficient power to melt the small thread of congealed mercury in the stem of the thermometer, and allow it to subside along with the rest. Mr Hellant, however, so little understood the nature of this phenomenon, that he frequently attempted to repeat it by bringing the thermometer near a fire, when the cold was only a few degrees below the freezing point of water, but could never succeed until it fell to —58°, or lower, that is, until the cold was sufficiently intense to congeal the metal. The only seeming difficulty in his whole account is, that when the mercury had subsided entirely into the ball of the thermometer, a vacuum or empty spot appeared, which run round the cavity like an air bubble, on turning the instrument; but this proceeded from a partial liquefaction of the mercury, which must necessarily melt first on the outside, and thus exhibit the appearance just mentioned.

10 Remarkable experiments of Dr Pallas.

The most remarkable congelation of mercury, which has ever yet been observed, was that related by Dr Peter Simon Pallas, who had been sent by the empress of Russia, with some other gentlemen, on an expedition similar to that of Dr Gmelin. He did not, however, spend the winters in which he was in Siberia in the coldest parts of that country; that is, about the middle of the northern part. Twice indeed he resided at Krasnoyarsk, in N. Lat. $56\frac{1}{2}$°, E. Long. 93°; where, in the year 1772, he had an opportunity of observing the phenomenon we speak of. "The winter (says he) set in early this year, and was felt with uncommon severity in December. On the 6th and 7th of that month happened the greatest cold I have ever experienced in Siberia; the air was calm at the time, and seemingly thickened; so that, though the sky was in other respects clear, the sun appeared as through a fog. I had only one small thermometer left, in which the scale went no lower than —7°; and on the 6th in the morning, I remarked that the quicksilver in it sunk into the ball, except some small columns which stuck fast in the tube. When the ball of the thermometer, as it hung in the open air, was warmed by being touched with the finger, the quicksilver rose; and it could plainly be seen that the solid columns stuck and resisted a good while, and were at length pushed upward with a sort of violence. In the mean time I placed upon the gallery, on the north side of my house, about a quarter of a pound of clean and dry quicksilver in an open bowl. Within an hour I found the edges and surface of it frozen solid, and some minutes afterwards the whole was condensed by the natural cold into a soft mass very much like tin. While the inner part was still fluid, the frozen surface exhibited a great variety of branched wrinkles; but in general it remained pretty smooth in freezing, as did also a larger quantity which I afterwards exposed to the cold. The congealed mercury was more flexible than lead; and on being bent short, it was found more brittle than tin; and when hammered out thin, it seemed somewhat granulated. If the hammer had not been

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been perfectly cooled, the quicksilver melted away under it in drops; and the same thing happened when the metal was touched with the finger, by which also the finger was immediately benumbed. In our warm room it thawed on its surface gradually, by drops, like wax on the fire, and did not melt all at one. When the frozen mass was broken to pieces in the cold, the fragments adhered to each other and to the bowl on which they lay. Although the frost seemed to abate a little towards night, yet the congealed quicksilver remained unaltered, and the experiment with the thermometer could still be repeated. On the 7th of December, I had an opportunity of making the same observations all day; but some hours after sunset, a north-west wind sprung up, which raised the thermometer to —46°, when the mass of quicksilver began to melt."

19 Von Elterlein's experiment.

In the beginning of the year 1780 M. Von Elterlein, of Vytegra, a town of Russia, in N. Lat. 61. E. Long. 36. froze quicksilver by natural cold; of which he gives the following account. "On the 4th of January 1780, the cold having increased to —34° that evening at Vytegra, I exposed to the open air three ounces of very pure quicksilver in a china tea-cup, covered with paper pierced full of holes. Next day, at eight in the morning, I found it solid, and looking like a piece of cast lead, with a considerable depression in the middle. On attempting to loosen it in the cup, my knife raised shavings from it as if it had been lead, which remained sticking up; and at length the metal separated from the bottom of the cup in one mass. I then took it in my hand to try if it would bend; it was stiff like glue, and broke into two pieces; but my fingers immediately lost all feeling, and could scarcely be restored in an hour and a half by rubbing with snow. At eight o'clock a thermometer, made by Mr Lexmann of the academy, stood at —57°; by half after nine it was risen to —40°; and then the two pieces of mercury which lay in the cup had lost so much of their hardness, that they could no longer be broken, or cut into shavings, but resembled a thick amalgam, which, though it became fluid when pressed by the fingers, immediately afterwards resumed the consistence of pap. With the thermometer at —39°, the quicksilver became fluid. The cold was never less on the 5th than —28°, and by nine in the evening it had increased again to —33°."

An instance of the natural congelation of quicksilver also occurred in Jemtland, one of the provinces of Sweden, on the 1st of January 1782; and, lastly, on the 26th of the same month, Mr Hutchins observed the same effect of the cold at Hudson's bay. "The subject of this curious phenomenon (says he), was quicksilver put into a common two-ounce phial, and corked. The phial was about a third part full, and had constantly been standing by the thermometer for a month past. At eight o'clock this morning I observed it was frozen rather more than a quarter of an inch thick round the sides and bottom of the phial, the middle part continuing fluid. As this was a certain method of finding the point of congelation, I introduced a mercurial and a spirit thermometer into the fluid part, after breaking off the top of the phial, and they rose directly and became stationary; the former at 40° or $40\frac{1}{4}$°, the latter at $29\frac{1}{2}$°, both below the cipher. Having taken these out, I put in two others,

20 Experiment of Mr Hutchins.

G a mercurial one formerly described, and a spirit thermometer; the former of which became stationary at 40° and the latter at 30°. I then decanted the fluid quicksilver, to examine the internal surface of the frozen metal, which proved very uneven, with many radii going across, some of which resembled pin-heads. Urgent business called me away an hour. On my return I found a small portion only had liquefied in my absence. I then broke the phial entirely, and with a hammer repeatedly struck the quicksilver. It beat out flat, yielded a deadish sound, and became fluid in less than a minute afterwards. It may be worth remarking, that the quicksilver in one of the thermometers, which had sunk to very near 500, and was then at 444, very readily ran up and down the tube by elevating either end of the instrument."

These are all the well authenticated accounts of the congelation of mercury by the natural cold of the atmosphere. Some others have been published; but being either less important, or not so well authenticated, we forbear to mention them. A very considerable confirmation is obtained from the above history, of the theory of congelation delivered by Dr Black, and which is fully explained under the article CHEMISTRY. On Mr Hutchins's experiments, and on congelation in general, Mr Cavendish makes many valuable remarks; the substance of which is as follows:

21 Mr Cavendish's remarks on congelation.

"If a vessel of water, with a thermometer in it, be exposed to the cold, the thermometer will sink several degrees below the freezing point, especially if the water be covered up so as to be defended from the wind, and care taken not to agitate it; and then on dropping in a bit of ice, or on mere agitation, spiculæ of ice shoot suddenly through the water, and the inclosed thermometer rises quickly to the freezing point, where it remains stationary." In a note he says, that though in conformity to the common opinion he has allowed that "mere agitation may set the water a freezing, yet some experiments lately made by Dr Blagden seem to show, that it has not much, if any, effect of that kind, otherwise than by bringing the water in contact with some substance colder than itself. Though in general also the ice shoots rapidly, and the inclosed thermometer rises very quick; yet he once observed it to rise very slowly, taking up not less than half a minute, before it ascended to the freezing point; but in this experiment the water was cooled not more than one or two degrees below freezing, and it should seem, that the more the water is cooled below the freezing point, the more rapidly the ice shoots and the inclosed thermometer rises."

Mr Cavendish then observes, that from the foregoing experiments we learn that water is capable of being cooled considerably below the freezing point, without any congelation taking place; and that, as soon as by any means a small part of it is made to freeze, the ice spreads rapidly through the whole of the water. The cause of this rise of the thermometer is, that all, or almost all bodies, by changing from a fluid to a solid state, or from the state of an elastic to that of an unelastic fluid, generate heat; and that cold is produced by the contrary process. Thus all the circumstances of the phenomenon may be perfectly well explained; for, as soon as any part of the water freezes, heat will be generated thereby in consequence of the

the above-mentioned law, so that the new formed ice and remaining water will be warmed, and must continue to receive heat by the freezing of fresh portions of water, till it is heated exactly to the freezing point, unless the water could become quite solid before a sufficient quantity of heat was generated to raise it to that point, which is not the case: and it is evident, that it cannot be heated above the freezing point: for as soon as it comes thereto, no more water will freeze, and consequently no more heat will be generated.—The reason why the ice spreads all over the water, instead of forming a solid lump in one part, is, that, as soon as any small portion of ice is formed, the water in contact with it will be so much warmed as to be prevented from freezing, but the water at a little distance from it will still be below the freezing point, and will consequently begin to freeze.

"Were it not for this generation of heat, the whole of any quantity of water would freeze as soon as the process of congelation began; and in like manner the cold is generated by the melting of ice; which is the cause of the long time required to thaw ice and snow. It was formerly found that, by adding snow to warm water, and stirring it about until all was melted, the water was as much cooled as it would have been by the addition of the same quantity of water rather more than 150° colder than the snow; or, in other words, somewhat more than 150° of cold are generated by the thawing of the snow; and there is great reason to believe that just as much heat is produced by the freezing of water. The cold generated in the experiment just mentioned was the same whether ice or snow was used.

22 On metals when beginning to turn solid.

"A thermometer kept in melted tin or lead till they become solid, remains perfectly stationary from the time the metal begins to harden round the sides of the pot till it is entirely solid: but it cannot be perceived at all to sink below that point, and rise up to it when the metal begins to harden. It is not unlikely, however, that the great difference of heat between the air and melted metal might prevent this effect from taking place; so that though it was not perceived in these experiments, it is not unlikely that those metals, as well as water and quicksilver, may bear being cooled a little below the freezing or hardening point (for the hardening of melted metals, and freezing of water, seems exactly the same process), without beginning to lose their fluidity.

"The experiments of Mr Hutchins prove, that quicksilver contracts or diminishes in bulk by freezing, and that the very low degrees to which the thermometers have been made to sink, is owing to this contraction, and not to the cold having been in any degree equal to that shown by the thermometer. In the fourth experiment, one of the thermometers sunk to 450°, though it appeared by the spirit thermometers, that the cold of the mixture was not more than five or six degrees below the point of freezing quicksilver. In the first experiment also, it sunk to 448° at a time when the cold of the mixture was only $2\frac{1}{2}$° below that point; so that it appears that the contraction of quicksilver by freezing must be at least equal to its expansion by 404 degrees of heat (c). This, however, is not the whole contraction that it suffers; for it appears, by an extract from a meteorological journal kept by Mr Hutchins at Albany fort, that his thermometer once sunk to 490° below 0; though it was known by a spirit thermometer that the cold scarcely exceeded the point of freezing quicksilver. There are two experiments also of Professor Braun, in which the thermometer sunk to 544 and 556° below 0; which is the greatest descent he ever observed without the ball being cracked. It is not indeed known how cold his mixtures were; but from Mr Hutchins's experiments, there is great reason to think they could not be many degrees below 40°. If so, the contraction which quicksilver suffers in freezing, is not much less than its expansion by 500° or 510° of heat, that is, almost $\frac{1}{23}$ of its whole bulk; and in all probability is never much more than that, though it is probable that this contraction is not always determinate; for a considerable variation may frequently be observed in the specific gravity of the same piece of metal cast different times over; and almost all cast metals become heavier by hammering. Mr Cavendish observed, that on casting the same piece of tin three times over, its density varied from 7.252 to 7.294, though there was great reason to think that no hollows were left in it, and that only a small part of this difference could proceed from the error of the experiment. This variation of density is as much as is produced in quicksilver by an alteration of 66° of heat: and it is not unlikely, that the descent of a thermometer, on account of the contraction of the quicksilver in its ball by freezing, may vary as much in different trials, though the whole mass of quicksilver is frozen without any vacuities.

23 Variation of the density of metals by frequent casting.

24 Of freezing mixtures.

"The cold produced by mixing spirit of nitre with snow is entirely owing to the melting of the snow. Now, in all probability, there is a certain degree of cold, in which the spirit of nitre, so far from dissolving snow, will yield part of its own water, and suffer that to freeze, as is the case with solutions of common salt; so that if the cold of the materials before mixing is equal to this, no additional cold can be produced. If the cold of the materials is less, some increase of cold will be produced; but the total cold will be less than in the former case, since the additional cold cannot be generated without some of the snow being dissolved, and thereby weakening the acid, and making it less able to dissolve more snow; but yet the less the cold of the materials is, the greater will be the additional cold produced. This is conformable to Mr Hutchins's experiments; for in the fifth experiment, in

(c) The numbers here given are those shown by the thermometer without any correction; but if a proper allowance is made for the error of that instrument, it will appear, that the true contraction was 25° less than here set down; and from the manner in which thermometers have been usually adjusted, it is likely that in the 5th experiment of Mr Hutchins, as well as in those of Professor Braun, the contraction might equally fall short of that by observation.

Congelation. in which the cold of the materials was —40°, the additional cold produced was only 5°. In the first experiment, in which the cold of the materials was only —23°, an addition of at least 19° of cold was obtained; and by mixing some of the same spirit of nitre with snow in this climate, when the heat of the materials was +26°, Mr Cavendish was able to sink the thermometer to —29°, so that an addition of 55 degrees of cold was produced.

"It is remarkable that in none of Mr Hutchins's experiments the cold of the mixture was more than 6° of the spirit thermometer below the freezing point of quicksilver; which is so little, that it might incline one to think that the spirit of nitre used by him was weak. This, however, was not the case: as its specific gravity at 58° of heat was 1,4923. It was able to dissolve $\frac{1}{1.42}$ its weight of marble, and contained very little mixture of sulphuric or muriatic acid; as well as could be judged from an examination of it, it was as little phlogisticated as acid of that strength usually is."

25 Congelation of sulphuric acid. Acids, especially those of the mineral kind, powerfully resist congelation. There is, however, a peculiarity with regard to that of vitriol. M. Chaptal, a foreign chemist, observed, that it condensed by the cold of the atmosphere, and the crystals began to melt only at +70° of his thermometer; which, if Reaumur's, corresponds to about 47° of Fahrenheit. The crystals were unctuous from the melting acid, and they felt warmer than the neighbouring bodies: the form was that of a prism of six sides, flatted and terminated by a pyramid of six sides; but the pyramid appeared on one end only; on the other, the crystal was lost in the general mass. The pyramid resulted from an assemblage of six isosceles triangles; the oil, when the crystal was melted, was of a yellowish black; on re-distilling it in a proper apparatus, no peculiar gas came over. M. Chaptal repeated his experiments with the highly concentrated acid, but found that it did not freeze; that the density of the acid which he thought froze most easily was to the oil, of the usual strength for sale, as from 63 and 65 to 66; and the necessary degree of cold about 19° of Fahrenheit. Sulphuric acid once melted will not crystallize again with the same degree of cold.

In the experiments which had been made on the freezing of sulphuric acid, Mr Cavendish found some uncertainty in determining the point at which it freezes most readily; neither could he determine whether the cold necessary for congelation does not increase without any limitation in proportion to the strength of the acid. A new set of experiments

26 Mr Keir's experiments. was therefore made by Mr Keir to determine this point. He had observed, after a severe frost at the end of the year 1784 and beginning of 1785, that some sulphuric acid, contained in a corked phial, had congealed, while other bottles containing the same, some stronger and some weaker, retained their fluidity. As the congelation was naturally imputed to the extremity of the cold, he was afterwards surprised to find, when the frost ceased, that the acid remained congealed for many days, when the temperature of the atmosphere was sometimes above 40° of Fahrenheit; and when the congealed acid was brought into a warm room on purpose to thaw it, a thermometer placed in contact with it during its thawing, continued stationary at 45°. Hence he concluded, that the freezing and thawing point of this acid was nearly at 45°; and accordingly, on exposing the liquor which had been thawed to the air at the temperature of 30°, the congelation again took place in a few hours. From the circumstance of other parcels of the same acid, but of different strengths, remaining fluid, though they had been exposed to a much greater degree of cold, he was led to believe that there must be some certain strength at which the acid is more disposed to congeal than at any other. The specific gravity of the acid which had frozen was to that of water nearly as 1800 to 1000, and that of the stronger acid which had not frozen was as 1846 to 1000, which is the common density of that usually sold in England; and there was not the least difference, excepting in point of strength, between the acid which had frozen and that which had not; Mr Keir having taken the acid some weeks before with his own hands from the bottle which contained the latter, and diluted it with water, till it became of the specific gravity of 1800.

To render the experiment complete, Mr Keir immersed several acids of different strengths in melting snow, instead of exposing them to the air; the temperature of which was variable, whereas that of melting snow was certain and invariable. Those which would not freeze in melting snow were afterwards immersed in a mixture of common salt, snow, and water; the temperature of which, though not so constant and determinate as that of melting snow, generally remained for several hours at 18°, and was sometimes several degrees lower. The intention of adding water to the snow and salt was to lessen the intensity of the cold of this mixture, and to render it more permanent than if the snow and salt alone were mixed. The acids which had frozen in melting snow were five in number; which being thawed and brought to the temperature of 60°, were found on examination to have the following specific gravities, viz. 1786, 1784, 1780, 1778, 1775. Those which had not congealed with the melting snow, but which did so with the mixture of snow, salt, and water, were found, when brought to the temperature of 60°, to be of the following specific gravities, viz. 1814, 1810, 1804, 1794, 1790, 1770, 1759, 1750. Those which remained, and would freeze neither in melting snow nor in the mixture of snow, salt, and water, were of the gravities 1864, 1839, 1815, 1745, 1720, 1700, 1610, 1551. From the first of these it appears, that the medium density of the acids which froze with the natural cold was 1780; and from the second, that at the densities of 1790 and 1770 the acid had been incapable of freezing with that degree of cold. Hence it follows, that 1780 is nearly the degree of strength of easiest freezing, and that an increase or diminution of that density equal to $\frac{1}{178}$th of the whole, renders the acid incapable of freezing with the cold of melting snow, though this cold is something above the freezing point of the most congealable acid. From the second it appears, that by applying a more intense cold, viz. that produced by a mixture of snow, salt, and water, the limits of the densities of acids capable of congelation were extended to about $\frac{2}{178}$th above or below the point

point of easiest freezing: and there seems little reason to doubt, that, by greater augmentations of cold, these limits may be further extended; but in what ratio these augmentations and extensions proceed, cannot be determined, without many observations made in different temperatures.

"But (says Mr Keir) though it is probable that the most concentrated acids may be frozen, provided the cold be sufficiently intense, yet there seems reason to believe, that some of the congelations which have been observed in highly concentrated acids, have been effected in consequence of the density of these acids being reduced nearly to the point of easy freezing by their having absorbed moisture from the air: for the Duke d'Ayen and M. de Morveau exposed their acids to the air in cups or open vessels; and the latter even acquaints us, that on examining the specific gravity of the acid which had frozen, he found it to that of water as 129 to 74; which density being less than that of easiest freezing, proves that the acid he employed, and which he had previously concentrated, had been actually weakened during the experiment. I have several times exposed concentrated sulphuric acid in open vessels in frosty weather; and I have sometimes, but not always, observed a congelation to take place. Upon separating the congealed part, and on examining the specific gravity of the latter after it had thawed, I found that it had been reduced to the point of easiest freezing. When the congealed acid was kept longer exposed it gradually thawed, even when the cold of the air increased; the reason of which is not to be imputed to the heat produced by the moisture of the air mixing with the acid, but principally to the diminution below the point of easiest freezing, which was occasioned by the continued absorption of moisture from the air, and which rendered the acid incapable of continuing frozen without a great increase of cold.

"It appears, then, that the concentration of M. de Morveau's acid, at the time of its congelation, from which circumstance Mr Cavendish infers generally that sulphuric acid freezes more easily as it is more dense, is not a true premise: and that therefore the inference, though justly deduced, is invalid. On the contrary, there seems every reason to believe, that as the density of the acids increases beyond the point of easiest freezing, the facility of the congelation diminishes; at least to as great density as we have ever been able to obtain sulphuric acid: for if it were possible to divest it entirely of water, it would probably assume a solid form in any temperature of the air.

"The crystallization of sulphuric acid is more or less distinct, according to the slowness of the formation of the crystals and other favourable circumstances. Sometimes they are very large, distinctly shaped, and hard. Their shape is like those of the common mineral alkali and selenite spar, but with angles different in dimensions from either of these. They are solid, consisting of ten faces; of which the two largest are equal, parallel, and opposite to each other; and are oblique-angled parallelograms or rhomboids, whose angles are, as near as could be measured, of 105 and 75 degrees. Between these rhomboidal faces are placed eight of the form of trapeziums; and thus each

2

crystal may be supposed to be compounded of two equal and similar frustums of pyramids joined together by their rhomboidal bases. They always sunk in the fluid acid to the bottom of the vessel, which showed that their density was increased by congelation. It was attempted to determine their specific gravity by adding to this fluid some concentrated acid, which should make them float in the liquor, the examination of whose specific gravity should ascertain that of the floating crystals; but they were found to sink even in the most concentrated acid, and were consequently denser. Some of the congealable acid previously brought to the freezing temperature was then poured into a graduated narrow cylindrical glass, up to a certain mark, which indicated a space equal to that occupied by 200 grains of water. The glass was placed in a mixture of snow, salt, and water; and when the acid was frozen, a mark was made on the part of the glass to which it had sunk. Having thawed the acid and emptied the glass, it was filled with water to the mark to which it had sunk by freezing: and it was then found that 15 grains more of water were required to raise it to the mark expressing 200 grains; which shows, that the diminution of bulk sustained by the acid in freezing had been equal to $\frac{1}{13.3}$ of the whole. Computing from this datum, we should estimate the specific gravity of the congealed acid to have been 1924; but as it evidently contained a great number of bubbles, its real specific gravity must have been considerably greater than the above calculation, and cannot easily be determined on account of these bubbles. By way of comparison, Mr Keir observed the alteration of bulk which water contained in the same cylindrical vessel would suffer by freezing: and found that its expansion was equal to about $\frac{1}{18}$th of its bulk. The water had been previously boiled, but nevertheless contained a great number of air bubbles; so that in this respect there is a considerable difference between the congelations of water and sulphuric acid; though perhaps it may arise principally from the bubbles of elastic fluid being in greater proportion in the one than the other.

"Greater cold is produced by mixing snow or pounded ice with the congealed than with the fluid sulphuric acid, though the quantity is not yet determined. The greatest cold produced by Mr M'Nab at Hudson's Bay, was effected by mixing snow with a sulphuric acid which had been previously congealed; and to this circumstance Mr Cavendish imputes the intensity of the cold, as the liquefaction both of the acid and the snow had concurred in producing the same effect; while in mixing fluid acids with snow, the thawing of the snow is probably the only productive cause.

"To compare the times requisite for the liquefactions of ice and of congealed sulphuric acid, two equal and similar glasses were filled, one with the congealable sulphuric acid, the other with water; and after having immersed them in a freezing mixture, till both were congealed and reduced to the temperature of 28°, the glasses were withdrawn, wiped dry, and placed in a room where the thermometer stood at 62°. The ice thawed in 40 minutes, and the acid in 95; at the end

end of which time the thermometer, which stood near the glasses, had risen to 64°. Hence it appears that the congealed acid requires more than twice the time for its liquefaction that ice does, though it cannot thence be fairly inferred, that the cold generated by the liquefaction of the ice and of congealed acid are in the above proportions of the times, from the following considerations, viz. that as, during the liquefaction of the ice, its temperature remains stationary at 32°, and during the liquefaction of the acid, its temperature remains about 44° or 45°, it appears, that the ice being considerably colder than the acid, will take the heat from the contiguous air much faster. By this experiment, however, we know that a considerable quantity of cold is generated by the liquefaction of the acid; and hence it appears probable, that in producing cold artificially, by mixing snow with acids in very cold temperatures, it would probably be useful to employ a sulphuric acid of the proper density for congelation, and to freeze it previously to its mixture with snow. It must not, however, be imagined, that the cold generated by the mixture of these two frozen substances is nearly equal to the sums of the colds generated by the separate liquefactions of the congealed acid and ice, when singly exposed to a thawing temperature; for the mixture resulting from the liquefaction, consisting of sulphuric acid and the water of the snow, appears from the generation of heat which occurs from the mixture of these ingredients in a fluid state, to be subject to different laws than those which rule either of the ingredients separately.

"The sulphuric acid, like water and other fluids, is capable of retaining its fluidity when cooled considerably below its freezing point. A phial containing some congealable sulphuric acid being placed in a mixture of salt, snow, and water, a thermometer was soon afterwards immersed in it while the acid was yet fluid, on which it quickly sunk from 50 to 29°. On moving the thermometer in the fluid, to make it acquire the exact temperature, the mercury was observed suddenly to rise; and on looking at the acid, numberless small crystals were observed floating in it, which had been suddenly formed. The degree to which the mercury then rose was $46\frac{1}{2}$°; and at another time, while the acid was freezing, it stood at 45°."

From these experiments our author infers, "1. That sulphuric acid has a point of easiest freezing, and that this is when the specific gravity is to that of water as 1780 to 1000. 2. That the greater or less disposition to congelation does not depend on any other circumstance than the strength of the acid. 3. That the freezing and thawing degree of the most congealable acid is about 45° of Fahrenheit's scale. It is, however, to be observed, that this degree is inferred from the temperature indicated by the thermometers immersed in the freezing and thawing acids; but the congelation of the fluid acid could never be accomplished without exposing it to a greater degree of cold, either by exposing it to the air in frosty weather or to the cold of melting snow. 4. Like water, this acid possesses the property of retaining its fluidity when cooled several degrees below the freezing point; and of rising suddenly to it when its congelation is promoted by agitation, or by contact even with a warmer thermometer. 5. That, like water and other congealable fluids, sulphuric acid generates cold by its liquefaction, and heat during its congelation, though the quantity of this heat and cold remains to be determined by future experiments. 6. That the acid, by congelation, when the circumstances for distinct crystallization are favourable, assumes a regular crystalline form, a considerable solidity and hardness, and a density much greater than it possessed in its fluid state."

Besides this species of congelation, sulphuric acid is subject to another, probably the same described by Basil Valentine and some of the other chemists. This is effected in the ordinary temperature of the air, even in summer; and according to Mr Keir *, is peculiar to that species of sulphuric acid which is distilled from green vitriol, and which is possessed of a smoking quality in a high degree; "for not only the authors (says Mr Keir) by whom this congelation has been observed, have given this description of the acid employed, but also the late experiments of Mr Dolfuss, seem to show that this smoking quality is essential to the phenomenon: for neither the acid obtained from vitriol, when deprived by rectification of its smoking quality, nor the English sulphuric acid, which is known to be obtained by burning sulphur, and which does not smoke, were found by his trials to be susceptible of this species of congelation. It may, however, be worth the attention of those chemists who have an opportunity of seeing this *icy sulphuric acid*, as it is called, to observe more accurately than has yet been done, the freezing temperature and the density of the congealable acids; and to examine whether the density of this smoking acid also is connected with the glacial property. It seems also further deserving of investigation, whether there be not some analogy between the congelation of the smoking sulphuric acid and the very curious crystallization which Dr Priestley observed in a concentrated sulphuric acid saturated with nitrous acid vapours; and whether this smoking quality does not proceed from some marine or other volatile acid, which may be contained in the martial vitriol whence the sulphuric acid is obtained."

* *Phil. Trans.* vol. lxxvii. p. 267.

Mr Keir also observes, that M. Cornatter has effected the crystallization of sulphuric acid, by distilling it with nitrous acid and charcoal; and we can add from our own experience, that a crystallization instantly takes place on allowing the fumes of the nitrous and sulphuric acids to mix together; and this, whether the former be procured from martial vitriol or sulphur, and whether it be in a phlogisticated state or not, concentration in both acids is here the only requisite. See COLD, SUPPLEMENT.

CONGER, in *Zoology*. See MURÆNA, ICHTHYOLOGY *Index*.

CONGERIES, a Latin word, sometimes used in our language for a collection or heap of several particles of bodies united into one mass or aggregate.

CONGESTION, in *Medicine*, a mass or collection of humours, crowded together and hardened in any part of the body, and there forming a preternatural tumour.

Congestion is effected by little and little; in which it differs from *defluxion*, which is more sudden.

CONGIARIUM,

Congo.

and sometimes three, months. When this happens, the low lands are commonly overflowed with extraordinary floods, and all their corn carried off. A disaster of this kind is commonly followed by a famine; for the lazy inhabitants take no care to lay up any provisions, although such misfortunes happen very frequently. This first season they reckon commences at the time the plants begin to spring.

The second season, Neasu, begins about the end of January, when the produce of their lands has arrived at its full height, and wants but a few days of being ripened for harvest. This first crop is no sooner gathered in, than they sow their fields afresh, their land commonly yielding them two harvests.

The third and fourth seasons, called *Ecundi* and *Quitombo*, are frequently blended together towards the middle of March, when the more gentle rains begin to fall, and continue till the month of May. These two seasons are distinguished by the greater or lesser quantity of rain that falls during that interval. During the rest of the time, the air is either very clear, hot, and dry; or the clouds being overcharged with electric matter, burst out into the most terrible thunders and lightnings, without yielding the least drop of rain, though they seem loaded with it.

The two last, viz. the Quibiso and Quibangala, make up their short winter, which consists not in frost or snow, but in dry blasting winds, which strip the earth of all its verdure, till the next Massanza begins to restore them to their former bloom.

They now divide their year into twelve lunar months, and begin it in September. They have also weeks consisting of four days only, the last of which is their sabbath; and on it they religiously abstain from

7 Natives excessively indolent.

every kind of work. This practice, the compilers of the Universal History conjecture to have arisen from the extreme laziness for which this people, and indeed all the African nations, are so remarkable. To this shameful indolence also is to be ascribed the little produce they reap from their lands, while the Portuguese settled among them, who are at more pains in the cultivation of theirs, enjoy all manner of plenty. The natives, however, had rather run the risk of the most terrible famines, than be at the tenth part of the labour they see the Portuguese take. They seem to think it below them to use any other exercises than those of dancing, leaping, hunting, shooting, &c.; the rest of their time they spend in smoking, and downright idleness, committing the laborious part of their household affairs to their slaves, or, in want of them, to their wives. Nothing is more common than to see these poor creatures toiling in the fields and woods with a child tied to their backs, and fainting under their excessive labour and heavy burdens, or (which is still worse) hunger and thirst. What is yet more surprisingly shameful is, that though they have plenty of domestic animals, which they might easily make use of for cultivating their grounds, and for other laborious services, and though they see the Portuguese do it every day to great advantage; yet they will rather see their tender females sink under their toil and labour, than be at the trouble of breeding up any of these useful creatures to their assistance.

The ground produces variety of grain, but no corn or rice except what is cultivated by the Portuguese.

8 Vegetables produced in Congo.

Their maize, or Indian wheat, grows very strong, and is well laden. This being well ground, they make into bread, or boil with water into a kind of pap. Of this they have four kinds; one of which, resembling what we call French wheat, is produced in plenty, and makes some amends for the want of industry in the people. They cultivate also a variety of the pease and bean kind; but what they chiefly live upon, as most suitable to their lazy disposition, is a kind of nut like our filberts, which fall to the ground of themselves, and are to be found everywhere; every nut that falls to the ground producing a new shrub next year. They have scarcely any fruit trees but what have been brought hither by the Portuguese. They have various sorts of palm-trees, useful both by their fruit, leaves, and their juice, which is easily converted into wine; also by affording a kind of oil with which they dress their victuals, though the Europeans use it only to burn in their lamps. They have also a vast number of plants and shrubs, which it would be impossible to describe or enumerate. Wheat is the only thing that the ground will not produce. It pushes forth, indeed, the straw and the ear; the former of which grows high enough, we are told, to hide a man on horseback, but the latter is empty, without one grain fit for use. Father Labat, however, who had lived a considerable time in some of the American islands, where he had observed the same thing, tells us, that he had the curiosity to examine those ears more carefully, and had found some few grains; and that, having sowed them afresh, they produced very long ears full of large heavy grain. Whence he conjectures, that if the Portuguese had tried the same experiment in their African settlements, it might perhaps have been attended with the same success.

9 Hazardous travelling.

In the low lands the grass grows so high, rank, and thick, that it becomes one of the most dangerous receptacles for wild beasts, serpents, and other venomous insects: on this account travelling is exceedingly hazardous, as there are few beaten roads in the whole country, and travellers are obliged to march over it, through vast plains, in continual danger of being devoured or stung to death; to say nothing of the manifold diseases produced by the unwholesome dews with which the grass is covered during some part of the day. The only method of guarding against all these evils effectually, is by setting fire to the grass in the hot weather, when it is quite parched by the heat of the sun: but even this cannot be done without the greatest danger; because both the wild beasts and venomous reptiles being roused out of their places of retirement, will fly furiously at those who happen to be in the way. In this case there is no possibility of escaping, but by climbing up the highest trees, or defending one's self with fire arms or other weapons. In such emergencies, the natives have a much better chance than the Europeans; the former being able to climb trees with surprising swiftness; while the latter must be assisted with rope-ladders, which they commonly cause their blacks to carry about with them, and to go up and fasten to one of the branches.

10 Great variety of flowers.

The flowers are here exceedingly beautiful and numerous. Almost every field and grove yields a much

nobler

Congo.

nobler prospect than the European gardens can boast of, notwithstanding the pains bestowed on their cultivation. The flowers are remarkable, not only for the prodigious variety of their colours, but the vast quantity of heads which grow upon one stalk. In the day-time, indeed, they seem to have lost their natural fragrancy; that being in some measure exhaled by the heat of the sun: but this is amply compensated after its setting, and more especially a little before its rising, when their sweetness is again condensed, and revived by the coldness and dews of the night, after which they exhale their various refreshing scents in a much higher degree than ours. The lilies, which there grow naturally in the fields, valleys, and woods, excel those of our gardens, not only in their extreme whiteness, but much more in a delightful fragrancy, without offending the head, as the European lilies do by their faintish sweetness. The tulips which there grow wild, though generally called *Persic*, have something so surprisingly charming in the variety and combination of their colours, that they dazzle the eyes of an intense beholder: neither do their flowers grow singly as with us, but ten or twelve upon one stalk; and with this double advantage, that they diffuse a very reviving and agreeable sweetness, and continue much longer in their full bloom. Of the same nature are their tuberoses, hyacinths, and other native flowers; which spring up in vast groups of 100 and 200 from one root, though somewhat smaller than ours; some of them finely variegated, and all of them yielding an agreeable smell. The roses, jessamines, and other exotics brought hither from Europe or America, come up likewise in great perfection, but require a constant supply of water, and diligent attendance, to prevent them from degenerating. The American jessamine, in particular, instead of single flowers, will grow up by dozens in a bunch; some of them of an exquisite white, and others of the colour of the most vivid fire.

11 Animals of different kinds.

A vast variety of animals of different kinds are found in the kingdom of Congo; the chief of which is the elephant. This creature is mostly found in the province of Bamba, which abounds with woods, pasture, and plenty of water; the elephants delighting much to bathe themselves during the heat of the day. They commonly go in troops of an hundred or more; and some of them are of such a monstrous size, that we are told the print of their hoof hath measured four, nay seven spans in diameter. From the hair of their tails, and that of some other animals, the natives, especially the women, weave themselves collars, bracelets, girdles, &c. with variety of devices and figures, which denote their quality; and are in such esteem, that the hair of two elephants tails is sufficient to buy a slave. The reason of this is, that the natives have not the art of taming them, but are obliged to send some of the bravest and stoutest men to hunt them in the woods; which is not done without great labour and danger, they being here exceedingly fierce. The most common way of hunting them is by digging deep holes in the ground, the top of which they cover with branches and leaves, as is practised in most parts of Asia.

Lions, leopards, tigers, wolves, and other beasts of prey, abound here in great plenty, and do much damage. Here are also a vast variety of monkeys of all sizes and shapes. The zebra, well known for its extreme beauty and swiftness, is also met with in this country. They have also a variety of buffaloes and wild asses; but the *dante* seems to be an animal peculiar to this kingdom. It is shaped and coloured much like an ox, though not so large. Its skin is commonly bought by the Portuguese, and sent into Germany to be tanned and made into targets, which are then called *dantes*. The natives make use of their raw hides dried to make their shields; which are so tough that no arrow or dart can pierce them; and they are also large enough to cover the whole body. The creature is vastly swift; and when wounded, will follow the scent or smoke of the gunpowder with such fury, that the hunter is obliged to climb up a tree with all possible speed; and this retreat he always takes care to secure before he ventures to fire. The wounded beast finding its enemy out of its reach, stays for him at the foot of the tree, and will not stir from it: of which the hunter taking the advantage, dispatches it with repeated shots. The forests of Congo also swarm with wild dogs, who, like the wolves, prey upon the tame cattle, and are so fierce that they will attack armed men. Their teeth are exceeding keen and sharp; they never bark, but make a dreadful howling when famished or in pursuit of their prey.

This country also abounds with all the different kinds of birds that are to be found in other warm climates. One sort, which they call *birds of music*, is greatly esteemed, insomuch that persons of the highest rank have from time immemorial taken the greatest delight in keeping them in cages and aviaries for the sake of their surprising melody. On the other hand, as the Congoese are superstitious to the last degree, there are several kinds of birds which they look upon as ominous, and are so terrified at the sight or hearing of them, that if they were going to enter upon ever so momentous an expedition, if they were met in council, or going to engage an enemy with ever so great an advantage, the flight or cry of such birds would throw them into a general panic, and disperse them in the utmost haste and confusion. The most dreadful of the ominous kinds are the crows, ravens, bats, and owls. The great owl is the most terrible of all, and to him they give the name of *kariam pemba*, by which words they likewise denote the devil. 12 Birds.

Fish of different kinds abound on the coasts of Congo in great numbers; but the inland parts are infested with such numbers of serpents, scorpions, and other venomous insects, as are perhaps sufficient to overbalance every natural advantage we have yet mentioned. The most pernicious and dangerous kinds are the ants; of which they reckon no less than six several species of different colours and sizes; all of them formidable on account of their prodigious numbers, and the mischief they do not only to the fruits of the earth, but to men and beasts; whom they will surround in the night-time, and devour even to the very bone. It is a common practice, we are told, to condemn persons guilty of some atrocious crimes to be stripped naked, tied hand and foot, and thrown into a hole where these insects swarm; where they are sure to be devoured by them in less than 24 hours to the very bones. But criminals are not the only persons who are in danger from the 13 Ants very dangerous.

Congo.

the jaws of these little devouring insects. People may be attacked by them, as we have already hinted, in the night-time, and while they are sleeping in their beds. This obliges the natives to be careful where they lie down, and to kindle a small fire, or at least to have a circle of burning hot embers round their beds. This caution is still more necessary in the country villages and hamlets, where persons are otherwise in danger of being attacked by millions of them in the dead of the night. In such a case the only expedient to save one's self is to jump up as soon as one feels the bite, to brush them off with all possible speed, and then at once to set the house on fire. The danger is still greater in travelling through the country, where a person is often obliged to take up his lodging on the bare ground; and may be overtaken during the heat of the day with such profound sleep, as not to be awakened by these diminutive animals till they have made their way through the skin; and in such a case nothing will prevent their devouring a man alive, though there were ever so many hands to assist him: in such incredible quantities do these creatures abound, notwithstanding the great numbers of monkeys who are continually ferreting the ants out of their retreats, and feed upon them with the utmost avidity. This can only be ascribed to the natural laziness and indolence of the inhabitants; which is such, that they not only neglect to rid their land of them by proper cultivation, but will suffer their houses, nay, even their very churches, to be undermined by them. Another kind of these destructive vermin lie so thick upon the paths and highways, that a person cannot walk without treading upon, and having his legs and thighs almost devoured by them. A third sort, of a white and red colour, but very small, will gnaw their way through the hardest wood, penetrate into a strong chest, and in a little while devour all the clothes, linen, and every thing that is in it. A fourth sort, small and black, leave a most intolerable stench upon every thing they touch or crawl over, whether clothes or household-stuff, which are not easily sweetened again; or if they pass over victuals, they are entirely spoiled. A fifth sort harbour chiefly on the leaves and branches of trees; and if a man chance to climb up thither to save himself from a wild beast, he is so tormented by them, that nothing but the fear of the jaws of the one could make him endure the stings of the other. A sixth sort is of the flying kind; and is probably one of the former kinds, that live wholly under ground, till nature furnishes them with wings. After this, they rise in such swarms as darken the air, and would make terrible havock among all kinds of vegetables, did not the natives come out against them in whole companies, and by dint of flaps, and other flat weapons, knock them down by myriads, and then laying them in heaps, set fire to their wings, which half broils them for food. Amidst all this variety of pernicious insects, however, they have one species of a more friendly and profitable kind, viz. the industrious bee, which furnishes the inhabitants with honey and wax in such plenty, that there is scarce a hollow tree, cleft of a rock, or chop of the earth, in which their combs are not found in great quantities.

14
Congo very populous.

With respect to the populousness of the kingdom of Congo, some authors, writing either from mere conjecture, or at best precarious inferences, have represented it as thinly peopled. The accounts of the missionaries and Portuguese, however, are directly opposite to these. They found the country for the most part covered with towns and villages, and these swarming with inhabitants; the cities well filled with people, particularly the metropolis, which is said to contain above 50,000 souls. The provinces, though not equally populous, yet in the whole make up such an amount as plainly proves, that what is wanting in the one is amply made up by the other. We are told that the duchy of Bamba is still able to raise 200,000 fighting men, and was formerly in a condition to raise double that number; and that the army of the king of Congo, in the year 1665, consisted of 900,000 fighting men, who were attended by an infinite number of women, children, and slaves. The numbers of the Congoese will appear the more credible, when we consider the extreme fecundity of their women. In some villages, if the missionaries are to be credited, the number of children is so great, that a father will part with one or two, for any commodity he wants, or even for some trifling bauble he fancies. There can be no doubt, however, that these accounts are greatly exaggerated. Captain Tuckey, in his recent expedition up the Congo river, found the villages very small, and the country thinly inhabited. He found scarcely any trace of the labours of the Romish missionaries, though they were long established in the country.

15
Congoese have a high opinion of themselves.

There is scarcely a nation on earth that have a higher opinion of themselves or their country than the Congoese, or that is more hardened against all conviction to the contrary, from reason, experience, or the most impartial comparison with other countries in Europe or Asia. Indeed it is impossible they should think otherwise, when it is one of the fundamentals of their belief, that the rest of the world was the work of angels, but that the kingdom of Congo, in its full and ancient extent, was the handywork of the Supreme Architect; and must of course have vast prerogatives and advantages over all others. When told of the magnificence of the European and Asiatic courts, their immense revenues, the grandeur of their palaces and edifices, the richness and happiness of their subjects, the great progress they have made in the arts and sciences to which their country is wholly a stranger, they coolly answer, that all this comes vastly short of the dignity and splendour of the kings and kingdom of Congo; and that there can be but one Congo in the world, to the happiness of whose monarch and people all the rest were created to contribute, and to whose treasury the sea and rivers pay their constant tribute of zimbis (or shells, which are their current coin); whilst other princes must condescend to enrich themselves by digging through rocks and mountains, to come at the excrements of the earth, so they style gold and silver which are in such request among other nations. Accordingly, they imagine, that the nations which come to traffic with them, are forced to that servile employment by their poverty and the badness of their country, rather than induced to it by luxury or avarice; whilst they themselves can indulge their natural indolence or sloth, though attended with the most pinching poverty, rather than disgrace the dignity of their blood by the least effort of industry, which, how laudable and beneficial soever, is looked upon by them as only a lesser degree of slavery. But though they generally esteem it so much below their dignity to apply to any useful

16
Their sloth, pride, &c.

Congo. useful work, they think it no disgrace to beg or steal. With respect to the first, they are said to be the most shameless and importunate beggars in the world. They will take no denial, spare no crouching, lying, prayers, to obtain what they want, nor curses and ill language when sent away without it. With regard to the last, they deem no theft unlawful or scandalous, except it be committed in a private manner, without the knowledge of the person wronged. It is esteemed a piece of bravery and gallantry to wrench any thing from another by violence; and this kind of theft is so common, not only among the vulgar, but also among the great ones, that they make no scruple, in their travels from place to place, to seize not only upon all the provisions they meet with in towns and villages, but upon every thing else that falls in their way. These violences oblige the poor people to conceal the few valuables they have, in some secret place out of the knowledge and reach of those harpies; and they think themselves well off if they can escape a severe bastinading, or other cruel usage, frequently inflicted upon them, in order to make them discover the place of their concealment.

17 Complexion, character, customs, &c. The complexion of the natives, both men and women, is black, though not in the same degree; some being of a much deeper black than others. Their hair is black and finely curled; some have it also of a dark sandy colour: their eyes are mostly of a fine lively black; but some are of a dark sea-colour. They have neither flat noses nor thick lips like the Nubians and other negroes. Their stature is mostly of the middle size; and, excepting their black complexion, they much resemble the Portuguese. In their temper, they are mistrustful, envious, jealous, and treacherous; and where they once take a distaste or affront, will spare no pains, and stick at no means, however base, to be avenged of, and crush their enemy under their feet. There is no such thing among them as natural affection. A husband, if a Heathen, may take as many wives as he pleases; and if a Christian, may have any number of concubines, whom he may divorce at pleasure, and even sell them though with child. So little regard have they for their children, that there is scarce one among them who will not sell a son or a daughter, or perhaps both, for a piece of cloth, a collar or girdle of coral or beads, and often for a bottle of wine or brandy.

18 Religion. The religion of the Congoese in many parts is downright idolatry, accompanied with the most ridiculous superstitions, and the most absurd and detestable rites invented by their gangas or priests; and even in those parts where Christianity is professed, it is so darkened by superstitions of one kind or other, that we may justly question whether the people are any gainers by the exchange.

19 Government. The government of this kingdom is monarchical, and as despotic as any in Asia or Africa. The kings are the sole proprietors of all the lands within their dominions; and these they can dispose of to whom they please, upon condition they pay a certain tribute out of them: upon failure of the payment of which, or any other neglect, they turn them out. Even the princes of the blood are subjected to the same law; so that there is no person of any rank or quality whatever that can bequeath a foot of land to his heirs or successors; and when these owners under the crown die, the lands immediately return to it again, whether they were in their possession, or had been left to ever so many tenants under them; so that it entirely depends on the prince whether these lands shall be continued in the same, or be disposed into other hands. The Portuguese, however, since their settling in these parts, have prevailed upon the monarchs to permit the heirs and successors to continue in the quiet possession of such lands, in order to avoid the confusions, or even rebellions, which the alienation and deprival of them frequently occasioned, and to oblige the tenants of them to pay their tribute more exactly and readily than they did before.

20 Commerce. St Salvador is the chief place of trade in this country belonging to the Portuguese and other Europeans. There were formerly about 4000 of them settled here, who traded with most parts of the kingdom; but their number is now diminished. The chief commodities they bring hither are either the product of Brazil or European manufactures. The former consist chiefly of grains, fruits, plants, &c.; the latter of Turkey carpets, English cloth, and other stuffs; copper, brass vessels, some kinds of blue earthen wares, rings, and ornaments of gold, silver, and other baser metals; coral, glass-beads, bugles, and other trinkets; light stuffs made of cotton, woollen, and linen, for clothing; and a great variety of tools and other utensils. In return for these they carry off a great number of slaves, amounting to 15,000 or 16,000 annually, as we have already observed. Formerly they used also to carry away elephants teeth, furs, and other commodities of the country; but those branches of commerce are now greatly decayed, and the slave-trade is what the Portuguese merchants principally depend on.

Congo, a term applied to tea of the second quality.

CONGREGATION, an assembly of several ecclesiastics, united so as to constitute a body.

The term is principally used for assemblies of cardinals appointed by the pope, and distributed into several chambers, for the discharge of certain functions and jurisdictions, after the manner of our offices and courts. The first is the congregation of the holy office, or the inquisition: the second, that of jurisdiction over bishops and regulars; the third, that of councils; this has power to interpret the council of Trent: the fourth, that of customs, ceremonies, precedencies, canonizations, called *the congregation of rites*: the fifth, that of St Peter's fabric, which takes cognizance of all causes relating to piety and charity, part whereof is due to the church of St Peter: the sixth, that of waters, rivers, roads: the seventh, of fountains and streets: the eighth, that of the index, which examines the books to be printed or corrected: the ninth, that of the council of state, for the management of the territories belonging to the pope and church (see Camerlingo): the tenth, *de bono regimine*; of which two last the cardinal nephew is chief: the eleventh, that of money: the twelfth, that of bishops, wherein those who are to be promoted to bishoprics in Italy are examined; this is held before the pope: the thirteenth, that of consistorial matters; the chief whereof is the cardinal dean: the fourteenth, a congregation for propagating the faith (see College): and the fifteenth, that of ecclesiastical immunity, for settling suits against churchmen. There is also a congregation

tion of alms, which takes care of every thing that relates to the subsistence of Rome and the state of the church.

CONGREGATION is also used for a company or society of religious cantoned out of this or that order; and making, as it were, an inferior order, or a subdivision of the order itself. Such are the congregations of the oratory, and those of Cluny, &c. among the Benedictines.

The word is also used for assemblies of pious persons in manner of fraternities, frequent among the Jesuits, in honour of the Virgin, &c. It is likewise applied to the audience in a church, particularly as consisting of the inhabitants of the same parish.

CONGREGATIONALISTS, in church history, a sect of Protestants who reject all church-government, except that of a single congregation under the direction of one pastor.

CONGRESS, in political affairs, an assembly of commissioners, envoys, deputies, &c. from several courts, meeting to concert matters for their common good.

CONGRESS, in America, is the assembly of delegates from the United States. See AMERICA.

CONGRESS, in a judicial sense, the trial made by appointment of a judge before surgeons and matrons, in order to prove whether or not a man be impotent, before sentence is passed for the dissolution of a marriage solicited upon such a complaint.

Neither the civil nor canon law makes any mention of the trial of virility by congress. It had its origin in France from the boldness of a young fellow, who, in open court, having been hard pressed by his wife, demanded the congress. The judge, surprised with the novelty of the demand, found it could not be denied, as being the surest evidence that the case could admit of. In time it became a branch in the French jurisprudence, and was authorized by decreets and arrets. It obtained for about 120 years; and was annulled by an arret of parliament in 1677, as being found precarious; some having failed under the experiment out of mere modesty and shame, which is found to have the same effect with actual impotency.

CONGREVE, WILLIAM, a younger brother of an ancient family in Staffordshire. His father was employed in the stewardship of the great estate of the earl of Burlington in Ireland, where he resided many years; and our author was born there in 1672. Mr Congreve entered into the Middle-Temple when he came to England, and began to study the law; but his bias was toward polite literature and poetry. His first performance was a novel entitled, *Incognita*, or *Love and Duty reconciled*. He soon after began his comedy of the *Old Bachelor;* which was the amusement of some leisure hours during a slow recovery from a fit of illness soon after his return to England; yet was in itself so perfect, that Mr Dryden, on its being shown to him, declared he had never in his life seen such a first play. When brought on the stage in 1693, it met with such universal approbation, that Mr Congreve, though he was but 19 years old at the time of his writing it, became now considered as a prop to the declining stage, and a rising genius in dramatic poetry. The next year he produced the *Double-Dealer;* which, for what reason is not so obvious, did not meet with so much success as the former. The merit of his first play, however, had obtained him the favour and patronage of Lord Halifax, and some peculiar mark of distinction from Queen Mary; on whose death, which happened in the close of this year, he wrote a very elegant elegiac pastoral. In 1695, when Betterton opened the new house in Lincoln's Inn Fields, Mr Congreve joining with him, gave him his comedy of *Love for Love;* with which the company opened their campaign, and which met with such success, that they immediately offered the author a share in the management of the house, on condition of his furnishing them with one play yearly. This offer he accepted; but, whether through indolence, or that correctness which he looked upon as necessary to his works, his *Mourning Bride* did not come out till 1697, nor his *Way of the World* till two years after that. The indifferent success this last mentioned play, though an exceeding good one, met with from the public, completed that disgust to the theatre, which a long contest with Jeremy Collier, who had attacked the immoralities of the English stage, and more especially some of his pieces, had begun, and he determined never more to write for the stage. However, though he quitted dramatic writing, he did not lay down the pen entirely; but occasionally wrote many little pieces both in prose and verse, all of which stand on the records of literary fame. It is very possible, however, that he might not so soon have given way to this disgust, had not the easiness of his circumstances rendered any subservience to the opinions and caprice of the town absolutely unnecessary to him. For his abilities having very early in life raised him to the acquaintance of the earl of Halifax, who was then the Mecænas of the age; that nobleman, desirous of raising so promising a genius above the necessity of too hasty productions, made him one of the commissioners for licensing hackney-coaches; or, according to Coxeter, a commissioner of the wine-license. He soon after bestowed on him a place in the pipe-office; and not long after gave him a post in the customs worth 600l. per annum. In the year 1718, he was appointed secretary of Jamaica; so that the whole of his income towards the latter part of his life was upwards of 1200l. a-year.

The greatest part of the last 20 years of his life was spent in ease and retirement; and he either did not, or affected not to give himself any trouble about reputation. Yet some part of that conduct might proceed from a degree of pride; to which purpose, T. Cibber, in his Lives of the Poets, vol. iv. p. 93. relates the following anecdote of him: "When the celebrated Voltaire was in England, he waited upon Mr Congreve, and passed some compliments upon the merit and reputation of his works. Congreve thanked him; but at the same time told that ingenious foreigner, that he did not choose to be considered as an author, but only as a private gentleman, and in that light expected to be visited. Voltaire answered, that if he had never been any thing but a private gentleman, in all probability he had never been troubled with that visit." He observes, in his own account of the transaction, that he was not a little disgusted with so unseasonable a piece of vanity.

Towards the close of his life he was much afflicted with the gout; and making a tour to Bath for the benefit ture upon the shield of Achilles, is of the arts of peace in general, and of joy and festivity in particular: the author of Telemachus betrays the same inattention, in describing that young hero.

In judging of propriety with regard to ornaments, we must attend, not only to the nature of the subject that is to be adorned, but also to the circumstances in which it is placed; the ornaments that are proper for a ball, will appear not altogether so decent at public worship; and the same person ought to dress differently for a marriage feast and for a burial.

Nothing is more intimately related to a man, than his sentiments, words, and actions; and therefore we require here the strictest conformity. When we find what we thus require, we have a lively sense of propriety: when we find the contrary, our sense of impropriety is not less lively. Hence the universal distaste of affectation, which consists in making a show of greater delicacy and refinement than is suited either to the character or circumstance of the person.

Congruity and propriety, wherever perceived, appear agreeable; and every agreeable object produces in the mind a pleasant emotion: incongruity and impropriety, on the other hand, are disagreeable; and of course produce painful emotions. These emotions, whether pleasant or painful, sometimes vanish without any consequence; but more frequently occasion other emotions, which we proceed to exemplify.

When any slight incongruity is perceived in an accidental combination of persons or things, as of passengers in a stage-coach, or of individuals dining at an ordinary; the painful emotion of incongruity, after a momentary existence, vanisheth without producing any effect. But this is not the case of propriety and impropriety: voluntary acts, whether words or deeds, are imputed to the author; when proper we reward him with our esteem; when improper, we punish him with our contempt. Let us suppose, for example, a generous action suited to the character of the author, which raises in him and in every spectator the pleasant emotion of propriety; this emotion generates in the author both self-esteem and joy, the former when he considers his relation to the action, and the latter when he considers the good opinion that others will entertain of him: the same emotion of propriety produceth in the spectators esteem for the author of the action; and when they think of themselves, it also produceth, by means of contrast, an emotion of humility. To discover the effects of an unsuitable action, we must invert each of these circumstances: the painful emotion of impropriety generates in the author of the action both humility and shame; the former when he considers his relation to the action, and the latter when he considers what others will think of him: the same emotion of impropriety produceth in the spectators contempt for the author of the action; and it also produceth, by means of contrast, when they think of themselves, an emotion of self-esteem. Here then are many different emotions, derived from the same action, considered in different views by different persons; a machine provided with many spsings, and not a little complicated. Propriety of action, it would seem, is a chief favourite of nature, when such care and solicitude is bestowed upon it. It is not left to our own choice; but, like justice, is required at our hands; and, like justice, is enforced by natural rewards and punishments: a man cannot, with impunity, do any thing unbecoming or improper; he suffers the chastisement of contempt inflicted by others, and of shame inflicted by himself. An apparatus so complicated, and so singular, ought to rouse our attention: for nature doth nothing in vain; and we may conclude with great certainty, that this curious branch of the human constitution is intended for some valuable purpose.

A gross impropriety is punished with contempt and indignation, which are vented against the offender by corresponding external expressions; nor is even the slightest impropriety suffered to pass without some degree of contempt. But there are improprieties, of the slighter kind, that provoke laughter: of which we have examples without end, in the blunders and absurdities of our own species: such improprieties receive a different punishment, as will appear by what follows. The emotions of contempt and of laughter occasioned by an impropriety of this kind, uniting intimately in the mind of the spectator, are expressed externally by a peculiar sort of laugh, termed *a laugh of derision* or *scorn*. An impropriety that thus moves not only contempt, but laughter, is distinguished by the epithet of *ridiculous;* and a laugh of derision or scorn is the punishment provided for it by nature. Nor ought it to escape observation, that we are so fond of inflicting this punishment, as sometimes to exert it even against creatures of an inferior species; witness a turkey-cock swelling with pride, and strutting with displayed feathers; a ridiculous object, which in a gay mood is apt to provoke a laugh of derision.

We must not expect that these different improprieties are separated by distinct boundaries; for improprieties from the slightest to the most gross, from the most risible to the most serious, there are degrees without end. Hence it is, that in viewing some unbecoming actions, too risible for anger, and too serious for derision, the spectator feels a sort of mixt emotion, partaking both of derision and of anger; which accounts for an expression, common with respect to the impropriety of some actions, that we know not whether to laugh or be angry.

It cannot fail to be observed, that in the case of a risible impropriety, which is always slight, the contempt we have for the offender is extremely faint, though derision, its gratification, is extremely pleasant. This disproportion between a passion and its gratification, seems not conformable to the analogy of nature. In looking about for a solution, we must reflect upon what is laid down above, that an improper action not only moves our contempt for the author, but also, by means of contrast, swells the good opinion we have of ourselves. This contributes, more than any other article, to the pleasure we have in ridiculing follies and absurdities; and accordingly, it is well known, that they who put the greatest value upon themselves are the most prone to laugh at others. Pride, which is a vivid passion, pleasant in itself, and not less so in its gratification, would singly be sufficient to account for the pleasure of ridicule, without borrowing any aid from contempt. Hence appears the reason of a noted observation, That we are the most disposed to ridicule the

Congruity. the blunders and absurdities of others, when we are in high spirits; for in high spirits, self-conceit displays itself with more than ordinary vigour.

With regard to the final causes of congruity and impropriety; one regarding congruity, is pretty obvious, that the sense of congruity, as one principle of the fine arts, contributes in a remarkable degree to our entertainment. Congruity, indeed, with respect to quantity coincides with proportion: when the parts of a building are nicely adjusted to each other, it may be said indifferently, that it is agreeable by the congruity of its parts, or by the proportion of its parts. But propriety, which regards voluntary agents only, can never be the same with proportion, a very long nose is disproportioned, but cannot be termed *improper*. In some instances, it is true, impropriety coincides with disproportion in the same subject, but never in the same respect; for example, a very little man buckled to a long toledo: considering the man and the sword with respect to size, we perceive a disproportion; considering the sword as the choice of the man, we perceive an impropriety.

The sense of impropriety with respect to mistakes, blunders, and absurdities, is happily contrived for the good of mankind. In the spectators, it is productive of mirth and laughter, excellent recreation in an interval from business. But this is a trifle in respect of what follows. It is painful to be the subject of ridicule; and to punish with ridicule the man who is guilty of an absurdity, tends to put him more upon his guard in time coming. Thus even the most innocent blunder is not committed with impunity; because, were errors licensed where they do not hurt, inattention would grow into a habit, and be the occasion of much hurt.

The final cause of propriety as to moral duties, is of all the most illustrious. To have a just notion of it, the moral duties that respect others must be distinguished from those that respect ourselves. Fidelity, gratitude, and the forbearing injury, are examples of the first sort; temperance, modesty, firmness of mind, are examples of the other; the former are made duties by the sense of justice; the latter by the sense of propriety. Here is a final cause of the sense of propriety, that must rouse our attention. It is undoubtedly the interest of every man, to suit his behaviour to the dignity of his nature, and to the station allotted him by Providence; for such rational conduct contributes in every respect to happiness, by preserving health, by procuring plenty, by gaining the esteem of others, and, which of all is the greatest blessing, by gaining a justly-founded self-esteem. But in a matter so essential to our well-being, even self-interest is not relied on; the powerful authority of duty is superadded to the motive of interest. The God of nature, in all things essential to our happiness, hath observed one uniform method; to keep us steady in our conduct, he hath fortified us with natural laws and principles, which prevent many aberrations, that would daily happen were we totally surrendered to so fallible a guide as human reason. Propriety cannot rightly be considered in another light, than as the natural law that regulates our conduct with respect to ourselves; as justice is the natural law that regulates our conduct with respect to others. We call propriety a law, not less than justice; because both are equally rules of conduct that ought to be obeyed: propriety includes this obligation; for to say an action is proper, is, in other words, to say, that it *ought* to be performed; and to say it is improper, is, in other words, to say that it ought to be forborne. It is this very character of *ought* and *should* that makes justice a law to us; and the same character is applicable to propriety, though perhaps more faintly than to justice: but the difference is in degree only, not in kind; and we ought, without hesitation or reluctance, to submit equally to the government of both.

But it must, in the next place, be observed, that to the sense of propriety, as well as of justice, are annexed the sanctions of rewards and punishments; which evidently prove the one to be a law as well as the other. The satisfaction a man hath in doing his duty, joined with the esteem and good will of others, is the reward that belongs to both equally. The punishments also, though not the same, are nearly allied; and differ in degree more than in quality. Disobedience to the law of justice, is punished with remorse; disobedience to the law of propriety, with shame, which is remorse in a lower degree. Every transgression of the law of justice raises indignation in the beholder; and so doth every flagrant transgression of the law of propriety. Slighter improprieties receive a milder punishment: they are always rebuked with some degree of contempt and frequently with derision. In general, it is true that the rewards and punishments annexed to the sense of propriety, are slighter in degree than those annexed to the sense of justice: which is wisely ordered, because duty to others is still more essential to society than duty to ourselves; for society could not subsist a moment were individuals not protected from the headlong and turbulent passion of their neighbours.

Coni. CONI, a strong town of Italy in Piedmont, and capital of a territory of that name, with a good citadel. The town being divided into two factions, it surrendered to the French in 1641; but was restored to the duke of Savoy soon after. It is seated at the confluence of the rivers Gresse and Sture. Its trade is considerable, being the repository of all merchandise from Turin and Nice, designed for Lombardy, Switzerland, and Germany. It contains about 10,000 people besides the garrison. It was taken by the French in April 1796. E. Long. 7. 45. N. Lat. 44. 30.

CONIC SECTIONS.

INTRODUCTION.

IN treating of so considerable a branch of the mathematical sciences as the Conic Sections, it would be improper to pass over in total silence the history of those remarkable curves. But this topic will not require any long detail. None of the works of the more early Greek geometers have reached our time; nor have we any work of antiquity professedly written on the subject of our inquiry. Our curiosity must therefore rest satisfied with the knowledge of a few incidental notices and facts, gleaned from different authors.

The discovery of the conic sections seems to have originated in the school of *Plato*, in which geometry was highly respected, and much cultivated. It is probable that the followers of that philosopher were led to the discovery of these curves, and to the investigation of many of their properties, in seeking to resolve the two famous problems of the duplication of the cube, and the trisection of an angle, for which the artifices of the ordinary or plane geometry were insufficient. Two solutions of the former problem, by the help of the conic sections, are preserved by *Eutocius* *, and are attributed by him to *Menæchmus*, the scholar of *Eudoxus*, who lived not much posterior to the time of Plato: and this circumstance, added to a few words in an epigram of *Eratosthenes* †, has been thought sufficient authority, by some authors, to ascribe the honour of the discovery of the conic sections to *Menæchmus*. We may at least infer that, at this epoch, geometers had made some progress in developing the properties of these curves.

* In *Arch.* lib. ii. de Sph. et Cyl.

† Ibid.

The writings of *Archimedes* that have reached us explicitly shew, that the geometers before his time had advanced a great length in investigating the properties of the conic sections. This author expressly mentions many principal propositions to have been demonstrated by preceding writers; and he often refers to properties of the conic sections, as truths commonly divulged, and known to mathematicians. His own discoveries in this branch of science are worthy of the most profound and inventive genius of antiquity. In the quadrature of the parabola he gave the first, and the most remarkable instance that has yet been discovered, of the exact equality of a curvilineal to a rectilineal space. He determined the proportion of the elliptic spaces to the circle; and he invented many propositions respecting the mensuration of the solids formed by the revolution of the conic sections about their axes.

It is chiefly from the writings of *Apollonius* of Perga, a town in Pamphylia, on the subject of the conic sections, that we know how far the ancient mathematicians carried their speculations concerning these curves. *Apollonius* flourished under *Ptolemy Philopator*, about forty years later than *Archimedes*. He formed his taste for geometry, and acquired that superior skill in the science to which he is indebted for his fame, in the school of Alexandria, under the successors of *Euclid*. Besides his great work on the conic sections, he was the author of many smaller treatises, relating chiefly to the geometrical analysis, the originals of which have all perished, and are only known to modern mathematicians by the account given of them by *Pappus* of Alexandria, in the seventh book of his *Mathematical Collections*.

The work of *Apollonius* on the conic sections, written in eight books, was held in such high estimation by the ancients, as to procure for him the name of the Great Geometer. The first four books of this treatise only have come down to us in the original Greek. It is the purpose of these four books, as we are informed in the prefatory epistle to *Eudemus*, to deliver the elements of the science; and in this part of his labour, the author claims no farther merit than that of having collected, amplified, and reduced to order, the discoveries of preceding mathematicians. One improvement introduced by Apollonius is too remarkable to be passed over without notice. The geometers who preceded him derived each curve from a *right cone*, which they conceived to be cut by a plane perpendicular to its slant side. It will readily be perceived, from what is shewn in the first section of the fourth part of the following treatise, that the section would be a parabola when the vertical angle of the cone was a right angle; an ellipse when it was acute; and a hyperbola when it was obtuse. Thus each curve was derived from a different sort of cone. *Apollonius* was the first to shew that all the curves are produced from any sort of cone, whether right or oblique, according to the different inclinations of the cutting plane. This fact is one remarkable instance of the adherence of the mind to its first conceptions, and of the slowness and difficulty with which it generalizes.

The original of the first four books of the treatise of *Apollonius* is lost; nor is it easy to ascertain in what age it disappeared. In the year 1658 *Borelli* discovered at Florence an Arabic manuscript, entitled *Apollonii Pergæi Conicorum Libri Octo*. By the liberality of the *Duke of Tuscany* he was permitted to carry the manuscript to Rome, and, with the aid of an Arabic scholar, *Abraham Ecchellensis*, he published in 1661 a Latin translation of it. The manuscript, although from its title it was expected to be a complete translation of all the eight books, was yet found to contain only the first seven books: and it is remarkable, that another manuscript, brought from the east by *Golius*, the learned professor of Leyden, so early as 1664, as well as a third, of which *Ravius* published a translation in 1669, have the same defect: all the three manuscripts agreeing in the want of the eighth book, we may now consider that part of the work of *Apollonius* as irrecoverably lost. Fortunately, in the *Collectiones Mathematicæ* of *Pappus*, in whose time the entire treatise of *Apollonius* was extant, there is preserved

served some account of the subjects treated in each book, and all the *Lemmata* required in the investigations of the propositions they contain. *Dr Halley*, who in 1710 gave a correct edition of the Conics of *Apollonius*, guided in his researches by the lights derived from *Pappus*, has restored the eighth book with so much ability as to leave little room to regret the original.

The four last books of the Conics of *Apollonius*, containing the higher or more recondite parts of the science, are generally supposed to be the fruit of the author's own researches; and they do much honour to the geometrical skill and invention of the Great Geometer. Even in our times the whole treatise must be regarded as a very extensive, if not a complete work on the conic sections. Modern mathematicians make important applications of these curves, with which the ancients were unacquainted; and they have been thus led to consider the subject in particular points of view, suited to their purposes; but they have made few discoveries, of which there are not some traces to be found in the work of the illustrious ancient.

The geometers who followed *Apollonius* seem to have contented themselves with the humble task of commenting on his treatise, and of rendering it of more easy access to the bulk of mathematicians. Till about the middle of the 16th century, the history of this branch of mathematical science presents nothing remarkable. The study of it was then revived; and since that time this part of mathematics has been more cultivated, or has been illustrated by a greater variety of ingenious writings.

Among the ancients, the study of the conic sections was a subject of pure intellectual speculation. The applications of the properties of these curves in natural philosophy have, in modern times, given to this part of the mathematics a degree of importance that it did not formerly possess. That which, in former times, might be considered as interesting only to the learned theorist and profound mathematician, is now a necessary attainment to him who would not be ignorant of those discoveries in nature, that do the greatest honour to the present age.

It is curious to remark the progress of discovery, and the connexion that subsists between the different branches of human knowledge; and it excites some degree of admiration to reflect, that the astronomical discoveries of *Kepler*, and the sublime theory of *Newton*, depend on the seemingly barren speculations of Greek geometers concerning the sections of the cone.

Apollonius, and all the writers on conic sections before *Dr Wallis*, derived the elementary properties of the curves from the nature of the cone. In the second part of his treatise *De Sectionibus Conicis*, published in 1665, Dr Wallis laid aside the consideration of the cone, deriving the properties of the curves from a description *in plano*. Since his time authors have been much divided as to the best method of defining those curves, and demonstrating their elementary properties; many of them preferring that of the ancient geometers, while others, and some of great note, have followed the example of *Dr Wallis*.

In support of the innovation made by *Dr Wallis*, it is urged, that in the ancient manner of treating the conic sections, young students are perplexed, and discouraged by the previous matter to be learnt respecting the generation and properties of the cone; and that they find it no easy matter to conceive steadily, and to understand diagrams rendered confused by lines drawn in different planes: all which difficulties are avoided by defining the curves *in plano* from one of their essential properties. It is not our intention particularly to discuss this point; and we have only to add, that, in the following treatise, we have chosen to deduce the properties of the conic sections from their description *in plano*, as better adapted to the nature of a work designed for general readers.

A geometrical treatise on the conic sections must necessarily be founded upon the elements of geometry. As *Euclid's* Elements of Geometry are generally studied, and in every one's hands, we have chosen to refer to it in the demonstrations. The edition we have used is that published by Professor Playfair of Edinburgh. Although the references are made to Euclid's Elements, yet they will also apply to the treatise on GEOMETRY given in this Work; for a table is there given, indicating the particular proposition of our treatise that corresponds to each of the most material propositions in Euclid's Elements.

The references are to be thus understood: (20. 1. E.) means the 20th prop. of the 1st book of *Euclid's* Elements: (2 cor. 20. 6. E.) means the 2d corollary to the 20th prop. of the sixth book of the same work; and so of others. Again, (7.) means the seventh proposition of that PART of the following treatise in which such reference happens to occur: (cor. 1.) means the corollary to the first proposition: (2 cor. 3.) means the 2d corollary to the third proposition, &c.—such references being all made to the propositions in the division of the treatise in which they are found.

PART I. OF THE PARABOLA.

DEFINITIONS.

Plate CLVI. fig. 1.

I. IF a straight line BC, and a point without it F, be given by position in a plane, and a point D be supposed to move in such a manner that DF, its distance from the given point, is equal to DB, its distance from the given line, the point D will describe a line DAD, called a *Parabola*.

COROLLARY. The line DF, DB, may become greater than any given line; therefore the parabola extends to a greater distance from the point F, and the line BC, than any that can be assigned.

II. The straight line BC, which is given by position, is called the *Directrix of the Parabola*.

III. The given point F is called the *Focus*.

IV. A straight line perpendicular to the directrix, terminated at one extremity by the parabola, and produced indefinitely within it, is called a *Diameter*.

V. The point in which a diameter meets the parabola is called its *Vertex*.

VI. The

Of the Parabola.

VI. The diameter which passes through the focus is called the *Axis of the parabola;* and the vertex of the axis is called the *Principal Vertex.*

COR. A perpendicular drawn from the focus to the directrix is bisected at the vertex of the axis.

VII. A straight line terminated both ways by the parabola, and bisected by a diameter, is called an *Ordinate to that diameter.*

VIII. The segment of a diameter between its vertex, and an ordinate, is called an *Absciss.*

IX. A straight line quadruple the distance between the vertex of a diameter and the directrix, is called the *Parameter,* also the *Latus Rectum of that diameter.*

X. A straight line meeting the parabola only in one point, and which everywhere else falls without it, is said to *touch* the parabola at that point, and is called a *Tangent to the parabola.*

PROPOSITION I.

The distance of any point without the parabola from the focus is greater than its distance from the directrix; and the distance of any point within the parabola from the focus is less than its distance from the directrix.

Fig. 2. LET DA*d* be a parabola, of which F is the focus, GC the directrix, and P a point without the curve, that is, on the same side of the curve with the directrix; PF, a line drawn to the focus, will be greater than PG, a perpendicular to the directrix. For, as PF must necessarily cut the curve, let D be the point of intersection; draw DB perpendicular to the directrix, and join PB. Because D is a point in the parabola, DB=DF (Definition 1.), therefore PF=PD+DB; but PD+DB is greater than PB (20. 1. E.), and therefore still greater than PG (19. 1. E.), therefore PF is greater than PG.

Again, let Q be a point within the parabola, QF, a line drawn to the focus, is less than QB, a perpendicular to the directrix. The perpendicular QB necessarily cuts the curve; let D be the point of intersection; join DF. Then DF=DB (Def. 1.), and QD+DF=QB; but QF is less than QD+DF, therefore QF is less than QB.

COROLLARY. A point is without or within the parabola, according as its distance from the focus is greater or less than its distance from the directrix.

PROP. II.

Every straight line perpendicular to the directrix meets the parabola, and every diameter falls wholly within it.

Fig. 2. LET the straight line BQ be perpendicular to the directrix at B, BQ shall meet the parabola. Draw BF to the focus, and make the angle BFP equal to FBQ; then, because QBC is a right angle, QBF and PFB are each less than a right angle, therefore QB and PF intersect each other; let D be the point of intersection, then DB=DF (5. 1. E.); therefore, D is a point in the parabola. Again, the diameter DQ falls wholly within the parabola; for take Q any point in the diameter, and draw FQ to the focus, then QB or QD+DF is greater than QF, therefore Q is within the parabola (Cor. 1.).

COR. The parabola continually recedes from the axis, and a point may be found in the curve that shall be at a greater distance from the axis than any assigned line.

PROP. III.

The straight line which bisects the angle contained by two straight lines drawn from any point in the parabola, the one to the focus, and the other perpendicular to the directrix, is a tangent to the curve in that point.

LET D be any point in the curve; let DF be drawn to the focus, and DB perpendicular to the directrix; the straight line DE, which bisects the angle FDB, is a tangent to the curve. Join BF meeting DE in I, take H any other point in DE, join HF, HB, and draw HG perpendicular to the directrix. Because DF=DB, and DI is common to the triangles DFI, DBI, and the angles FDI, BDI, are equal, these triangles are equal, and FI=IB, and hence FH=HB (4. 1. E.): but HB is greater than HG (19. 1. E.); therefore the distance of the point H from the focus is greater than its distance from the directrix, hence that point is without the parabola (Cor. 1.), and therefore HDI is a tangent to the curve at D (Def. 10.). Fig. 3.

COR. 1. There cannot be more than one tangent to the parabola at the same point. For let any other line DK, except a diameter, be drawn through D; draw FK perpendicular to DK; on D for a centre, with a radius equal to DB, or DF, describe a circle, cutting FK in N; draw NL parallel to the axis, meeting DK in L, and join FL. Then FK=KN (3. 3. E.) and therefore FL=LN. Now BD being perpendicular to the directrix, the circle FBN touches the directrix at B (16. 3. E.); and hence N, any other point in the circumference, is without the directrix, and on the same side of it as the parabola, therefore the point L is nearer to the focus than to the directrix, and consequently is within the parabola. Fig. 4. Fig. 3.

COR. 2. A perpendicular to the axis at its vertex is a tangent to the curve. Let AM be perpendicular to the axis at the vertex A, then RS, the distance of any point in AM from the directrix, is equal to CA, that is, to AF, and therefore is less than RF, the distance of the same point from the focus.

COR. 3. A straight line drawn from the focus of a parabola perpendicular to a tangent, and produced to meet the directrix, is bisected by the tangent. For it has been shewn that FB, which is perpendicular to the tangent DI, is bisected at I.

COR. 4. A tangent to the parabola makes equal angles with the diameter which passes through the point of contact, and a straight line drawn from that point to the focus. For BD being produced to Q, DQ is a diameter, and the angle HDQ is equal to BDE, that is, to EDF. Fig. 3.

COR. 5. The axis is the only diameter which is perpendicular to a tangent at its vertex. For the angle HDQ, or BDE, is the half of BDF, and therefore less than a right angle, except when BD and DF lie in

Of the Parabola.

in a straight line, which happens when D falls at the vertex.

SCHOLIUM.

From the property of tangents to the parabola demonstrated in Cor. 4. the point F takes the name of the *Focus*. For rays of light proceeding parallel to the axis of a parabola, and falling upon a polished surface whose figure is that produced by the revolution of the parabola about its axis, are reflected to the focus.

PROP. IV.

A straight line drawn from the focus of a parabola to the intersection of two tangents to the curve, will make equal angles with straight lines drawn from the focus to the points of contact.

Fig. 5.

LET HP, H*p* be tangents to a parabola at the points P, *p*; let a straight line be drawn from H, their intersection, to F the focus, and let FP, F*p* be drawn to the points of contact, the lines PF and *p*F make equal angles with HF.

Draw PK, *pk* perpendicular to the directrix; join HK, H*k*, join also FK, F*k*, meeting the tangents in G and *g*. The triangles FPH, KPH have PF equal to PK, and PH common to both, also the angle FPH equal to KPH (3.), therefore FH is equal to KH, and the angle HFP is equal to the angle HKP. In like manner it may be shewn that FH is equal to *k*H, and that the angle HF*p* is equal to the angle H*kp*; therefore HK is equal to H*k*, and hence the angle HK*k* is equal to H*k*K: now the angles PK*k*, *pk*K are right angles, therefore the angle HKP is equal to H*kp*; but these angles have been shewn to be equal to HFP and HF*p* respectively, therefore the lines PF and *p*F make equal angles with HF.

PROP. V.

Two tangents to a parabola, which are limited by their mutual intersection and the points in which they touch the curve, are to each other reciprocally as the sines of the angles they contain with straight lines drawn from the points of contact to the focus.

Fig. 6.

LET HP, H*p*, which intersect each other at H, be tangents to a parabola at the points P, *p*; and let PF, *p*F be drawn to the focus: then

HP : H*p* :: sine H*p*F : sine HPF.

Join HF; and in FP take FQ equal to F*p*, and join HQ; then, the angles at F being equal (4.), the triangles HFQ, HF*p* are equal, therefore HQ is equal to H*p*, and the angle HQF is equal to H*p*F. Now, in the triangle HPQ,

HP : HQ :: sine HQP or sine HQF : sine HPF (by Trigon.)

therefore HP : H*p* :: sine H*p*F : sine HPF.

PROP. VI.

Any straight line terminated both ways by a parabola, and parallel to a tangent, is bisected by the diameter that passes through the point of contact; or is an ordinate to that diameter.

Of the Parabola.

THE straight line D*d*, terminated by the parabola, and parallel to the tangent HP*h*, is bisected at E by PE the diameter that passes through P the point of contact.

Fig. 7.

Let KD, K*d*, tangents at the points D, *d*, meet the tangent at the vertex in H and *h*; draw DL, *dl*, parallel to EP, meeting H*h* in L and *l*, and draw DF, *d*F, PF to the focus.

Because H*h* is parallel to D*d*,

HD : *hd* :: KD : K*d*.

But KD, K*d* being tangents to the parabola,

Sine *hd*F : sine HDF :: KD : K*d* (5.),

Therefore, sine *hd*F : sine HDF :: HD : *hd*;

Now sine *h*PF : sine *hd*F :: *hd* : *h*P (5.),

Therefore, (23.5.E.) sine *h*PF : sine HDF :: HD : *h*P;

but sine HPF, or sine *h*PF : sine HDF :: HD : HP, therefore the ratio of HD to *h*P is the same as that of HD to HP, wherefore HP=P*h*.

Again, because the angles HDF and *hd*F are respectively equal to HDL and *hdl*, (3.)

DH : *dh* :: sine *hdl* : sine HDL,

Now HL : DH :: sine HDL : sine HLD, or sine *hld* (by Trigon.)

therefore (23.5.E.) HL : *dh* :: sine *hdl* : sine *hld* :: *hl* : *dh*, wherefore HL, and *hl*, have the same ratio to *dh*, hence HL=*hl*; and since it has been shewn that HP=P*h*, it follows that LP=P*l*, and therefore DE=E*d*.

COR. 1. Straight lines which touch a parabola at the extremities of an ordinate to a diameter intersect each other in that diameter. For D*d* and H*h* being similarly divided at E and P, the straight line which joins the points E, P, will pass through K the vertex of the triangle DK*d*.

COR. 2. Every ordinate to a diameter is parallel to a tangent at its vertex. For, if not, let a tangent be drawn parallel to the ordinate, then the diameter drawn through the point of contact would bisect the ordinate, and thus the same line would be bisected in two different points, which is absurd.

COR. 3. All the ordinates to the same diameter are parallel to each other.

COR. 4. A straight line that bisects two parallel chords, and terminates in the curve, is a diameter.

COR. 5. The ordinates to the axis are perpendicular to it, and no other diameter is perpendicular to its ordinates. This is evident from 2 cor. and 5 cor. to Prop. III.

COR. 6. Hence the axis divides the parabola into two parts which are similar to each other.

PROP. VII.

If a tangent to any point in a parabola meet a diameter, and from the point of contact an ordinate be drawn to that diameter, the segment of the diameter between the vertex and the tangent is equal to the segment between the vertex and the ordinate.

LET DK, a tangent to the curve at D, meet the diameter EP in K, and let DE*d* be an ordinate to that diameter, PK is equal to PE. Fig. 7.

Through P, the vertex of the diameter, draw the tangent PH, meeting KD in H; draw DL parallel to EP, meeting PH in L, and draw DF, PF to the focus: then

PH

Of the Parabola.

PH : HD :: sine HDF : sine HPF (5.)
But the angle HDF is equal to HDL, and HPF is equal to HPK (3.), that is (because of the parallel lines DL, PK) to HLD, therefore

PH : HD :: sine HDL : sine HLD :: HL : HD, wherefore PH=HL, and consequently PK=DL; but PL is parallel to DE, by last proposition, and therefore DL=PE, therefore PK=PE.

Prop. VIII.

If an ordinate to any diameter pass through the focus, the absciss is equal to one-fourth of the parameter of that diameter, and the ordinate is equal to the whole parameter.

Fig. 8. Let DE*d*, a straight line passing through the focus, be an ordinate to the diameter PE; the absciss PE is equal to $\frac{1}{4}$ the parameter, and the ordinate D*d* is equal to the whole parameter of the diameter PE.

Let DK, PI be tangents at D and P; let DK meet the diameter in K; draw PF to the focus, and DL parallel to EP. The angles KPI, IPF being equal (3.), and PI parallel to EF (2 cor. 6.), the angles PEF, PFE are also equal (29. 1. E.), and PE=PF=$\frac{1}{4}$ the parameter (Def. 9. and Def. 1.). Again, the angle KDE is equal to LDK (3.), and therefore equal to DKE; consequently ED is equal to EK, or to twice EP (7.): therefore D *d* is equal to 4 EP, or to 4 PF, that is, to the parameter of the diameter.

Prop. IX.

If any two diameters of a parabola be produced to meet a tangent to the curve, the segments of the diameters between their vertices and the tangent are to one another as the squares of the segments of the tangent intercepted between each diameter and the point of contact.

Fig. 9. Let QH, RK, any two diameters, be produced to meet PI, a tangent to the curve at P, in the points G, I; then

$$HG : KI :: PG^2 : PI^2.$$

Let PN, a semi-ordinate to the diameter HQ, meet KR in O, and let PR, a semi-ordinate to the diameter KO, meet HN in R; from H draw parallels to NO and QR, meeting KR in L and M, thus HL is a tangent to the curve, and HM a semi-ordinate to KR.

Now KI=KR, and KL=KM (7.)
Therefore, by subtraction, LI=MR=HQ,
But LO=HN=HG (7.)
Therefore by addition, IO=GQ.
The triangles PGN, PIO, are similar, as also PGQ, PIR,
Therefore GN : IO, or 2 GH : IO :: PG : PI,
And GQ : IR, or IO : 2IK :: PG : PI,
Hence, taking the rectangles of the corresponding terms,

$$2GH \cdot IO : 2IO \cdot IK :: PG^2 : PI^2$$
$$\text{Therefore } GH : IK :: PG^2 : PI^2$$

Fig. 10. Cor. The squares of semi-ordinates, and of ordinates to any diameter, are to one another as their corresponding abscisses. Let HE*h*, KN*k* be ordinates to the diameter PN; draw PG a tangent to the curve at the vertex of the diameter, and complete the parallelograms PEHG, PNKI; then PG, PI are equal to EH, NK, and GH, IK to PE, PN, respectively therefore $HE^2 : KN^2$ :: PE : PN.

Prop. X.

If an ordinate be drawn to any diameter of a parabola, the rectangle under the absciss and the parameter of the diameter is equal to the square of the semi-ordinate.

Let HB*h* be an ordinate to the diameter PK, the rectangle contained by PB and the parameter of the diameter is equal to the square of HB, the semi-ordinate. Fig. 8.

Let DE*d* be that ordinate to the diameter which passes through the focus. The semi-ordinates DE, E*d* are each half of the parameter, and the absciss EP is one-fourth of the parameter (8.),

$$\text{Therefore } Dd : DE :: DE : PE,$$
$$\text{and } Dd \cdot PE = DE^2,$$
$$\text{But } Dd \cdot PE : Dd \cdot PB, \text{ or } PE : PB :: DE^2 : HB^2 \text{ (cor. 9.)},$$
$$\text{Therefore } Dd \cdot PB = HB^2.$$

Scholium.

It was on account of the equality of the square of the semi-ordinate to a rectangle contained by the parameter of the diameter and the absciss, that Apollonius called the curve line to which the property belonged a *Parabola*.

Prop. XI.

A straight line drawn from the focus of a parabola, perpendicular to a tangent, is a mean proportional between the straight line drawn from the focus to the point of contact, and one-fourth the parameter of the axis.

Let FB be a perpendicular from the focus upon the tangent PB, and FP a straight line drawn to the point of contrct; let A be the principal vertex, and therefore FA equal to one-fourth of the parameter of the axis; FB is a mean proportional between FP and FA. Fig. 11.

Produce FB and FA to meet the directrix in D and C, and join AB. The lines FC, FD are bisected at A and B (3 cor. 3.), therefore (2. 6. E.) AB is parallel to CD, or perpendicular to CF, and consequently a tangent to the curve at A (2 cor. 3.); now BP is a tangent at P, therefore the angle AFB is equal to BFP (4.), and since the angles FAB, FBP are right angles, the triangles FAB, FBP are equiangular; hence

$$FP : FB :: FB : FA.$$

Cor. 1. The common intersection of a tangent, and a perpendicular from the focus to the tangent, is in a straight line touching the parabola at its vertex.

Cor. 2. If PH be drawn perpendicular to the tangent meeting the axis in H, and HK be drawn perpendicular to PF, PK shall be equal to half the parameter of the axis. For the triangles HPK, FBP are manifestly equiangular, therefore

HP : PK :: PF : FB :: FB : FA :: FD : FC,

 But

PART II. OF THE ELLIPSE.

Definitions.

Fig. 16. I. If two points F and f be given in a plane, and a point D be conceived to move around them in such a manner that $Df+DF$, the sum of its distances from them, is always the same, the point D will describe upon the plane a line AB ab, which is called an *Ellipse*.

II. The given points F, f are called the *Foci* of the ellipse.

III. The point C, which bisects the straight line between the foci, is called the *Centre*.

IV. The distance of either focus from the centre is called the *Excentricity*.

V. A straight line passing through the centre, and terminated both ways by the ellipse, is called a *Diameter*.

VI. The extremities of a diameter are called its *Vertices*.

VII. The diameter which passes through the foci is called the *Transverse Axis*, also the *Greater Axis*.

VIII. The diameter which is perpendicular to the transverse axis is called the *Conjugate Axis*, also the *Lesser Axis*.

IX. Any straight line not passing through the centre, but terminated both ways by the ellipse, and bisected by a diameter, is called an *Ordinate* to that diameter.

X. Each of the segments of a diameter intercepted between its vertices and an ordinate, is called an *Absciss*.

XI. A straight line which meets the ellipse in one point only, and everywhere else falls without it, is said to *touch* the ellipse in that point, and is called a *Tangent to the ellipse*.

Prop. I.

If from any point in an ellipse two straight lines be drawn to the foci, their sum is equal to the transverse axis.

Fig. 17. Let AB ab be an ellipse, of which F, f are the foci, and A a the transverse axis; let D be any point in the curve, and DF, Df lines drawn to the foci, $Df+DF=Aa$,

Because A, a are the points in the ellipse,

$$Af+AF=aF+af \text{ (Def. 1.)}$$

therefore $Ff+2AF=Ff+2af$;

Hence $2AF=2af$, and $AF=af$,

and $Af+AF=Af\times af=Aa$.

But D and A being points in the ellipse,

$$Df+DF=Af+AF,$$

therefore $Df+DF=Aa$.

Cor. 1. The sum of two straight lines drawn from a point without the ellipse to the foci is greater than the transverse axis. And the sum of two straight lines drawn from a point within the ellipse to the foci is less than the transverse axis.

Let PF, Pf be drawn from a point without the ellipse to the foci; let Pf meet the ellipse in D; join FD; then $Pf+PF$ is greater than $Df+DF$ (21. 1. E.), that is, than Aa. Again, let QF, Qf be drawn from a point within the ellipse, let Qf meet the curve in D, and join FD; $Qf+QF$ is less than $Df+DF$ (21. 1. E.), that is, than Aa. Fig. 17.

Cor. 2. A point is without or within the ellipse, according as the sum of two lines drawn from it to the foci is greater or less than the transverse axis.

Cor. 3. The transverse axis is bisected in the centre. Let C be the centre, then $CF=Cf$ (Def. 3.), and $FA=fa$, therefore $CA=Ca$.

Cor. 4. The distance of either extremity of the conjugate axis from either of the foci is equal to half the transverse axis. Let Bb be the conjugate axis; join Fb, fb. Because $CF=Cf$, and Cb is common to the triangles CFb, Cfb, also the angles at C are right angles, these triangles are equal; hence $Fb=fb$, and since $Fb+bf=Aa$, $Fb=AC$.

Cor. 5. The conjugate axis is bisected in the centre. Join fb, fB. By the last corollary $Bf=bf$, therefore the angles fBC, fbC are equal; now fC is common to the tringles fCB, fCb, and the angles at C are right angles, therefore (26. 1. E.) $CB=Cb$.

Prop. II.

Every diameter of an ellipse is bisected in the centre.

Let Pp be a diameter, it is bisected in C. For if Cp be not equal to CP, take CQ equal to CP, and from the points P, p, Q draw lines to F, f the foci. The triangles FCP, fCQ, having $FC=Cf$, $PC=CQ$, and the angles at C equal, are in all respects equal, therefore $FP=fQ$; in like manner it appears that $fP=FQ$, therefore $FQ+fQ$ is equal to $FP+fP$, or, (Def. 1.), to $Fp+fp$, which is absurd (21. 1. E.), therefore $CP=Cp$. Fig. 18.

Cor. 1. Every diameter meets the ellipse in two points only.

Cor. 2. Every diameter divides the ellipse into two parts which are equal and similar, the like parts of the curve being at opposite extremities of the diameter.

Prop III.

The square of half the conjugate axis of an ellipse is equal to the rectangle contained by the segments into which the transverse axis is divided by either focus.

Draw a straight line from f, either of the foci, to B, either of the extremities of the conjugate axis. Fig. 17.

Then $BC^2+Cf^2=Bf^2=Ca^2$ (4 cor. 1.),

But because Aa is bisected at C,

$$Ca^2=Af\cdot fa+Cf^2,$$

therefore $BC^2+Cf^2=Af\cdot fa+Cf^2$,

and $BC^2=Af\cdot fa$.

Prop.

Of the Ellipse.

Prop. IV.

The straight line which bisects the angle adjacent to that which is contained by two straight lines drawn from any point in the ellipse to the foci is a tangent to the curve in that point.

Fig. 19. Let D be any point in the curve; let DF, D*f* be straight lines drawn to the foci, the straight line DE which bisects the angle *f*DG adjacent to *f*DF, is a tangent to the curve at D.

Take H any other point in DE, take DG=D*f*, and join H*f*, HE, HG, *f*G; let *f*G meet DE in I. Because D*f*=DG, and DI is common to the triangles D*f*I, DGI and the angles *f*DI, GDI are equal, these triangles are equal, and *f*I=IG, and hence *f*H=HG (4. 1. E.), so that GH+*f*H=FH+GH; but FH+HG is greater than FG, that is, greater than FD+*f*D or A*a*, therefore FH+*f*H is greater than A*a*, hence the point H is without the ellipse (2 cor. 1.), and therefore DHI is a tangent to the curve at D (Def. 11.).

Cor. 1. There cannot be more than one tangent at the same point. For D is such a point in the line DE that the sum of DF, D*f*, the distances of that point from the foci, is evidently less than the sum of HF, H*f*, the distances of H any other point in that line; and if another line KDL be drawn through D, there is in like manner a point K in that line, which will be different from D, such that the sum of FK, *f*K is less than the sum of the distances of any other point in KL, and therefore less than FD+*f*D; therefore the point K will be within the ellipse (2 cor. 1.), and the line KL will cut the curve.

Cor. 2. A perpendicular to the transverse axis at either of its extremities is a tangent to the curve. The demonstration is the same as for the proposition, if it be considered that when D falls at either extremity of the axis, the point I falls also at the extremity of the axis, and thus the tangent DE, which is always perpendicular to *f*I, is perpendicular to the axis.

Cor. 3. A perpendicular to the conjugate axis at either of its extremities is a tangent to the curve. For the perpendicular evidently bisects the angle adjacent to that which is contained by lines drawn from the extremity to the foci.

Cor. 4. A tangent to the ellipse makes equal angles with straight lines drawn from the point of contact to the foci. For the angle *f*DE being equal to GDE, is also equal to FDM, which is vertical to GDE.

Scholium.

From the property of the ellipse, which forms this last corollary, the points F and *f* take the name of *Foci*. For writers on optics shew that if a polished surface be formed, whose figure is that produced by the revolution of an ellipse about its transverse axis, rays of light which flow from one focus, and fall upon that surface, are reflected to the other focus, so that if a luminous point be placed in one focus, there is formed by reflection an image of it in the other focus.

Of the Ellipse.

Prop. V.

The tangents at the vertices of any diameter of an ellipse are parallel.

Let P*p* be a diameter, HPK, *h p k* tangents at its vertices; draw straight lines from P and *p* to F and *f* the foci. The triangles FCP, *f*C*p*, having FC=*f*c, CP=C*p* (2), and the angles at C equal, are in all respects equal; and because the angle FPC is equal to C*pf*, FP is parallel to *fp* (27. 1. E.); therefore P*f* is equal and parallel to *p*F (33. 1. E.), thus FP*fp* is a parallelogram, of which the opposite angles P and *p* are equal (34. 1. E.). Now the angles FPH, *fp h* are evidently half the supplements of these angles (4 cor. 4.), therefore the angles FPH, *fp h*, and hence CPH, C*ph* are also equal, and consequently HP is parallel to *hp*. Fig. 18.

Cor. 1. If tangents be drawn to an ellipse at the vertices of a diameter, straight lines drawn from either focus to the points of contact make equal angles with these tangents. For the angle F*p k* is equal to FPH.

Cor. 2. The axes of an ellipse are the only diameters which are perpendicular to tangents at their vertices. For let P*p* be any other diameter, then PF and *p*F are necessarily unequal, and therefore the angles F*p*P, FP*p* are also unequal; to these add the equal angles F*p k*, FPH, and the angles C*p k*, CPH are unequal, therefore neither of them can be a right angle (29. 1. E.).

Prop. VI.

A straight line drawn from either focus of an ellipse to the intersection of two tangents to the curve, will make equal angles with straight lines drawn from the same focus to the points of contact.

Let HP, H*p* be tangents to an ellipse at the points P, *p*; let a straight line be drawn from H, their intersection, to F, either of the foci, and let FP, F*p* be drawn to the points of contact; the lines PF and *p*F make equal angles with HF. Fig. 20.

Draw P*f*, *pf* to the other focus; in FP, F*p* produced take PK=P*f*, and *pk*=*pf*; join HK, H*k*, and let *f*K, *fk* be drawn, meeting the tangents at G and *g*. The triangles *f*PH, KPH, have P*f*=PK, by construction, and PH common to both, also the angle *f*PH equal to KPH (4.), therefore *f*H is equal to KH. In like manner it may be shewn that *f*H is equal to *k*H, therefore HK is equal to H*k*; now FK is equal to F*k*, for each is equal to FP+P*f*, or F*p*+*pf*, that is, to the transverse axis; therefore the triangles FKH, F*k*H are in all respects equal, and hence the angle KFH is equal to *k*FH; therefore PF and *p*F make equal angles with HF.

Prop. VII.

Two tangents to an ellipse, which are limited by their mutual intersection, and the points in which

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which they touch the curve, are to each other reciprocally as the sines of the angles they contain with straight lines drawn from the points of contact to either focus.

Fig. 21. LET the straight lines HP, Hp, which intersect each other at H, be tangents to an ellipse at the points Pp, and let PF, pF be drawn to either focus; then

HP : Hp :: sine HpF : sine HPF.

Join HF, and in FP take FQ equal to Fp, and join HQ; then the angles at F being equal (6.) the triangles HFQ, HFp are equal, therefore HQ is equal to Hp, and the angle HQF is equal to HpF. Now, in the triangle HPQ,

HP : HQ :: sine HQP or sine HQF : sine HPF (Trigon.)
therefore HP : Hp :: sine HpF : sine HPF.

LEMMA.

Let KLl be a triangle, having its base Ll bisected at p, and let Hh, any straight line parallel to the base, and terminated by the sides, be bisected at P; then P, p, the points of bisection, and K, the vertex of the triangle, are in the same straight line, and that line bisects Dd, any other line parallel to the base.

Fig. 22. Complete the parallelograms KHPM, KLpN. The triangles KHh, KLl being similar, and Hh, Ll similarly divided at P and p,

KH : KL :: Hh : Ll :: HP : Lp,

hence the parallelograms KHPM, KLpN are similar. Now they have a common angle at K, therefore they are about the same diameter, that is, the points K, P, p are in the same straight line (26. 6. E.).

Next, let Dd meet Kp in E, then

HP : DE (:: KP : KE) :: Ph : Ed,
therefore DE is equal to Dd.

PROP. VIII.

Any straight line not passing through the centre, but terminated both ways by an ellipse, and parallel to a tangent, is bisected by the diameter that passes through the point of contact; or is an ordinate to that diameter.

Fig. 23. THE straight line Dd, terminated by the ellipse, and parallel to the tangent HPh, is bisected at E, by Pp, the diameter that passes through the point of contact.

Let L$p$$l$ be a tangent at the other extremity of the diameter, and let KD, Kd, tangents at the points D, d, meet the parallel tangents, HPh, L$p$$l$ in the points H, L, h, l, and draw DF, dF, PF, pF to either focus. Because Hh is parallel to Dd,

HD : $h$$d$ :: KD : Kd.

But, KD, Kd being tangents to the ellipse,

Sine $h$$d$F : sine HDF :: KD : K$d$ (7.)
therefore sine $h$$d$F : sine HDF :: HD : $h$$d$.
Now, sine hPF : sine $h$$d$F :: $h$$d$: hP (7.)
therefore (23. 5. E.) sine hPF : HDF :: HD : HP;
but sine HPF or sine hPF : sine HDF :: HD : HP,

therefore the ratio of HD to hP is the same as that of HD to HP, wherefore PH=Ph. In the same manner it may be demonstrated that pL=$p$$l$, therefore (Lemma) the diameter pP when produced passes through K, and bisects Dd, which is parallel to Hh or Ll, at E.

COR 1. Straight lines which touch an ellipse at the extremities of an ordinate to any diameter intersect each other in that diameter.

COR. 2. Every ordinate to a diameter is parallel to a tangent at its vertex. For if not, let a tangent be drawn parallel to the ordinate, then the diameter drawn through the point of contact would bisect the ordinate, and thus the same line would be bisected in two different points, which is absurd.

COR. 3. All the ordinates to the same diameter are parallel to each other.

COR. 4. A straight line that bisects two parallel chords and terminates in the curve is a diameter.

COR. 5. The ordinates to either axis are perpendicular to that axis; and no other diameter is perpendicular to its ordinates. This follows evidently from 2 and 3 cor. to prop. 4. and 2 cor. to prop. 5.

COR. 6. Hence each axis divides the ellipse into two parts which are similar and equal.

PROP. IX.

If a tangent to an ellipse meet a diameter, and from the point of contact an ordinate be drawn to that diameter, the semi-diameter will be a mean proportional between the segments of the diameter intercepted between the centre and the ordinate, and between the centre and the tangent.

LET DK, a tangent to the curve at D, meet the diameter pP, produced in K, and let DEd be an ordinate to that diameter. Fig. 24.

Then CE : CP :: CP : CK.

Through P and p, the vertices of the diameter, draw the tangents PH and pL, meeting KD in H and L; these tangents are parallel to each other (5.) and to DE, the ordinate, by the last proposition. Draw PF, pF, DF to either of the foci. Then

DH : PH :: sine HPF : sine HDF
and DL : p L :: sine Lp F : sine LDF } (7.)

Now the angles HPF, LpF are equal (cor. 5.) and the sine of HDF is the same as that of LDF, therefore

DH : PH :: DL : pL,

and by alternation,

DH : DL :: PH : pL;

therefore, because of the parallel lines PH, ED, pL,

EP : Ep :: PK : p K.

Take

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Take $CG = CE$, then by division

$$EG : EP :: Pp : PK,$$

and taking the halves of the antecedents,

$$CE : EP :: CP : PK;$$

hence, by composition, $CE : CP :: CP : CK$.

Cor. 1. The rectangle contained by PE and Ep is equal to the rectangle contained by KE and CE.

$$\text{For } PC^2 = KC \cdot CE = KE \cdot EC + EC^2 \text{ (3. 2. E.)}$$
$$\text{also } PC^2 = PE \cdot Ep + EC^2 \text{ (5. 2. E.)}$$
$$\text{therefore } KE \cdot EC + EC^2 = PE \cdot Ep + EC^2,$$
$$\text{and } KE \cdot EC = PE \cdot Ep.$$

Cor. 2. The rectangle contained by PK and Kp is equal to the rectangle contained by KE and KC.

$$\text{For } KC^2 = PK \cdot Kp + CP^2 \text{ (6. 2. E.)}$$
$$\text{also } KC^2 = EK \cdot KC + EC \cdot KC = EK \cdot KC + CP^2 \text{ (1. 2. E. and by the prop.)}$$
$$\text{therefore } PK \cdot Kp + CP^2 = EK \cdot KC + CP^2,$$
$$\text{and } PK \cdot Kp = EK \cdot KC.$$

Prop. X.

If a diameter of an ellipse be parallel to the ordinates to another diameter, the latter diameter shall be parallel to the ordinates to the former.

Fig. 24. Let Pp, a diameter of an ellipse, be parallel to DEd any ordinate to the diameter Qq, the diameter Qq shall be parallel to the ordinates to the diameter Pp.

Draw the diameter dCG through one extremity of the ordinate dD, and join G and D, the other extremity, meeting Pp in H. Because dG is bisected at C, and CH is parallel to dD, the line DG is bisected at H, therefore DG is an ordinate to the diameter Pp. And because dG and dD are bisected at C and E, the diameter Qq is parallel to DG (2. 6. E.) therefore Qq is parallel to any ordinate to the diameter Pp.

Definitions.

XII. Two diameters are said to be *conjugate* to one another when each is parallel to the ordinates to the other diameter.

Cor. Diameters which are conjugate to one another are parallel to tangents at the vertices of each other.

XIII. A third proportional to any diameter and its conjugate is called the *Parameter*, also the *Latus rectum of that diameter*.

Prop. XI.

If an ordinate be drawn to any diameter of an ellipse, the rectangle under the abscisses of the diameter will be to the square of the semi-ordinate as the square of the diameter to the square of its conjugate.

Fig. 25. Let DEd be an ordinate to the diameter Pp, and let Qq be its conjugate, then

$$PE \cdot Ep : DE^2 :: Pp^2 : Qq^2.$$

Let KDL a tangent at D meet the diameter in K, and its conjugate in L; draw DG parallel to Pp, meeting Qq in G. Because CP is a mean proportional between CE and CK (9.)

$$CP^2 : CE^2 :: CK : CE \text{ (2 cor. 20. 6. E.)}$$

$$\text{and by division } CP^2 : PE \cdot Ep :: CK : KE.$$

But, because ED is parallel to CL,

$$CK : KE :: CL : DE \text{ or } CG,$$

and because CQ is a mean proportional between CG and CL (9.)

$$CL : CG :: CQ^2 : CG^2 \text{ or } ED^2;$$
$$\text{therefore } CP^2 : PE \cdot Ep :: CQ^2 : DE^2,$$

and by inversion and alternation,

$$PE \cdot Ep : DE^2 :: CP^2 : CQ^2 :: Pp^2 : Qq^2.$$

Cor. 1. The squares of semi-ordinates and of ordinates to any diameter of an ellipse are to one another as the rectangles contained by the corresponding abscisses.

Cor. 2. The ordinates to any diameter, which intercept equal segments of that diameter from the centre, are equal to one another, and, conversely, equal ordinates intercept equal segments of the diameter from the centre.

Cor. 3. If a circle be described upon Aa, either of the axes of an ellipse, as a diameter, and DE, de, any two semi-ordinates to the axes meet the circle in H and h, DE shall be to de as HE to he. For Fig. 26.

$$DE^2 : de^2 :: AE \cdot Ea : Ae \cdot ea :: HE^2 : he^2,$$
$$\text{therefore } DE : de :: HE : he.$$

Cor. 4. If a circle be described upon Aa the transverse axis as a diameter, and DE, any ordinate to the axis, be produced to meet the circle in H, HE shall be to DE as the transverse axis Aa to the conjugate axis Bb. For, produce the conjugate axis to meet the circle in K, then, by last corollary,

$$HE : DE :: KC, \text{ or } AC : BC :: Aa : Bb.$$

Cor. 5. And if HE be divided at D, so that HE is to DE, as the transverse axis to the conjugate axis, D is a point in the ellipse, and DE a semi-ordinate to the axis Aa.

Prop. XII.

The transverse axis of an ellipse is the greatest of all its diameters, and the conjugate axis is the least of all its diameters.

Let Aa be the transverse axis, Bb the conjugate axis, and CD any semidiameter. Draw DE perpendicular to Aa, and DL perpendicular to Bb. Fig. 26.

$$\text{Because } Aa^2 : Bb^2 :: AE \cdot Ea : DE^2 \text{ (11.)}$$
$$\text{and } Aa^2 \text{ is greater than } Bb^2,$$
$$\text{therefore } AE \cdot Ea \text{ is greater than } DE^2;$$
$$\text{and } AE \cdot Ea + EC^2 \text{ is greater than } DE^2 + EC^2,$$
$$\text{that is, } AC^2 \text{ is greater than } DC^2,$$
$$\text{therefore, } AC \text{ is greater than } DC.$$

 By

Of the Ellipse.

The triangles DEH, CL m are evidently equi-angular, therefore

$$DH : DE :: Cm : CL,$$
$$\text{hence } CL \cdot DH = DE \cdot Cm;$$
$$\text{but } DE \cdot Cm, \text{ or } Ce \cdot Cm = BC^2,$$
$$\text{therefore } CL \cdot DH = BC^2.$$

In the same way it is shewn that $CL \cdot D\,h = AC^2$.

Cor. 1. If a perpendicular be drawn to a tangent at the point of contact, the segments intercepted between the points of contact, and the axes, are to each other reciprocally as the squares of the axes by which they are terminated.

For $AC^2 : BC^2 :: CL \cdot Dh : CL \cdot DH :: Dh : DH$.

Cor. 2. If DF be drawn to either focus, and HK be drawn perpendicular to DF, the straight line DK shall be equal to half the parameter of the transverse axis.

Draw CG parallel to the tangent at D, meeting DH in N, and DF in G. The triangles GDN, HDK are similar, therefore

$$GD : DN :: HD : DK, \text{ and hence } GD \cdot DK = HD \cdot DN.$$
$$\text{But } GD = AC \text{ (cor. 17.) and } ND = CL,$$
$$\text{therefore } AC \cdot DK = HD \cdot CL = \text{(by the prop.) } CB^2,$$
$$\text{wherefore } AC : BC :: BC : DK, \text{ hence DK is half the parameter of } A\,a \text{ (Def. 13.).}$$

Definitions.

Fig. 33. XIV. If a point G be taken in the transverse axis of an ellipse produced, so that the distance of G from the centre may be a third proportional to CF the excentricity, and CA the semi-transverse axis, a straight line GH h, drawn through G perpendicular to the axis, is called the *Directrix of the ellipse*.

Cor. 1. If MF m, an ordinate to the axis, be drawn through the focus, tangents to the ellipse at the extremities of the ordinate will meet the axis at the point G (9.)

Cor. 2. The ellipse has two directrices, for the point G may be taken on either side of the centre.

Prop. XX.

The distance of any point in an ellipse from either directrix is to its distance from the focus nearest that directrix in the constant ratio of the semi-transverse axis to the excentricity.

Fig. 33. Let D be any point in the ellipse, let DK be drawn perpendicular to the directrix, and let DF be drawn to the focus nearest the directrix; DK is to DF as CA, half the transverse axis, to CF, the excentricity.

Draw Df to the other focus, and DE perpendicular to A a, take L a point in the axis, so that AL=FD, and consequently L a=Df, then CL is evidently half the difference between AL and a L, or FD and fD, and CE half the difference between fE and FE, and because

$$Df + DF : fF :: fE - FE : Df - DF \text{ (Trigon.)}$$

By taking the halves of the terms of the proportion

$$CA : CF :: CE : CL,$$
$$\text{But } CA : CF :: CG : CA \text{ (Def. 14.)}$$
$$\text{therefore } CG : CA :: CE : CL,$$
$$\text{hence (20. 5. E.) } EG : AL :: CG : CA :: CA : CF,$$
$$\text{that is, } DK : DF :: CA : CF.$$

Cor. 1. If the tangent GMN be drawn through M, the extremity of the ordinate passing through the focus, and ED be produced to meet GM in N, EN shall be equal to DF. For draw MO perpendicular to the directrix, then, because M and D are points in the ellipse, and from similar triangles.

$$FM : FD :: MO : DK :: GF : GE :: FM : EN,$$
$$\text{therefore } FD = EN.$$

Cor. 2. If AI and $a\,i$ be drawn perpendicular to the transverse axis at its extremities, meeting the tangent GM in I and i, then AI=AF, and $a\,i = a$ F. This follows evidently from last corollary.

Prop. XXI.

Let A a, B b be the transverse and conjugate axes of an ellipse; from K any point in the conjugate axis let a straight line KH, which is equal to the sum or difference of the semi-axis CA, CB, be placed so as to meet the transverse axis in H; and in KH, produced beyond H when KH is the difference of the semi-axes, let HD be taken equal to CB; the point D is in the ellipse. Fig. 34.

Draw DE perpendicular to A a, and through C draw CG parallel to KD, meeting ED in G, then CG=KD=AC by construction, hence G is in the circumference of a circle of which C is the centre, and CA the radius; and because the triangles CEG, HED are similar,

$$GE : DE :: CG : HD :: CA : CB,$$

therefore DE is a semi-ordinate, and D a point in the ellipse (5 cor. 11.)

Scholium.

The instrument called the *trammels*, also the *elliptic compasses*, which workmen use for describing elliptic curves, is constructed on the property of the curve demonstrated in this proposition. (See Compasses.) Upon the same principle lathes are constructed for turning picture frames, &c. of an oval form.

Prop. XXII.

If a circle be described on the transverse axis of an ellipse as a diameter, the area of the circle will be to the area of the ellipse as the transverse axis to the conjugate axis.

Let A a be the transverse axis of the ellipse, which is also the diameter of the circle. Draw DE, D′E′, D″ E″ any number of perpendiculars to the axis, meeting the ellipse in D, D′, D″, and the circle in d, d', d'', and join AD, DD′, D′D″, D″a; also A d, $d\,d'$, Fig. 35.

$d' d''$,

Of the Hyperbola.

dd'', $d''a$, and draw DG, dg parallel to A a, meeting d' E′ in G and g.

The triangle A d E is to the triangle ADE as d E to DF, that is (4 cor. 11.) as the transverse axis to the conjugate axis. Again, because d'E′ and d E are similarly divided at D′ and D (3 cor. 11.)

d E : DE :: (d'E′—d E : D′E′—DE ::) $d'g$: D′G,

But, triangle $d g d'$: triangle DGD′ :: $d'g$: DG,

therefore the triangles $d g d'$, DGD′ as well as the rectangles d E′, DE′ are to each other as d E to DE, or as the transverse axis to the conjugate axis, and consequently the trapezoids d EE′d', DEE′D′ are to each other in the same ratio. In like manner it may be shewn, that the trapezoids d'E′E″d'', D′E′E″D″, also the triangles d''E″ a, D″E″ a are to each other as the transverse to the conjugate axis, and therefore the whole rectilineal figure A d d' d'' a inscribed in the semicircle to the whole figure ADD′D″ a inscribed in the semiellipse in the same ratio, which ratio is constant, and altogether independent of the number of the sides of each figure. But, the base A a remaining common to both figures, if we suppose the number of perpendiculars dDE, d'D′E′, &c. indefinitely increased, it is evident that the polygons A d d' $d''$$a$, ADD′D″ a will approach nearer and nearer to the semicircle and semiellipse, which are their respective limits, therefore, the semicircle is to the semiellipse, and consequently the circle is to the ellipse, as the transverse to the conjugate axis.

Cor. The area of an ellipse is equal to the area of a circle, whose diameter is a mean proportional between the axes.

Prop. XXIII. Problem.

Two unequal straight lines which bisect each other at right angles being given by position, to describe an ellipse of which these may be the two axes.

First Method. By a Mechanical Description.

Fig. 36. Let A a, B b be the transverse and conjugate axes, and C the centre. On B, one extremity of the conjugate axis, as a centre, with a radius equal to AC, half the transverse axis, let a circle be described, cutting the transverse axis in F and f; these points will be the foci of the ellipse (4 cor. 1.).

Let the ends of a string, equal in length to A a, be fastened at the points F f, and let the string be stretched by a pin D, and while it is kept uniformly tense, let the point of the pin be carried round in the plane in which the lines A a, B b are situated, till it return to the place from which it set out; by this motion the point of the pin will trace upon the plane a curve line which is the ellipse required, as is evident from the definition of the Ellipse.

Second Method. By Finding any Number of Points in the Curve.

Find F either of the foci as before; draw HAK $h a k$, perpendicular to the transverse axis at its extremities, and take AH and AK on each side of the vertex equal to AF, also $a h$ and $a k$ each equal to a F, join H h and K k, take E any point in A a, and through E draw NE n parallel to HK, meeting H h and K k in N and n. On F as a centre with a radius equal to EN or E n let a circle be described, meeting N n in D and d, these will be two points in the ellipse, and in the same way may any number of points be found. The reason of this construction is obvious from cor. 1. and 2. to prop. 20. Fig. 37.

Prop. XXIV. Problem.

An ellipse being given by position, to find its axes.

Let AB $a b$ be the given ellipse. Draw two parallel chords H h, K k, and bisect them at L and M; join LM, and produce it to meet the ellipse in P and p, then, P p is a diameter (4 cor. 8.). Bisect P p in C, the point C is the centre of the ellipse (2.). Fig. 38.

Take D any point in the ellipse, and on C as a centre with the distance CD describe a circle. If this circle fall wholly without the curve, then CD must be half the transverse axis; and if it fall wholly within the curve, then CD must be half the conjugate axis (12.). If the circle neither falls wholly without the curve, nor wholly within it, let the circle meet it again in d, join D d, and bisect D d in E, join CE, which produce to meet the ellipse in A and a, then A a will be one of the axes (5 cor. 8.), for it is perpendicular to D d (3. 3. E.) which is an ordinate to A a. The other axis B b will be found by drawing a straight line through the centre perpendicular to A a.

PART III. OF THE HYPERBOLA.

Definitions.

Fig. 39. I. If two points F, f be given in a plane, and a point D be conceived to move in such a manner that Df—DF, the difference of its distances from them is always the same, the point D will describe upon the plane a line DAD′ called an *Hyperbola*. By assuming first one of the given points F, and then the other f as that to which the moving point is nearest, the difference of the lines DF and Df in both cases being the same, there will be two hyperbolas DAD′, $d a d'$, described, opposite to one another, which are therefore called *Opposite Hyperbolas*.

Cor. The lines DF, Df may become greater than any given line, therefore the hyperbolas extend to a greater distance from the given points F, f than any which can be assigned.

II. The given points F, f are called the *Foci of the hyperbola*.

III. The point C, which bisects the straight line between the foci, is called the *Centre*.

IV. A straight line passing through the centre, and terminated

Of the Hyperbola.

Plate CLVIII Fig. 39.

DRAW a straight line from a, either of the extremities of the transverse axis, to B, either of the extremities of the conjugate axis.

$$\text{Then } BC^2+Ca^2=Ba^2=Cf^2 \text{ (Def. 7.)}$$

But because Aa is bisected at C, and produced to f,

$$Cf^2=Af{\cdot}fa+Ca^2 \text{ (6. 2. E.)}$$
$$\text{therefore } BC^2+Ca^2=Af{\cdot}fa+Ca^2,$$
$$\text{and } BC^2=Af{\cdot}fa.$$

PROP. IV.

The straight line which bisects the angle contained by two straight lines drawn from any point in the hyperbola to the foci is a tangent to the curve at that point.

Plate CLIX. Fig. 43.

LET D be any point in the curve, let DF, Df be straight lines drawn to the foci, the straight line DE which bisects the angle fDF is a tangent to the curve.

Take H any other point in DE, take DG=Df, and join Hf, HF, HG, fG; let fG meet DE in I. Because Df=DG and DI is common to the triangles DfI, DGI, and the angles fDI, GDI are equal, these triangles are equal, and fI=IG, and hence fH =HG (4. 1. E.), so that FH—fH=FH—HG: but since FH is less than FG+GH, FH—HG is less than FG, that is less than FD—fD or Aa, therefore FH—fH is less than Aa; hence the point H is without the hyperbola, (2 cor. 1.), and consequently DHI is a tangent to the curve at D (Def. 10.)

COR. 1. There cannot be more than one tangent to the hyperbola at the same point. For D is such a point in the line DE, that the difference of the lines DF, Df, the distances of that point from the foci, is evidently greater than the difference of FH, fH the distances of H any other point in that line; and if another line KD be drawn through D, there is in like manner a point K in that line which will be different from D, such, that the difference of FK, fK is greater than the difference of the distances of any other point in KD, and therefore greater than FD—fD, therefore the point K will be within the hyperbola (2 cor. 1.), and the line KD will cut the curve.

COR. 2. A perpendicular to the transverse axis at either of its extremities is a tangent to the curve. The demonstration is the same as for the proposition, if it be considered that when D falls at either extremity of the axis, the point I falls also at the extremity of the axis, and thus the tangent DE, which is always perpendicular to fI, is perpendicular to the axis.

COR. 3. Every tangent to either of the opposite hyperbolas passes between that hyperbola and the centre. Let the tangent DI meet the axis in E. Because DE bisects the angle FDf,

$$FD : fD :: FE : fE \text{ (3. 6. E.)}$$

But FD is greater than fD (Def. 1.), therefore FE is greater than fE, and hence E is between C and the vertex of the hyperbola to which DE is a tangent.

Of the Hyperbola.

SCHOLIUM.

From the property of the hyperbola which forms this proposition, the points F and f are called *Foci*. For rays of light proceeding from one focus, and falling upon a polished surface whose figure is that formed by the revolution of the curve about the transverse axis, are reflected in lines passing through the other focus.

PROP. V.

The tangents at the vertices of any transverse diameter of an hyperbola are parallel.

LET Pp be a diameter, HP, hp tangents at its vertices; draw straight lines from P and p to F and f the foci. The triangles FCP, fCp, having FC=fC, CP=Cp (2.), and the angles at C equal, are in all respects equal, and because the angle FPC is equal to Cpf, FP is parallel to fp (27. 1. E.), therefore Pf is equal and parallel to pF (33. 1. E.): thus FPfp is a parallelogram of which the opposite angles P and p are equal (34. 1. E.); now the angles FPH, fph are the halves of these angles (4.); therefore the angles FPH, fph, and hence CPH, Cph, are also equal, and consequently HP is parallel to ph. Fig. 44.

COR. 1. If tangents be drawn to an hyperbola at the vertices of a transverse diameter, straight lines drawn from either focus to the points of contact make equal angles with these tangents. For the angle Fph is equal to FPH.

COR. 2. The transverse axis is the only diameter which is perpendicular to tangents at its vertices. For let Pp be any other diameter. The angle CPH is less than FPH, that is, less than the half of FPf, therefore CPH is less than a right angle.

PROP. VI.

A straight line drawn from either focus of an hyperbola to the intersection of two tangents to the curve, will make equal angles with straight lines drawn from the same focus to the points of contact.

LET HP, Hp be tangents to an hyperbola at the points P, p; let a straight line be drawn from H their intersection to F either of the foci; and let FP, Fp be drawn to the points of contact; the lines PF, pF make equal angles with HF. Fig. 45. and 46.

Draw Pf, pf to the other focus. In PF and pF take PK=Pf, and pk=pf; join HK, Hk, and let fK, fk be drawn, meeting the tangents in G and g. The triangles fPH, KPH have Pf=PK, by construction, and PH common to both, also the angle fPH equal to KPH (4.); therefore fH is equal to KH. In like manner it may be shown, that fH is equal to kH, therefore HK is equal to Hk; now FK is equal to Fk; for each is equal to the difference between FP and fP, or Fp and fp, that is, to the transverse axis; therefore the triangles FKH, FkH are in all respects equal, and hence the angle KFH is equal to kFH, therefore PF and pF make equal angles with HF.

PROP.

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PROP. VII.

Two tangents to an hyperbola, or opposite hyperbolas, which are limited by their mutual intersection and the points in which they touch the curve, are to each other, reciprocally, as the sines of the angles they contain with straight lines drawn from the points of contact to either focus.

Fig. 47. and 48. LET HP, H p, which intersect each other at H, be tangents to an hyperbola, or opposite hyperbolas, at the points P, p; and let PF, p F be drawn to either focus,

HP : H p :: sine H p F : sine PHF.

Join HF, and in FP take FQ equal to F p, and join HQ; then, the angles at F being equal (6.), the triangles HFQ, HF p are equal, therefore HQ is equal to H p, and the angle HQF is equal to H p F. Now in the triangle HPQ,

HP : HQ :: sine HQP, or sine HQF : sine HPF (Trig.)
therefore HP : H p :: sine H p F : sine HPF.

LEMMA II.

Fig. 49. Let KL l be a triangle, having its base L l bisected at p, and let H h, any straight line parallel to the base, and terminated by the sides produced, be bisected at P, then P, p the point of bisection, and K the vertex of the triangle, are in the same straight line, and that line bisects D d any other line parallel to the base.

JOIN KP, K p. The triangles KH h, KL l being similar, and H h, L l similarly divided at P, p,

KH : KL :: (H h : L l ::) HP : L p.

Now the angles at H and L are equal, therefore the triangles KHP, KL p are similar, and the angle PKH is equal to p KL; to both add the angle HK p, and the angles PKH, HK p are equal to p KL, HK p, that is, to two right angles; therefore KP, K p lie in the same straight line (14. 1. E.)

Next let D d meet K p in E, then

HP : DE (:: PK : EK) :: P h : E d,
therefore DE is equal to E d.

PROP. VIII.

Any straight line terminated both ways by an hyperbola, and parallel to a tangent, is bisected by the transverse diameter produced, that passes through the point of contact, or is an ordinate to that diameter.

Fig. 50. THE straight line D d, terminated by the hyperbola, and parallel to the tangent HP h, is bisected at E by P p the transverse diameter produced, which passes through P, the point of contact.

Let L p l be a tangent at the other extremity of the diameter, and let KD, K d, tangents at the points D, d, meet the parallel tangents HP h, L p l in the point H, L, h, l, and draw DF, d F, PF to either focus. Because H h is parallel to D d,

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HD : h d :: KD : K d.

But KD, K d being tangents to the hyperbola,

sine h d F : sine HDF :: KD : K d (7.)
therefore sine h d F : sine HDF :: HD : h d,
now, sine h PF : sine h d F :: h d : h P (7.)
therefore, (23. 5. E.) sine hPF : sine HDF :: HD : hP;

but sine HPF or sine h PF : sine HDF :: HD : HP, therefore the ratio of HD to h P is the same as the ratio of HD to HP, wherefore PH = P h. In the same manner it may be demonstrated that p L = p l, therefore (lemma 2.) the diameter P p when produced passes through K, and bisects D d, which is parallel to H h, or L l, at E.

COR. 1. Straight lines which touch an hyperbola at the extremities of an ordinate to any transverse diameter, intersect each other in that diameter.

COR. 2. Every ordinate to a transverse diameter is parallel to a tangent at its vertex. For, if not, let a tangent be drawn parallel to the ordinate, then the diameter drawn through the point of contact would bisect the ordinate, and thus the same line would be bisected in two different points, which is absurd.

COR. 3. All the ordinates to the same transverse diameter are parallel to each other.

COR. 4. A straight line that bisects two parallel chords, and terminates in the opposite hyperbola, is a transverse diameter.

COR. 5. The ordinates to the transverse axis are perpendicular to it, and no other transverse diameter has its ordinates perpendicular to it. This follows from 2 cor. 4. and 2 cor. 5.

COR. 6. The transverse axis, indefinitely produced, divides each of the opposite hyperbolas into two parts which are similar to one another.

PROP. IX.

If a tangent to an hyperbola meet a transverse diameter, and from the point of contact an ordinate be drawn to that diameter, the semidiameter will be a mean proportional between the segments of the diameter intercepted between the centre and the ordinate, and between the centre and the tangent.

LET DK a tangent to the curve at D meet the transverse diameter P p in K, and let DE d be an ordinate to that diameter, Fig. 50.

Then CE : CP :: CP : CK.

Through P and p, the vertices of the diameter, draw the tangents PH and p L, meeting KD in H and L, these tangents are parallel to each other (5.), and to DE, the ordinate, by last proposition. Draw PF, pF, DF to either of the foci. Then,

$$\left.\begin{array}{l}\text{DH : HP :: sine HPF : sine HDF.}\\ \text{and DL : L}p\text{ :: sine L}p\text{F : sine LDF, or sine HDF}\end{array}\right\}(7.)$$

Now the angles HPF, L p F are equal (1 cor. 5.); therefore,

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therefore,

$$DH : PH :: DL : pL,$$

and by alternation

$$DH : DL :: PH : pL;$$

therefore, because of the parallel lines PH, ED, pL,

$$EP : Ep :: PK : pK.$$

Take CG=CE, then PG=Ep, and by composition

$$EG : EP :: Pp : PK,$$

and taking the halves of the antecedents

$$CE : EP :: CP : PK;$$

hence, by division, $CE : CP :: CP : CK$.

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Cor. 1. The rectangle contained by PE and Ep is equal to the rectangle contained by KE and CE.

For $CP^2=KC\cdot CE=EC^2-KE\cdot EC$ (2. 2. E.)
also $CP^2=EC^2-PE\cdot Ep$ (6. 2. E.)
therefore $EC^2-KE\cdot EC=EC^2-PE\cdot Ep$,
and $KE\cdot EC=PE\cdot Ep$.

Cor. 2. The rectangle contained by PK and Kp is equal to the rectangle contained by KE and KC.

For $KC^2=CP^2-PK\cdot Kp$ (5. 2. E.)
also $KC^2=EC\cdot KC-EK\cdot KC=CP^2-EK\cdot KC$ (3. 2. E. and by the prop.)
therefore $CP^2-PK\cdot Kp=CP^2-EK\cdot KC$,
and $PK\cdot Kp=EK\cdot KC$.

Prop. X.

If a tangent to an hyperbola meet the conjugate axis, and from the point of contact a perpendicular be drawn to that axis, the semiaxis will be a mean proportional between the segments of the axis intercepted between the centre and the perpendicular, and between the centre and the tangent.

Fig. 51. Let DH, a tangent to the hyperbola at D, meet the conjugate axis Bb in H, and let DG be perpendicular to that axis, then

$$CG : CB :: CB : CH.$$

Let DH meet the transverse axis in K, draw DE perpendicular to that axis, draw DF, Df to the foci, and describe a circle about the triangle DfF; the conjugate axis will evidently pass through the centre of the circle, and because the angle FDf is bisected by the tangent DK, the line DK will pass through one extremity of the diameter; therefore the circle passes through H. Draw DL to the other extremity of the diameter. The triangles LGD, KCH, are similar, for each is similar to the right-angled triangle LDH, therefore,

$LG : GD\ (=CE) :: CK : CH;$
hence $LG\cdot CH=CE\cdot CK=$ (by last prop.) CA^2.
Now $LC\cdot CH=CF^2$ (35. 3. E.)
therefore $LC\cdot CH-LG\cdot CH=CF^2-CA^2$,
that is, $CG\cdot CH=CB^2$ (Def. 7.)
wherefore $CG : CB :: CB : CH$.

Definition.

Fig. 52. XI. If through A, one of the vertices of the transverse axis, a straight line HAh be drawn, equal and parallel to Bb the conjugate axis, and bisected at A by the transverse axis, the straight lines CHM, Chm drawn through the centre, and the extremities of that parallel, are called *Asymptotes*.

Cor. 1. The asymptotes of two opposite hyperbolas are common to both. Through a, the other extremity of the axis, draw H′$a$$h'$, parallel to B$b$, and meeting the asymptotes of the hyperbola DAD in H′ and h'. Because aC is equal to AC, aH′ is equal to Ah, or to BC; also ah' is equal to AH, or to BC; hence, by the definition, CH′ and Ch' are asymptotes of the opposite hyperbola dad.

Cor. 2. The asymptotes are diagonals of a rectangle formed by drawing perpendiculars to the axes at their vertices. For the lines AH, CB, aH′ being equal and parallel, the points H, B, H′ are in a straight line passing through B parallel to Aa; the same is true of the points h, b, h'.

Prop. XI.

The asymptotes do not meet the hyperbola; and if from any point in the curve a straight line be drawn parallel to the conjugate axis, and terminated by the asymptotes, the rectangle contained by its segments from that point is equal to the square of half that axis.

Through D any point in the hyperbola draw a straight line parallel to the conjugate axis, meeting the transverse axis in E, and the asymptotes in M and m; the points M and m shall be without the hyperbola, and the rectangle MD·Dm is equal to the square of BC. Fig. 53.

Draw DG perpendicular to Bb the conjugate axis, let a tangent to the curve at D meet the transverse axis in K, and the conjugate axis in L, and let a perpendicular at the vertex A meet the asymptote in H. Because DK is a tangent, and DE an ordinate to the axis, CA is a mean proportional between CK and CE (9.), and therefore

$CK : CE :: CA^2 : CE^2$ (2 cor. 20. 6. E.)
But $CK : CE :: LC : LG$,
and $CA^2 : CE^2 :: AH^2 : EM^2$;
therefore $LC : LG :: AH^2 : EM^2$.

Again, CB being a mean proportional between CL and CG (10.)

$LC : CG :: CB^2 : CG^2$,
and therefore
$LC : LG :: CB^2 : CB^2+CG^2$, or CB^2+ED^2;
wherefore $AH^2 : EM^2 :: CB^2 : CB^2+ED^2$;
Now $AH^2=CB^2$ (Def. 11.)
therefore $EM^2=CB^2+ED^2$,

consequently EM^2 is greater than ED^2, and EM greater

Of the Hyperbola. greater than ED, therefore M is without the hyperbola. In like manner it appears that m is without the hyperbola; therefore every point in both the asymptotes is without the hyperbola. Again, the straight line Mm terminated by the asymptotes, being manifestly bisected by the axis at E,

$$ME^2 = MD \cdot Dm + DE^2;$$

but it has been shewn that

$$ME^2 = BC^2 + DE^2,$$

$$\text{therefore } MD \cdot Dm = BC^2.$$

Cor. 1. Hence, if in a straight line Mm, terminated by the asymptotes, and parallel to the conjugate axis, there be taken a point D such that the rectangle MD·Dm is equal to the square of that axis, the point D is in the hyperbola.

Cor. 2. If straight lines MDm, NRn, be drawn through D and R, any points in the hyperbola, or opposite hyperbolas, parallel to the conjugate axis, and meeting the asymptotes in M, m, and N, n, the rectangles MD·Dm, NR·Rn are equal.

Prop. XII.

The hyperbola and its asymptote when produced continually approach to each other, and the distance between them becomes less than any given line.

Fig. 53. Take two points E and O in the transverse axis produced, and through these points draw straight lines parallel to the conjugate axis, meeting the hyperbola in D, R, and the asymptotes in M m, and N n.

Because NO^2 is greater than ME^2,
and $NR \cdot Rn = MD \cdot Dm$, (2 cor. 11.)
therefore $NO^2 - NR \cdot Rn$ is greater than $ME^2 - MD \cdot Dm$,
that is, RO^2 is greater than DE^2,
and RO is greater than DE;
now On is greater than Em,
therefore Rn is greater than Dm,
and since $Rn : Dm :: DM : RN$, (2 cor. 11.)
DM is greater than RN,

therefore the point R is nearer to the asymptote than D, that is, the hyperbola when produced approaches to the asymptote.

Let S be any line less than half the conjugate axis; then, because Dm, a straight line drawn from a point in the hyperbola, parallel to the conjugate axis, and terminated by the asymptote on the other side of the transverse axis, may evidently be of any magnitude greater than Ah, which is equal to half the conjugate axis, Dm may be a third proportional to S and BC; and since Dm is also a third proportional to DM (the segment between D and the other asymptote) and BC, DM may be equal to S; but the distance of D from the asymptote is less than DM, therefore that distance may become less than S, and consequently less than any given line.

Cor. Every straight line passing through the centre, within the angles contained by the asymptotes through which the transverse axis passes, meets the hyperbola, and therefore is a transverse diameter; and every straight line passing through the centre within the adjacent angles falls entirely without the hyperbola.

Scholium.

Of the Hyperbola. The name *asymptotes* (*non concurrentes*) has been given to the lines CH, Ch, because of the property they have of continually approaching to the hyperbola without meeting it, as has been proved in this proposition.

Prop. XIII.

If from two points in a hyperbola, or opposite hyperbolas, two parallel straight lines be drawn to meet the asymptotes, the rectangles contained by their segments between the points and the asymptotes are equal. Plate CLX.

Let D and G be two points in the hyperbola, or opposite hyperbolas, let parallel lines EDe, HGh be drawn to meet the asymptotes in E, e, and H, h, the rectangles ED·De, HG·GH are equal. Fig. 54. and 55.

Through D and G draw straight lines parallel to the conjugate axis, meeting the asymptotes in the points L, l, and M, m. The triangles HGM, EDL are similar, as also the triangles h G m, e D l,

$$\text{therefore } DL : DE :: GM : GH,$$
$$\text{and } Dl : De :: Gm : Gh;$$

hence, taking the rectangles of the corresponding terms of the proportions,

$$LD \cdot Dl : ED \cdot De :: MG \cdot Gm : HG \cdot Gh.$$
$$\text{But } LD \cdot Dl = MG \cdot Gm \text{ (2 cor. 11.)}$$
$$\text{therefore } ED \cdot De = HG \cdot Gh.$$

Cor. 1. If a straight line be drawn through D, d, two points in the same or opposite hyperbolas, the segments DE, de between those points and the asymptotes are equal. For in the same manner that the rectangles ED·De, HG·Gh have been proved to be equal, it may be shewn that the rectangles Ed · de, HG · Gh are equal, therefore ED · De=Ed · de. Let Ee be bisected in O, then $ED \cdot De = EO^2 - OD^2$ and $Ed \cdot de = EO^2 - Od^2$, therefore $EO^2 - OD^2 = EO^2 - Od^2$; hence OD=O$d$, and ED=$ed$. Fig. 54. and 55.

Cor. 2. When the points D and d are in the same hyperbola, by supposing them to approach till they coincide at P, the line Ee will thus become a tangent to the curve at P. Therefore any tangent KPk, which is terminated by the asymptotes, is bisected at P, the point of contact. Fig. 54. and 55.

Cor. 3. And if any straight line KPk, limited by the asymptotes, be bisected at P a point in the curve, that line is tangent at P. For it is evident that only one line can be drawn through P which shall be limited by the asymptotes, and bisected at P. Fig. 54.

Cor. 4. If a straight line be drawn through D, any point in the hyperbola, parallel to a tangent KPk, and terminated by the asymptotes at E and e, the rectangle ED·De is equal to the square of PK, the segment of the tangent between the point of contact and either asymptote. The demonstration is the same as in the proposition. Fig. 54.

Cor. 5. If from any point D in a hyperbola a straight line be drawn parallel to Pp any diameter, meeting the asymptotes in E and e, the rectangle ED.De is equal to the square of half the diameter. The demonstration is the same as in the proposition. Fig. 55.

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Prop. XIV.

If two straight lines be drawn from any point in an hyperbola to the asymptotes, and from any other point in the same, or opposite hyperbolas, two other lines be drawn parallel to the former, the rectangle contained by the two first lines will be equal to the rectangle contained by the other two lines.

Fig. 56. From D any point in the hyperbola draw DH and DK to the asymptotes, and from any other point d draw dh and dk parallel to DH and DK. The rectangles HD · DK, $hd \cdot dk$ are equal.

Join D, d meeting the asymptotes in E, e. From similar triangles

$$ED : DH :: Ed : dh,$$
$$\text{and } eD : DK :: ed : dk,$$

therefore taking the rectangles of corresponding terms,

$$ED \cdot De : HD \cdot DK :: Ed \cdot de : hd \cdot dk;$$
$$\text{but } ED \cdot De = Ed \cdot de \text{ (13.)},$$
$$\text{therefore } HD \cdot DK = hd \cdot dk.$$

Cor. 1. If the lines D′K′, D′H′, $d'k'$, $d'h'$, be parallel to the asymptotes, and thus form the parallelograms D′K′CH′, $d'k'$ C h', these are equal to one another (16. and 14. 6. E.). And if D′C, d'C be joined, the halves of the parallelograms, or the triangles D′K′C, $d'k'$ C are also equal.

Cor. 2. If from D′, d', any two points in an hyperbola, straight lines D′K, $d'k'$ be drawn parallel to one asymptote, meeting the other in K′ and k', these lines are to each other reciprocally as their distances from the centre, or D′K : $d'k'$ :: C k' : CK′. This appears from last cor. and 14. 6. E.

Definitions.

Fig. 57. XII. If A a be the transverse axis, and Bb the conjugate axis of two opposite hyperbolas DAD, dad, and if B b be the transverse axis, and A a the conjugate axis of other two opposite hyperbolas EBE, ebe, these hyperbolas are said to be *conjugate to the former*. When all the four hyperbolas are mentioned they are called *conjugate hyperbolas*.

Cor. The asymptotes of the hyperbolas DAD, dad are also the asymptotes of the hyperbolas EBE, ebe. This is evident from Cor. 2. to Definition 11.

XIII. Any diameter of the conjugate hyperbolas is called a *second diameter of the other hyperbolas*.

Cor. Every straight line passing through the centre within the angle through which the conjugate or second axis passes, is a second diameter of the hyperbola.

XIV. Any straight line not passing through the centre, but terminated both ways by the opposite hyperbolas, and bisected by a second diameter, is called an *Ordinate to that diameter*.

Prop. XV.

Any straight line not passing through the centre, but terminated by the opposite hyperbolas, and parallel to a tangent to either of the conjugate hyperbolas, is bisected by the second diameter that passes through the point of contact, or is an ordinate to that diameter.

Of the Hyperbola.

The straight line D d terminated by the opposite hyperbolas, and parallel to the tangent KQ k, is bisected at E by Q q the diameter that passes through the point of contact. Fig. 58.

Let D d meet the asymptotes in G and g, and let the tangent meet them in K and k. The straight lines Gg, Kk are evidently similarly divided at E and Q, and since KQ=Q k (2 cor. 13.) therefore GE=Eg; now DG=gd (1 cor. 13.) therefore DE=E d.

Cor. 1. Every ordinate to a second diameter is parallel to a tangent at its vertex. The demonstration is the same as in Cor. 2. Prop. 8.

Cor. 2. All the ordinates to the same second diameter are parallel to each other.

Cor. 4. A straight line that bisects two parallel straight lines which terminate in the opposite hyperbolas is a second diameter.

Cor. 5. The ordinates to the conjugate or second axis are perpendicular to it, and no other second diameter is perpendicular to its ordinates.

Cor. 6. The opposite hyperbolas are similar to one another, and like portions of them are, in all respects, equal.

Prop. XVI.

If a transverse diameter of an hyperbola be parallel to the ordinates to a second diameter, the latter shall be parallel to the ordinates to the former.

Let Pp, a transverse diameter of an hyperbola, be parallel to DEd, any ordinate to the second diameter Qq, the second diameter Qq shall be parallel to the ordinates to the diameter Pp. Fig. 59.

Draw the diameter dCG through one extremity of the ordinate dD, and join G and D, the other extremity, meeting Pp in H. Because dG is bisected at C, and CH is parallel to dD, the line DG is bisected at H, therefore DG is an ordinate to the diameter Pp. And because dG and dD are bisected at C and E, the diameter Qq is parallel to DG (2. 6. E.), therefore Qq is parallel to any ordinate to the diameter Pp.

Definitions.

XV. Two diameters are said to be *conjugate to one another* when each is parallel to the ordinates to the other diameter.

Cor. Diameters which are conjugate to one another are parallel to tangents at the vertices of each other.

XVI. A third proportional to any diameter and its conjugate is called the *Parameter*, also the *Latus rectum of that diameter*.

Prop. XVII.

The tangent at the vertex of any transverse diameter of an hyperbola, which is terminated by the asymptotes, is equal to the diameter that is conjugate to that diameter. Fig. 60.

Let PCp be any transverse diameter of an hyperbola, HPh a tangent at its vertex, meeting the asymptotes

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nates to any second diameter are to one another as the sums of the squares of half that diameter and the segments intercepted by the ordinate from the centre.

Cor. 3. The ordinates to any transverse diameter, which intercept equal segments of that diameter from the centre, are equal to one another, and, conversely, equal ordinates intercept equal segments of the diameter from the centre.

Prop. XX.

Plate CLXI. The transverse axis of an hyperbola is the least of all its transverse diameters, and the conjugate axis is the least of all its second diameters.

Fig. 64. Let Rr be the transverse axis, Pp any other transverse diameter, draw PE perpendicular to Rr; then CE being greater than CR, and CP greater than CE, much more is CP greater than CR, therefore Pp is greater than Rr. In like manner it is shewn that if Ss be the conjugate axis, and Qq any other second diameter, Qq is greater than Ss.

Prop. XXI.

Plate CLX. If an ordinate be drawn to any transverse diameter of an hyperbola, the rectangle under the abscisses of the diameter is to the square of the semi-ordinate as the diameter to its parameter.

Fig. 63. Let DE be a semi-ordinate to the transverse diameter Pp; let PG be the parameter of the diameter, and Qq the conjugate diameter. By the definition of the parameter (Def. 16.)

$$Pp : Qq :: Qq : PG,$$
therefore, $Pp : PG :: Pp^2 : Qq^2$, (2 cor. 20. 6. E.)
But $Pp^2 : Qq^2 :: PE \cdot Ep : DE^2$, (19.)
therefore $PE \cdot Ep : DE^2 :: Pp : PG$.

Cor. Let the parameter PG be perpendicular to the diameter Pp; join pG, and from E draw EM parallel to PG, meeting pG in M. The square of DE the semi-ordinate is equal to the rectangle contained by PE and EM.

For $PE \cdot Ep : DE^2 :: Pp : PG$,
and $Pp : PG :: Ep : EM :: PE \cdot Ep : PE \cdot EM$,
therefore $DE^2 = PE \cdot EM$.

Scholium.

If the rectangles PGLp, HGKM be completed, it will appear that the square of ED is equal to the rectangle MP, which rectangle is greater than the rectangle KP, contained by the absciss PE, and the parameter GP, by a rectangle KH similar and similarly situated to LP, the rectangle contained by the parameter and diameter. It was on account of the excess of the square of the ordinate above the rectangle contained by the absciss and parameter that Apollonius gave the curve to which the property belonged the name of Hyperbola.

Prop. XXII.

Plate CLXI. If from the vertices of two conjugate diameters of an hyperbola there be drawn ordinates to any third transverse diameter, the square of the segment of that diameter, intercepted between the ordinate from the vertex of the second diameter, and the centre, is equal to the rectangle contained by the segments between the other ordinate and the vertices of the third transverse diameter. And the square of the segment intercepted between the ordinate from the vertex of the transverse diameter and the centre is equal to the square of the segment between the other ordinate, and the centre, together with the square of half the third transverse diameter.

Fig. 64. Let Pp, Qq be two conjugate diameters, of which Pp is a transverse, and Qq a second diameter; let PE, QG be semi-ordinates to any third transverse diameter Rr, then $CG^2 = RE \cdot Er$, and $CE^2 = CG^2 + CR^2$.

Draw the tangents PH, QK, meeting Rr in H and K. The rectangles $HC \cdot CE$ and $KC \cdot CG$ are equal, for each is equal to CR^2 (9.) therefore,

$$HC : CK :: CG : CE.$$

But the triangles HPC, CQK are evidently similar (cor. Def. 15.) and since PE, QG are parallel, their bases CH, KC similarly divided at E and G, therefore

$$HC : CK :: HE : CG,$$
wherefore $CG : CE :: HE : CG$,
consequently $CG^2 = CE \cdot EH =$ (1 cor. 9.) $BE \cdot Er$.

Again, from the similar triangles HPC, CQK,

$$HC : CK :: CE : KG.$$

Now it was shewn that $HC : CK :: CG : CE$,
therefore $CG : CE :: CE : KG$,

consequently
$$CE^2 = CG \cdot GK = (3.\ 2.\ E.)\ CG^2 + GC \cdot CK.$$
But $GC \cdot CK = CR^2$ (18.)
therefore $CE^2 = CG^2 + CR^2$.

Cor. 1. Let Ss be the diameter that is conjugate to Rr, then Rr is to Ss as CG to PE, or as CE to QG.

For $Rr^2 : Ss^2 :: RE \cdot Er$, or $CG^2 : PE^2$,
therefore $Rr : Ss :: CG : PE$.

In like manner $Rr : Ss :: CE : QG$.

Cor. 2. The difference between the squares of CE, CG the segments of the transverse diameter to which the semi-ordinates PE, QG are drawn, is equal to the square of CR the semi-diameter. For it has been shewn that $CE^2 = CG^2 + CR^2$;

therefore $CE^2 - CG^2 = CR^2$.

Cor. 3. The difference of the squares of any two conjugate diameters is equal to the difference of the squares of the axes. Let Rr, Ss be the axes, and Pp, Qq any two conjugate diameters; draw PE, QG perpendicular to Rr, and PL, QM perpendicular to Ss. Then

$$CE^2 - CG^2 = CR^2,$$
and $CM^2 - CL^2$, or $GB^2 - PE^2 = CS^2$,
therefore $CE^2 + PE^2 - (CG^2 + GQ^2) = CR^2 - CS^2$,
that is (47. 1. E.) $CP^2 - CQ^2 = CR^2 - CS^2$,
therefore $Pp^2 - Qq^2 = Rr^2 - Ss^2$.

Prop.

PROP. XXIII.

If four straight lines be drawn touching conjugate hyperbolas at the vertices of any two conjugate diameters, the parallelogram formed by these lines is equal to the rectangle contained by the transverse and conjugate axes.

Fig. 65. LET P p, Q q be any two conjugate diameters, a parallelogram DEGH formed by tangents to the conjugate hyperbolas at their vertices is equal to the rectangle contained by A a, B b the two axes.

Let Aa, one of the axes, meet the tangent PE in K; join QK, and draw PL, QM perpendicular to A a.

Because CK : CA :: CA : CL (9.)
and CA : CB :: CL : QM (1 cor. 22.)
ex aeq. CK : CB :: CA : QM,
therefore CK · QM=CB · CA.

But CK · QM=twice trian. CKQ=paral. CPEQ,
therefore the parallelogram CPEQ=CB · CA;

and, taking the quadruples of these, the parallelogram DEGH is equal to the rectangle contained by A a and B b.

PROP. XXIV.

If two tangents at the vertex of any transverse diameter of an hyperbola meet a third tangent, the rectangle contained by their segments between the points of contact, and the points of intersection, is equal to the square of the semi-diameter to which they are parallel. And the rectangle contained by the segments of the third tangent between its points of contact and the parallel tangents, is equal to the square of the semi-diameter to which it is parallel.

Fig. 66. LET PH, p h, tangents at the vertices of a transverse diameter P p, meet DH h, a tangent to the curve at any point D, in H and h; let CQ be the semi-diameter to which the tangents PH, p h are parallel, and CR that to which H h is parallel; then

PH · p h=CQ², and DH · D h=CR².

Let H h meet the semi-diameters CP, CQ in L and K. Draw ED, RM parallel to CQ, and DG parallel to CP.

Because LP · L p=LE · LC (2 cor. 9.)
LP : LE :: LC : L p;

Hence, and because of the parallels PH, ED, CK, p h,

PH : ED :: CK : p h,
wherefore PH · p h=ED · CK.
But ED · CK=CG · CK=CQ² (18.)
therefore PH · ph=CQ².

Again, the triangles LED, CMR are evidently similar, and LE, LD are similarly divided at H and P, also at h and p,

therefore PE : HD :: (LE : LD ::) CM : CR,
also p E : h D :: (LE : LD ::) CM : CR,

hence taking the rectangles of the corresponding terms,

PE · p E : HD · h D :: CM² : CR².

But, if CD be joined, the points D and R are evidently the vertices of two conjugate diameters (cor. def. 15.) and therefore PE · p E=CM² (22.)

therefore HD · h D=CR².

COR. The rectangle contained by LD and DK, the segments of a tangent intercepted between D the point of contact, and P p, Q q, any two conjugate diameters, is equal to the square of CR, the semi-diameter to which the tangent is parallel.

Let the parallel tangents PH, p h meet LK in H and h, and draw DE a semi-ordinate to P p. Because of the parallels ED, PH, CK, p h,

LE : LD :: EP : DH,
and EC : DK :: E p : D h,
therefore
LE · EC : LD · DK :: EP · E p : DH · D h.
But LE · EC=EP · E p (1 cor. 9.)
therefore LD · DK=DH · D h= (by this prop.) CR².

PROP. XXV.

If two straight lines be drawn from the foci of an hyperbola perpendicular to a tangent, straight lines drawn from the centre, to the points in which they meet the tangent, will each be equal to half the transverse axis.

Let P d D be a tangent to the curve at P, and FD, f d perpendiculars to the tangent from the foci, the straight lines joining the points C, D and C, d are each equal to AC, half the transverse axis. Fig. 67.

Join FP, f P, and produce FD, P f till they intersect in E. The triangles FDP, EDP have the angles at D right angles, and the angles FPD, EPD equal (4.), and the side DP common to both; they are therefore equal, and consequently have ED=DF, and EP=PF, wherefore E f=FP—P f=A a. Now the straight lines FE, F f being bisected at D and C, the line DC is parallel to E f, and thus the triangles F f E, FCD are similar.

therefore F f : f F, or A a :: FC : CD;
but FC is half F f, therefore CD is half of A a.

COR. If a straight line Q q be drawn through the centre parallel to the tangent D d, it will cut off from PE, P f the segments PG, Pg, each equal to AC half the transverse axis. For Cd PG, CDPg are parallelograms, therefore PG=dC=AC, and Pg=DC=AC.

PROP. XXVI.

The rectangle contained by perpendiculars drawn from the foci of an hyperbola to a tangent is equal to the square of half the conjugate axis.

LET P d D be a tangent, and FD, f d perpendiculars from the foci, the rectangle contained by FD and f d is equal to the square of BC half the conjugate axis. Fig 67.

It is evident from last proposition that the points D, d are in the circumference of a circle, whose centre is

Of the Hyperbola.

is the centre of the hyperbola, and radius CA half the transverse axis; now FDd being a right angle, if dC be joined, and produced, it will meet DF in H, a point in the circumference; and since FC=fC, and CH=Cd, and the angles FCH, fCd are equal, FH is equal to fd, therefore,

$$DF \cdot df = DF \cdot FH = AF \cdot aF \text{ (36. 3. E.)} = CB^2 \text{ (3.)}$$

Cor. If PF, Pf, be drawn from the point of contact to the foci, the square of FD is a fourth proportional to fP, FP and CB². For the angles fPd, FPD are equal (4.), and FDP, fdP are right angles, therefore the triangles FDP, fdP are similar, and

$$fP : FP :: fd : FD :: fd \cdot FD \text{ or } BC^2 : FD^2.$$

Prop. XXVII.

Fig. 68.

If from C the centre of an hyperbola a straight line CL be drawn perpendicular to a tangent LD, and from D the point of contact a perpendicular be drawn to the tangent, meeting the transverse axis in H, and the conjugate axis in h, the rectangle contained by CL and DH is equal to the square of CB, the semi-conjugate axis; and the rectangle contained by CL and Dh is equal to the square of CA, the semi-transverse axis.

Let the axes meet the tangent in M and m, and from D draw the semi-ordinates DE, De, which will be perpendicular to the axes.

The triangles DEH, CLm are evidently equiangular, therefore,

$$DH : DE :: Cm : CL,$$
$$\text{hence } CL \cdot DH = DE \cdot Cm,$$
$$\text{but } DE \cdot Cm \text{ or } Ce \cdot Cm = BC^2 \text{ (10.)}$$
$$\text{therefore } CL \cdot DH = BC^2.$$

In the same way it may be shewn, that CL · Dh=AC².

Cor. 1. If a perpendicular be drawn to a tangent at the point of contact, the segments intercepted between the point of contact and the axes are to each other reciprocally as the squares of the axes by which they are terminated.

For $AC^2 : BC^2 :: CL \cdot Dh : CL \cdot DH :: Dh : DH.$

Cor. 2. If DF be drawn to either focus, and HK be drawn perpendicular to DF; the straight line DK shall be equal to half the parameter of the transverse axis.

Draw CG parallel to the tangent at D, meeting DH in N, and DF in G. The triangles GDN, HDK are similar, therefore

$$GD : DN :: DH : DK;$$
$$\text{and hence } GD \cdot DK = HD \cdot DN.$$
$$\text{But } GD = AC \text{ (cor. 25.) and } ND = CL,$$
$$\text{therefore } AC \cdot DK = HD : CL = \text{(by the prop.) } CB^2,$$
$$\text{wherefore } AC : BC :: BC : DK,$$
hence DK is half the parameter of Aa (def. 16.)

Definition.

Fig. 69.

XVII. If a point G be taken in the transverse axis of an hyperbola, so that the distance of G from the centre may be a third proportional to CF, the distance of either focus from the centre, and CA the semi-transverse axis, a straight line HGh drawn through G, perpendicular to the axis, is called the *Directrix* of the hyperbola.

Cor. 1. If MFm, an ordinate to the axis, be drawn through the focus, tangents to the hyperbola at the extremities of the ordinate will meet the axis at the point G (9).

Cor. 2. The hyperbola has two directrices, for the point G may be taken on either side of the centre.

Prop. XXVIII.

The distance of any point in an hyperbola from either directrix is to its distance from the focus nearest that directrix, in the constant ratio of the semi-transverse axis to the distance of the focus from the centre.

Fig. 69.

Let D be any point in the hyperbola; let DK be drawn perpendicular to the directrix, and DF to the focus nearest the directrix; DK is to DF as CA, half the transverse axis, to CF, the distance of the focus from the centre.

Draw Df to the other focus, and DE perpendicular to Aa; take L a point in the axis, so that AL=FD, and consequently La=Df; then CL is evidently half the sum of AL and aL, or of FD and fD, and CE half the sum of FE and fE, and because

$$Df - DF : Ff :: fE + FE : Df + DF \text{ (Trig.)}$$

by taking the halves of the terms of the proportion,

$$CA : CF :: CE : CL.$$
$$\text{But } CA : CF :: CG : CA \text{ (def. 17.)};$$
$$\text{therefore, } CG : CA :: CE : CL,$$
$$\text{hence (19. 5. E.) } EG : AL :: CG : CA :: CA : CF,$$
$$\text{that is, } DK : DF :: CA : CF.$$

Cor. 1. If the tangent GMN be drawn through M, the extremity of the ordinate passing through the focus, and ED be produced to meet GM in N, EN shall be equal to DF. For draw MO perpendicular to the directrix, then, because M and D are points in the hyperbola, and from similar triangles,

$$FM : FD :: MO : DK :: GF : GE :: MF : EN,$$
therefore FD=EN.

Cor. 2. If AI and ai be drawn perpendicular to the transverse axis at its extremities, meeting the tangent GM in I and i, then AI=AF and ai=aF.

Prop. XXIX.

Fig. 70.

If through P and Q, the vertices of two semi-diameters of an hyperbola, there be drawn straight lines PD, QE parallel to one of the asymptotes CN, meeting the other asymptote in D and E, the hyperbolic sector PCQ is equal to the hyperbolic trapezium PDEQ.

Let CQ meet PD in G. The triangles CDP, CEQ are equal (1 cor. 14.) therefore, taking the triangle CDG from both, the triangle CGP is equal to the quadrilateral DEQG; to these add the figure PGQ,

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PGQ, and the hyperbolic sector PCQ is equal to the hyperbolic trapezium PDEQ.

Prop. XXX.

Fig. 71. If from the centre of an hyperbola the segments CD, CE, CH be taken in continued proportion, in one of the asymptotes, and the straight lines DP, EQ, HR be drawn parallel to the other asymptote, meeting the hyperbola in P, Q, R, the hyperbolic areas PDEQ, QEHR are equal.

Through Q draw a tangent to the curve, meeting the asymptotes in K and L: join PR meeting the asymptotes in M and N; draw the semi-diameters CP, CQ, CR, let CQ meet PR in G.

Because QE is parallel to CM, and KQ is equal to QL (2 cor. 13.) CE is equal to EL; and because MC, PD, RH, are parallel, and MP is equal to RN (1 cor. 13.) CD is equal to HN. Now, by hypothesis,

$$\begin{aligned} &CD : CE :: CE : CH, \\ \text{therefore } &NH : LE :: CE : CH; \\ \text{but } &CE : CH :: HR : EQ \ (2 \text{ cor. } 14.) \\ \text{therefore } &NH : LE :: HR : EQ, \\ \text{and by alternation } &NH : HR :: LE : EQ. \end{aligned}$$

Now the angles at H and E are equal, therefore the triangles NHR, LEQ are equiangular, and NR is parallel to LQ; consequently RP is an ordinate to the diameter CQ (8.), and is bisected by it at G; and as CQ bisects all lines which are parallel to KL, and are terminated by the hyperbola, it will bisect the area PQR. Let the equal areas PQG, RQG be taken from the equal triangles PCG, RCG, and there will remain the hyperbolic sectors PCQ, RCQ equal to each other. Therefore (29.) the areas DPQE, EQRH are also equal.

Cor. Hence if CD, CE, CH, &c. any number of segments of the asymptote be taken in continued proportion, the areas DPQE, DPQRH, &c. reckoned from the first line DP, will be in arithmetical progression.

Prop. XXXI. Problem.

Fig. 72, 73. Two straight lines H *a*, B *b*, which bisect each other at right angles in C, being given by position, to describe an hyperbola, of which H *a* shall be the transverse and B *b* the conjugate axis.

First Method. By a Mechanical Description.

Fig. 72. Join AB, and in A *a*, produced, take CF, C *f* each equal to AB; the points F, *f* will be the foci of the hyperbola.

Let one end of a string be fastened at F, and the other to G the extremity of a ruler *f* DG, and let the difference between the length of the ruler and the string be equal to A *a*. Let the other end of the ruler be fixed to the point *f*, and let the ruler be made to revolve about *f* as a centre in the plane in which the axes are situated, while the string is stretched by means of a pin D, so that the part of it between G and D is applied close to the edge of the ruler; the point of the pin will by its motion trace a curve line DAD upon the plane which is one of the hyperbolas required.

If the ruler be made to revolve about the other focus F, while the end of the string is fastened to *f*, the opposite hyperbola will be described by the moving point D; for in either case G *f*—(GD+DF), that is, D *f*—DF is by hypothesis equal to A *a* the transverse axis.

Second Method. By finding any number of points in the curve.

Fig. 73. Find F, either of the foci as before, draw HAK, *h a k* perpendicular to the transverse axis at its extremities, and take AH and AK on each side of the vertex equal to AF, also *a h* and *a k* each equal to *a* F; join H *h* and K *k*; take E any point in A *a*, and through E draw NE *n* parallel to HK, meeting H *h* and K *k* in N and *n*. On F as a centre, with a radius equal to EN or E *n*, let a circle be described meeting N *n* in D and *d*, these will be two points in the hyperbola; and in the same way may any number of points in the hyperbola, or opposite hyperbolas, be found. The reason of this construction is obvious from cor. 1. and 2. Prop. 28.

Prop. XXXII. Problem.

Plate CLXII.

An hyperbola being given by position, to find its axes.

Fig. 74. Let HA *h* be the given hyperbola. Draw two parallel straight lines H *h*, K *k* terminating in either of the opposite hyperbolas, and bisect them at L and M; join LM, and produce it to meet the hyperbola in P; then LP will be a transverse diameter (4 cor. 8.). Let *p* be the point in which it meets the opposite hyperbola, bisect P *p* in C, the point C is the centre (2.). Take D any point in the hyperbola, and on C as a centre with the distance CD describe a circle; if this circle lie wholly without the opposite hyperbolas, then CD must be half the transverse axis (20.), but if not, let the circle meet the hyperbola again in *d*, join D *d*, and bisect it in E, join CE, meeting the opposite hyperbolas in A and *a*, then A *a* will be the transverse axis (5 cor. 8.) for it is perpendicular to D *d* (3. 3. E.) which is an ordinate to A *a*. The other axis will be found by drawing B *b* a straight line through the centre perpendicular to A *a*, and taking CB so that CB^2 may be a fourth proportional to the rectangle AE · E *a*, and the squares of DE and CA, thus CB is half the conjugate axis (19.).

PART

PART IV.

SECT. I.

OF THE CONE AND ITS SECTIONS.

Definitions.

Fig. 75. I. If through the point V, without the plane of the circle ADB, a straight line AVE be drawn, and produced indefinitely both ways, and if the point V remain fixed while the straight line AVE is moved round the whole circumference of the circle, two superficies will be generated by its motion, each of which is called a *Conical Superficies*, and these mentioned together are called *Opposite Conical Superficies*.

II. The solid contained by the conical superficies, and the circle ADB is called a *Cone*.

III. The fixed point V is called the *Vertex of the cone*.

IV. The circle ADB is called the *Base of the cone*.

V. Any straight line drawn from the vertex to the circumference of the base is called a *Side of the cone*.

VI. Any straight line VC drawn through the vertex of the cone, and the centre of the base, is called the *Axis of the cone*.

VII. If the axis of the cone be perpendicular to the base, it is called a *Right cone*.

VIII. If the axis of the cone be not perpendicular to the base, it is called a *Scalene cone*.

Prop. I.

If a cone be cut by a plane passing through the vertex, the section will be a triangle.

Fig. 75. Let ADBV be a cone, of which VC is the axis; let AD be the common section of the base of the cone and the cutting plane; join VA, VD. When the generating line comes to the points A and D, it is evident that it will coincide with the straight lines VA, VD, they are therefore in the surface of the cone, and they are in the plane which passes through the points V, A, D, therefore the triangle VAD is the common section of the cone and the plane which passes through its vertex.

Prop. II.

If a cone be cut by a plane parallel to its base, the section will be a circle, the centre of which is in the axis.

Fig. 75. Let EFG be the section made by a plane parallel to the base of the cone, and VAB, VCD two sections of the cone made by any two planes passing through the axis VC; let EG, HF be the common sections of the plane EFG, and the triangles VAB, VCD. Because the planes EFG, ADB are parallel, HE, HF will be parallel to CA, CD, and

$$AC : EH :: (VC : VH ::) CD : HF,$$

but $AC = CD$, therefore $EH = HF$. For the same reason $GH = HF$, therefore EFG is a circle of which H is the centre and EG the diameter.

Prop. III.

If a scalene cone ADBV be cut through the axis by a plane perpendicular to the base, making the triangle VAB, and from any point H, in the straight line AV, a straight line HK be drawn in the plane of the triangle VAB, so that the angle VHK may be equal to the angle VBA, and the cone be cut by another plane passing through HK perpendicular to the plane of the triangle ABC, the common section HFKM of this plane and the cone will be a circle.

Take any point L in the straight line HK, and through L draw EG parallel to AB, and let EFGM be a section parallel to the base, passing through EG; then the two planes HFKM, EFGM being perpendicular to the plane VAB, their common section FLM is perpendicular to ELG, and since EFGM is a circle (by last prop.) and EG its diameter, the square of FL is equal to the rectangle contained by EL and LG (35. 3. E.); but since the angle VHK is equal to VBA, or VGE, the angles EHK, EGK are equal, therefore the points E, H, G, K, are in the circumference of a circle (21.3.E.), and $HL \cdot LK = EL \cdot LG$ (35. 3. E.)$= FL^2$, therefore the section HFKM is a circle of which HLK is a diameter (35. 3. E.) Fig. 76.

This section is called a *Subcontrary Section*.

Prop. IV.

If a cone be cut by a plane which does not pass through the vertex, and which is neither parallel to the base, nor the plane of a subcontrary section, the common section of the plane and the surface of the cone will be an ellipse, a parabola, or an hyperbola, according as the plane passing through the vertex parallel to the cutting plane falls without the cone, touches it, or falls within it.

Let ADVB be any cone, and let ONP be the common section of a plane passing through its vertex and the plane of the base, which will fall without the base, will touch it, or will fall within it. Fig. 77, 78, 79.

Let FKM be a section of the cone parallel to VPO; through C the centre of the base draw CN perpendicular to OP, meeting the circumference of the base in A and B; let a plane pass through V, A and B, meeting the plane OVP in the line NV, the surface of the cone in VA, VB, and the plane of the section FKM in LK; then because the planes OVP, MKF are parallel, KL will be parallel to VN, and will meet VB one side of the cone in K; it will meet VA the of contact. For if a greater circle be described it will cut off from the diameter a segment greater than its parameter, therefore a part of its circumference on each side of the point of contact will be wholly without the conic section; and as it will also be without the former circle, it will not pass between that circle and the conic section at the point of contact. If, on the other hand, a less circle be discribed, it will cut off from the diameter a segment less than its parameter, therefore a part of its circumference on each side of the point of contact will fall within the conic section; and as it will be within the former circle, it will not pass between that circle and the conic section at the point of contact. Hence (Def. 2.), the circle which cuts off a segment equal to the parameter is the circle of curvature.

Cor. 2. Only one circle can have the same curvature with a conic section in a given point.

Prop. II.

Plate CLXIII.

The circle of curvature at the vertex of the axis of a parabola, or at the vertex of the transverse axis of an ellipse or hyperbola, falls wholly within the conic section; but the circle of curvature at the vertex of the conjugate axis of an ellipse falls wholly without the conic section.

Fig. 85, 86, 87, 88.

Let Pp be the axis of the parabola (fig. 85.), and $PGLg$ the circle of curvature at its vertex, which therefore cuts off from the axis a segment PL equal to the parameter of the axis; because the tangent at the vertex is common to the parabola and circle, the centre of the circle is in Pp. Let DEd an ordinate to the axis meet the circle in G and g; it may be shewn as in last proposition that

$$DE^2 : GE^2 :: LP : LE.$$

But in every position of the ordinate LP is greater than LE, therefore DE^2 is always greater than GE^2, and dE^2 greater than gE^2; therefore the circle is wholly within the parabola. Next let Pp be the transverse axis of an ellipse or hyperbola (fig. 86, 87.), or the conjugate axis of an ellipse (fig. 88.), and $PGLg$ the circle of curvature, then as in the parabola the centre of the circle will be in the axis. Draw Dd an ordinate to the axis meeting the circle in G, g; and take a point V in PL, so that

$$pP : pE :: LP : LV;$$

then it will appear as in last prop. that

$$DE^2 : GE^2 :: LV : LE.$$

Now, when Pp is the transverse axis of an ellipse, (fig. 86.) as Pp is greater than LP, and $Pp : PL :: PE : PV$, therefore PE is greater than PV, and hence LV is always greater than LE, therefore DE^2 is greater than GE^2, also dE^2 greater than gE^2, so that the circle falls wholly within the ellipse.

Again, when Pp is the transverse axis of an hyperbola (fig. 87.) as pE is greater than pP, therefore LV is greater than LP, and consequently greater also than LE; hence DE^2 is greater than GE, and dE^2 is greater than gE^2, and the circle is wholly within the hyperbola.

Lastly, When Pp is the conjugate axis of an ellipse (fig. 88.) as Pp is less than LP, and $Pp : LP :: PE : PV$, therefore, PE is less than PV; hence LV is less than LE, and consequently DE^2 is less than GE^2, also dE^2 less than gE^2, therefore the circle is wholly without the ellipse.

Prop. III.

The circle of curvature at the vertex of any diameter of a conic section, which is not an axis, meets the conic section again in one point only; and between that point and the vertex of the diameter the circle falls wholly within the conic section on the one side, and wholly without it on the other.

Fig. 89, 90.

Case I. Let the conic section be a parabola, of which Pp is a diameter (fig. 89.) and PLK the circle of curvature at the vertex, cutting off from the diameter a segment PL equal to its parameter. Draw LK a diameter of the circle, and draw PO perpendicular to LK, this line will necessarily meet the circle again, let it meet the circle in I; draw IS parallel to the tangent at P, meeting the chord PL in S; then, because IP is perpendicular to LK,

$$IS^2 = PS \cdot PL \text{ (Lemma)};$$

hence (Cor. Prop. 9. Part I.) I is a point in the parabola.

Let DEd an ordinate to the diameter Pp meet the arch PLI anywhere in G; draw GH perpendicular to LK, meeting PL in N, then because LP is equal to the parameter, as in Prop. I. Case I.

$$DE^2 : GE^2 :: LP : LN :: LO : LH.$$

But wherever the point G be taken in the arch PLI, LO is greater than LH, therefore DE^2 is also greater than OE^2; thus the arch PGLI falls wholly within the parabola.

Let the ordinate DEd now meet the arch PKI, anywhere, as at g, draw gh perpendicular to LK, meeting LP in n, then it will appear as before that

$$dE^2 : gE^2 :: LP : Ln :: LO : Lh;$$

but LO is less than Lh, and therefore dE^2 less than gE^2, thus the arch PgKI falls wholly without the parabola.

Case II. Let the conic section be either an ellipse or hyperbola (fig. 90.) of which Pp is a diameter, and PLK the circle of curvature at its vertex, cutting off PL equal to its parameter. Draw LK the diameter of the circle and LQ perpendicular to LK, and let pQ, a tangent to the conic section in p, meet LQ in Q. Join PQ, this line will necessarily meet the circle again; let it meet the circle in I; and draw IS, IT parallel to Qp, QL, meeting PL in S, T. Because of the parallels,

$$pP : pS :: QP : QI :: LP : LT,$$
$$\text{hence } pP : LP :: pS : LT :: pS \cdot SP : LT \cdot SP;$$
$$\text{but } LT \cdot SP = IS^2 \text{ (Lemma)},$$
$$\text{therefore } pP : LP :: pS \cdot SP : SI^2;$$

hence I is a point in the ellipse or hyperbola (13. Prop. Part II. and 21. Prop. Part III.)

Let DEd an ordinate to the diameter Pp meet the arch PLI anywhere in G, if the point L is between

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P and p, or the arch PIL, if L is in Pp produced. Let Dd meet PI in Y, draw GH perpendicular to LK meeting PL in N, and PI in Z, and draw YV parallel to GN meeting LP in V. Because EY, pQ are parallel, also VY, LQ,

$$Pp : pE :: (QP : QY ::)\ LP : LV;$$

now LP being the parameter, we have, as in Case II. Prop. I.

$$DE^2 : GE^2 :: LV : LN :: QY : QZ;$$

but wherever the point G be taken in the arch PGI, QY is greater than QZ, therefore also DE² is greater than GE²; thus the arch PGI falls wholly within the conic section.

Let the ordinate DEd now meet the other arch PgI anywhere in g; draw gh perpendicular to LK meeting LP in n, and IP in z, then it will in like manner appear that

$$dE^2 : gE^2 :: LV : Ln :: QY : Qz;$$

and since in this case QY is less than Qz, therefore dE² is less than gE²; hence the arch PgI is wholly without the conic section.

Prop. IV.

The chord of the circle of curvature which is drawn from the point of contact through the focus of a parabola is equal to that which is cut off from the diameter; and half the radius of the circle is a third proportional to the perpendicular from the focus upon the tangent, and the distance of the point of contact from the focus.

Fig 91. Let PL be the chord cut off from the diameter, and PFH the chord passing through F the focus; draw PM the diameter of the circle, join HL, HM, and draw FK perpendicular to the tangent at P. Because the lines PFH, PL make equal angles with the tangent at P (3. Part I.), the angles PHL, PLH are equal (32. 3. E.) hence PH=PL. Secondly, the triangles FKP, PHM, being manifestly similar,

$$FK : FP :: PH, \text{ or } 4\,PF : PM,$$

hence $FK : FP :: FP : \frac{1}{4}PM$, or $\frac{1}{2}$ the radius.

Cor. 1. Hence the radius is equal to $\frac{2FP^2}{FK}$.

Cor. 2. The radius is also equal to $\frac{2FK^3}{AF^2}$, where AF is the distance of the focus from the vertex of the parabola; for $FP=\frac{FK^2}{AF}$ (11. Part I.)

Cor. 3. Hence also the radius is equal to $\frac{\frac{1}{2}L\cdot FP^3}{FK^3}$, where L denotes the parameter of the axis,

$$\text{for } \frac{2FP^2}{FK}=\frac{2AF\cdot FP^3}{AF\cdot FP\cdot FK}=\frac{\frac{1}{2}L\cdot FP^3}{FK^3}.$$

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Prop. V.

The radius of the circle of curvature at the vertex of any diameter of an ellipse, or hyperbola, is a third proportional to the perpendicular drawn from the centre upon the tangent, and half the conjugate diameter; and the chord which is drawn from the point of contact through the focus is a third proportional to the transverse axis, and conjugate diameter.

Let PL be the chord cut off from the diameter, Fig. 92. and PFH the chord passing through F the focus; draw PM the diameter of the circle, and from the centre O draw OR perpendicular to PL, which will bisect PL in R; join HM, and draw the conjugate diameter QCq meeting PH in N and PM in S, then PS is equal to the perpendicular from the centre C upon the tangent. The triangles PSC, PRO are similar, therefore,

$$PS : PC :: PR : PO,$$
but $PC : CQ :: CQ : PR$ (Def. of param.)
therefore $PS : CQ :: CQ : PO$.

Secondly, the triangles PSN, PHM are similar,

therefore $PN : PS :: PM : PH$;
but $PS : CQ :: (CQ : PO ::)\ Qq : PM$,
therefore $PN : CQ :: Qq : PH$,

or, since PN=AC (Cor. 17. Part II. and Cor. 25. Part III.),

$$Aa : Qq :: Qq : PH.$$

Cor. 1. Hence the radius of curvature is equal to $\frac{CQ^2}{PS}$, and the chord passing through the focus is equal to $\frac{2CQ^2}{AC}$.

Cor. 2. The radius of curvature is also equal to $\frac{CQ^3}{AC\cdot BC}$, for $PS=\frac{AC\cdot BC}{CQ}$ (15. Part II. and 23. Part III.).

Cor. 3. Draw FK from the focus perpendicular to the tangent, and let L denote the parameter of the transverse axis; the radius of curvature is also equal to $\frac{\frac{1}{2}L\times FP^3}{FK^3}$. For the triangles PFK, NPS are manifestly similar, therefore

$$FK : FP :: PS : PN, \text{ or } AC :: BC : CQ;$$

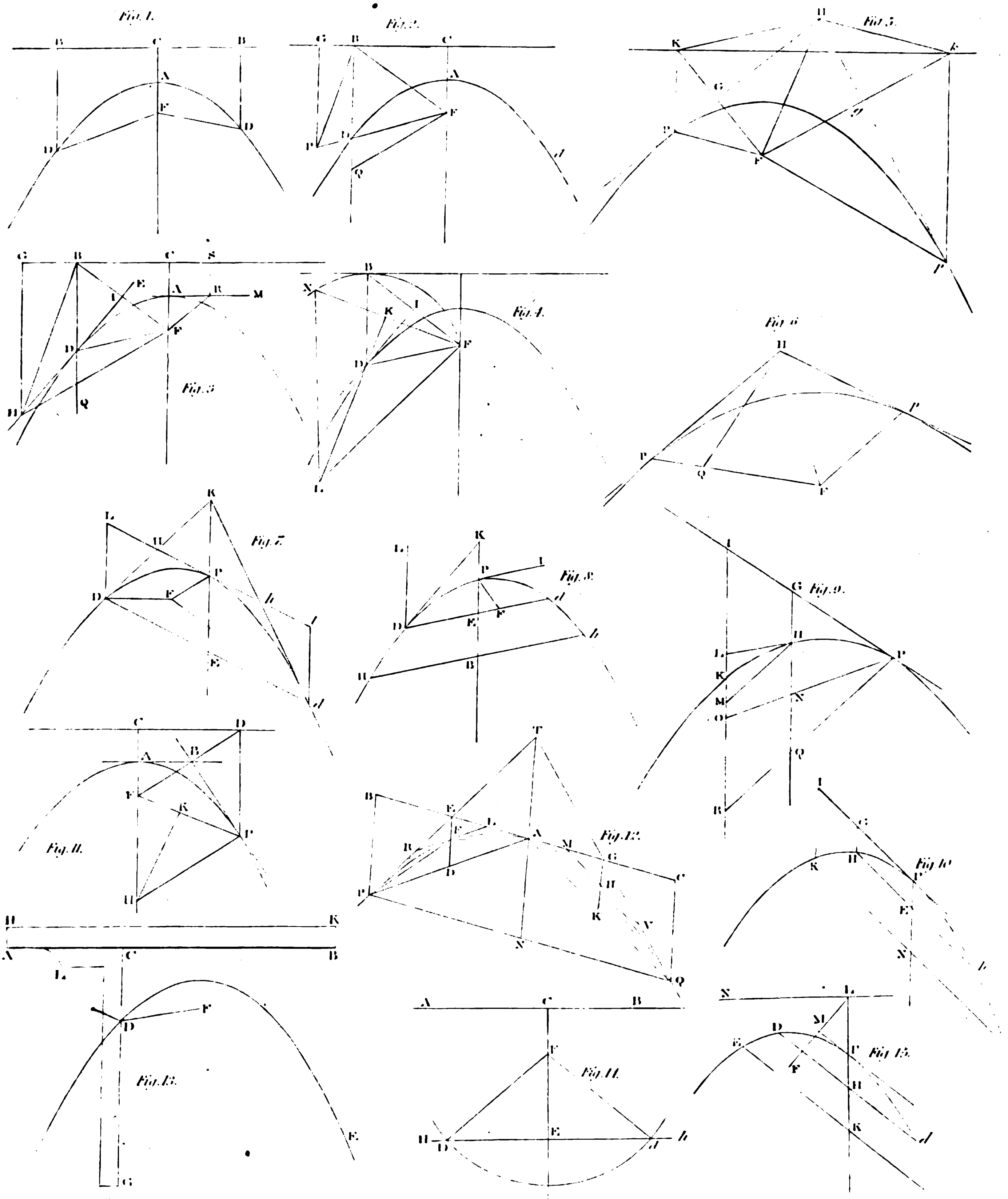
$$\text{hence } CQ=\frac{FP}{FK}\times BC,$$

$$\text{and } \frac{CQ^3}{AC\cdot BC}=\frac{FP^3}{FK^3}=\frac{BC^2}{AC}=\frac{FP^3}{FK^3}\times\tfrac{1}{2}L.$$

This expression for the radius of curvature is the same for all the three conic sections.

CONICHTHYODONTES,

CONIC SECTIONS. PLATE CLVI.



Connecticut. passing through this hilly country, it tumbles over many falls, and affords a vast number of mill seats. The source of the Shetucket is not far from that of Quinnabog. It has the name of Willamantik while passing through Stafford, and between Tolland and Willington, Coventry, and Mansfield. Below Windham it takes the name of Shetucket, and empties as above. These rivers are fed by numberless brooks from every part of the adjacent country. At the mouth of Shetucket is a bridge of timber 124 feet in length, supported at each end by pillars, and held up in the middle by braces on the top, in the nature of an arch.

2 Harbours. The two principal harbours are at New London and New Haven. The former opens to the south. From the light-house, which stands at the mouth of the harbour, to the town, is about three miles; the breadth is three quarters of a mile, and in some places more. The harbour has from five to six fathoms water, a clear bottom, tough ooze, and as far as one mile above the town is entirely secure and commodious for large ships. New Haven harbour is greatly inferior to that of New London. It is a bay which sets up northerly from the sound about four miles. Its entrance is about half a mile wide. It has very good anchorage, and two and a half fathoms at low water, and three fathoms and four feet at common tides. The whole of the sea coast is indented with harbours, many of which are safe and commodious, but are not sufficiently used to merit a description.

3 Climate, soil, and productions. Connecticut, though subject to the extremes of heat and cold in their seasons, and to frequent sudden changes, is very healthful. As many as one in 46 of the inhabitants of Connecticut, who were living in 1774, were upwards of 40 years old. From accurate calculation it is found, that about one in eight live to the age of 70 years and upwards; one in 13 to the age of 80 years, and one in about 30 to the age of 90.

In the maritime towns the weather is variable, according as the wind blows from the sea or land. As you advance into the country, the sea breezes have less effect upon the air, and consequently the weather is less variable. The shortest day is 8 hours and 58 minutes, and the longest 15 hours. The north-west winds, in the winter-season, are often extremely severe and piercing, occasioned by the great body of snow which lies concealed from the dissolving influence of the sun in the immense forests north and north-west. The clear and serene temperature of the sky, however, makes amends for the severity of the weather, and is favourable to health and longevity. Connecticut is generally broken land, made up of mountains, hills, and valleys; and is exceedingly well watered. Some small parts of it are thin and barren. It lies in the fifth and sixth northern climates, and has a strong fertile soil. Its principal productions are Indian corn, rye, wheat in many parts of the state, oats, and barley, which are heavy and good, and of late buck-wheat, flax in large quantities, some hemp, potatoes of several kinds, pumpkins, turnips, pease, beans, &c. &c. fruits of all kinds, which are common to the climate. The soil is very well calculated for pasture and mowing, which enables the farmers to feed large numbers of neat cattle and horses. Actual calculation has evinced, that any given quantity of the best mowing land in Connecticut, produces about twice as much clear profit as the same quantity of the best wheat land in the state of New York. Many farmers, in the eastern part of the state, have lately found their advantage in raising mules, which are carried from the ports of Norwich and New London to the West India islands, and yield a handsome profit. The beef, pork, butter, and cheese, of Connecticut, are equal to any in the world.

4 Trade. The trade of Connecticut is partly with the West India islands, and is carried on in vessels from 60 to 140 tons.' The exports consist of horses, mules, oxen, oak staves, hoops, pine boards, oak planks, beans, Indian corn, fish, beef, pork, &c. Horses, live cattle and lumber, are permitted in the Dutch, Danish, and French ports. Beef and fish are liable to such heavy duties in the French islands, as that little profit arises to the merchant who sends them to their ports. Pork and flour are prohibited. As the ordinance making free ports in the French West India islands extends to all foreigners, the price of molasses and other articles has been greatly enhanced by the English purchasers for Canada and Nova Scotia; so that the trade of Connecticut with the French West India islands is not profitable. Cotton, cocoa, indigo, and sugars, are not permitted to be brought away by Americans. The severity with which these prohibitory laws are administered is such, as that these articles cannot be smuggled.

Connecticut has a large number of coasting vessels employed in carrying the produce of the state to other states.—To Rhode island, Massachusets, and New Hampshire, they carry pork, wheat, corn, and rye. To North and South Carolinas, and Georgia, butter, cheese, salted beef, cyder, apples, potatoes, hay, &c. and receive in return rice, indigo, and money. But as New York is nearer, and the state of the markets always well known, much of the produce of Connecticut, especially of the western parts, is carried there; particularly pot and pearl ashes, flax-seed, beef, pork, cheese, and butter in large quantities. Most of the produce of Connecticut river, from the parts of Massachusets, New Hampshire, and Vermont, as well as of Connecticut, which are adjacent, goes to the same market. Considerable quantities of the produce of the eastern parts of the state are marketed at Boston and Providence.

The value of the whole exported produce and commodities from this state amounted in 1805 to 1,443,729 dollars, and in 1817 only to 604,139 dollars. The high amount at the former period was owing to the extraordinary activity of the neutral trade during the war between France and Britain.

In 1774, the number of shipping in Connecticut was 189; their tonnage 10,317; seafaring men 1162; besides upwards of 20 sail of coasting vessels, which employed about 90 seamen. In 1815, the shipping belonging to the state amounted to 60,102 tons, of which 13,669 belonged to New London, 13,637 to New Haven, 25,950 to Middleton, and 6846 to Fairfield. New London harbour is fortified, and admits of large vessels, the other ports are unfortified.

Though

Though Connecticut has a great extent of sea coast, it is a much less commercial state than Massachusetts.

The number of shipping from the port of New London employed in 1788 in the European and West India trade, was four ships, one snow, 54 brigantines, 32 schooners, and 45 sloops. The number of horses and cattle exported from the district round New London, from the 10th of January 1787, to the 10th of January 1788, was 6917; besides jack asses imported and exported, not included. From 1786 to 1787, the number was 6671; so that the last year exceeded the other 246. From March 1787 to January 1788, 1459 horses, 780 oxen, and 23 cows, were exported from the port of Middleton.

5 Manufactures.

The farmers in Connecticut and their families are mostly clothed in plain, decent, homespun cloth. Their linens and woollens are manufactured in the family way; and although they are generally of a coarser kind, they are of a stronger texture, and much more durable, than those imported from France and Great Britain. Many of their cloths are fine and handsome.

In New Haven is a linen manufactory which flourishes, and one for cotton is about to be established. In East Hartford is a glass-work, a snuff and powder mill, and an iron-work and slitting mill. Iron-works are established also at Salisbury, Norwich, and other parts of the state. At Stafford is a furnace at which are made large quantities of hollow ware and other ironmongery, sufficient to supply the whole state. Paper is manufactured at Norwich, Hartford, New Haven, and in Litchfield county. Nails of every size are made in almost every town and village in Connecticut; so that considerable quantities can be exported to the neighbouring states, and at a better rate than they can be had from Europe. Ironmongery, hats of the best kinds, candles, leather, shoes, and boots, are manufactured in this state. We must not omit to mention wooden dishes and other wooden ware, which are made in vast quantities in Suffield and some few other places, and sold in almost every part of the eastern states. The annual value of the manufactures of this state in 1810 was estimated at 5,900,560 dollars.

It appears from experiments made formerly in this state, that a bushel of sun-flower seed yields a gallon of oil; and that an acre of ground planted with the seed at three feet apart, will yield between forty and fifty bushels of the seed. This oil is as mild as sweet oil, and is equally agreeable with salads, and as a medicine. It may, moreover, be used with advantage in paints, varnishes, and ointments. From its being manufactured in our own country, it may always be procured and used in a fresh state. The oil is pressed from the seed in the same manner that cold-drawn linseed oil is drawn from flax-seed, and with as little trouble. Sweet olive oils sells for six shillings a quart. Should the oil of the sun-flower sell for only two-thirds of that price, the produce of an acre of ground, supposing it to yield only 40 bushels of the seed, will be 32l. a sum far beyond the product of an acre of ground in any kind of grain. The seed is raised with very little trouble, and grows in land of moderate fertility. It may be gathered and shelled, fit for the extraction of the oil, by women and children.

6 Civil divisions and population.

Connecticut is divided into eight counties, viz. Hartford, New Haven, New London, Fairfield, Windham, Litchfield, Middlesex, and Tolland. The counties are subdivided into upwards of 119 townships; each of which is a corporation invested with power to hold lands, choose their own town officers, to make prudential laws, the penalty of transgression not to exceed 20s. and to choose their own representatives to the general assembly. The townships are generally divided into two or more parishes, in each of which is one or more places of public worship.

Connecticut is the most populous, in proportion to its extent, of any of the thirteen states. It is laid out in small farms from 50 to 300 or 400 acres each, which are held by the farmers in fee-simple; and are generally cultivated as well as the nature of the soil will admit. The state is chequered with innumerable roads or highways, crossing each other in every direction. A traveller in any of these roads, even in the most unsettled parts of the state, will seldom pass more than two or three miles without finding a house or cottage, and a farm under such improvements as to afford the necessaries for the support of a family. The whole state resembles a well-cultivated garden; which, with that degree of industry that is requisite for happiness, produces the necessaries and conveniences of life in great plenty.

In 1759, the number of inhabitants in Connecticut was 130,611; in 1774, there were 197,856 souls. In 18 years, the increase was 67,245; from 1774 to 1782, the increase was but 11,294 persons. This comparatively small increase was owing to the destruction of the war, and the numerous emigrations to Vermont. In 1810 the population was 261,942.

The inhabitants are almost entirely of English descent. There are no Dutch, French, or Germans, and very few Scotch or Irish people, in any part of New England.

7 Character, manners, &c.

In addition to what has been already said on these particulars under New England, it may be observed, that the people of Connecticut are remarkably fond of having all their disputes, even those of the most trivial kind, settled according to law. The prevalence of this litigious spirit affords employment and support for a numerous body of lawyers. The number of actions entered annually upon the several dockets in the state, justifies the above observations. That party spirit, however, which is the bane of political happiness, has not raged with such violence in this state as in Massachusets and Rhode Island. Public proceedings have been conducted, generally, and especially of late, with much calmness and candour. The people are well informed in regard to their rights, and judicious in the methods they adopt to secure them.

The clergy, who are numerous, and, as a body, very respectable, have hitherto preserved a kind of aristocratical balance in the very democratical government of the state; which has happily operated as a check upon the overbearing spirit of republicanism. It has been lamented that the unhappy religious disputes which have too much prevailed among some of the clergy, and the too great attention that others have paid to their temporal concerns, to the neglect of their flocks, and an inattention to the qualifications of those who have been admitted to the sacred office, have, heretofore, considerably diminished their influence. It is a pleasing circumstance that the rage for theological disputation is abating; and greater strictness is observed in the admission of candidates to the ministry. Their influence is on the increase; and it is no doubt to be attributed, in part, to their increasing influence, that an evident reformation in the manners of the people of this state has taken place since the peace. In regard to learning and abilities, the clergy, at the present day, are equal to their predecessors at any former period.

8 Religion.

As to ecclesiastical government and discipline, each church is a separate jurisdiction, and claims authority to choose their own minister, to exercise government, and to enjoy gospel ordinances within itself. The churches, however, are not independent of each other; they are associated for mutual benefit and convenience. The associations have power to license candidates for the ministry, to consult for the general welfare, and to recommend measures to be adopted by the churches, but have no authority to enforce them. When disputes arise in churches, councils are called, by the parties, to settle them; but their power is only advisory. There are as many associations in the state as there are counties; and they meet twice in a year. These are all combined in one general association, who meet annually.

All religions that are consistent with the peace of society are tolerated in Connecticut; and a spirit of liberality and catholicism is increasing. There are very few religious sects in this state; the bulk of the people are Congregationalists. Besides these there are Episcopalians and Baptists; and formerly there was a society of Sandimanians at New-Haven; but they are now reduced to a very small number. The Episcopalian churches are respectable, and are under the superintendence of a bishop. The Baptists are increasing here as in the other states. Their congregations, with those in the neighbouring states, meet in associations, by delegation, annually.

9 Chief towns.

There are a great number of very pleasant towns, both maritime and inland, in Connecticut. It contains five incorporated towns or cities. Two of these, Hartford and New-Haven, are the capitals of the state. The general assembly is holden at the former in May, and at the latter in October, annually. See HARTFORD and *New-HAVEN*.

10 Colleges, academies, and schools.

In no part of the world is the education of all ranks of people more attended to than in Connecticut. Almost every town in the state is divided into districts, and each district has a public school kept in it a greater or less part of every year. Somewhat more than one third of the money arising from a tax on the polls and rateable estate of the inhabitants, is appropriated to the support of schools, in the several towns, for the education of children and youth. The law directs that a grammar school shall be kept in every county town through the state.

There is a grammar school at Hartford, and another at New-Haven, supported by a donation of Governor Hopkins. This venerable and benevolent gentleman, in his last will, dated 1657, left in the hands of Theophilus Eaton, Esq. and three others, a legacy of 1324l. "as an encouragement, in these foreign plantations, of breeding up hopeful youths both at the grammar school and college." In 1664, this legacy was equally divided between New-Haven and Hartford; and grammar schools were erected, which have been supported ever since.

At Greenfield there is a respectable academy. At Plainfield is another. This academy has flourished for several years, and furnished a number of students for Yale and Dartmouth colleges. At Norwich and Windham, likewise are academies furnished with able instructors; each of these academies has 60 or 70 scholars. In 1801 Mr P. Bacon bequeathed 30,000 dollars to found an academy in Colchester.

Yale College was founded in 1700, and remained at Killingworth until 1707—then at Saybrook, until 1716, when it was removed and fixed at New-Haven. See *New-HAVEN*. 11

Mines, minerals, and fossils.

On the bank of Connecticut river, two miles from Middleton, is a lead mine, which was wrought during the war at the expence of the state, and was productive. It is too expensive to work in time of peace. Copper mines have been discovered and opened in several parts of the state, but have proved unprofitable, and are much neglected. Iron mines are numerous and productive. Steel ore has been found in the mountains between Woodbury and New Milford. Talcs of various kinds, white, brown, and chocolate-coloured crystals, zinc or speltzer, a semimetal, and several other fossils and metals, have been found in Connecticut. 12

Mode of levying taxes.

All freeholders in the state are required by law to give in lists of their polls and rateable estate, to persons appointed in the respective towns to receive them, on or before the 20th of August annually. These are valued according to law, arranged in proper order, and sent to the general assembly annually in May.

The sum total of the list of the polls and rateable estate of the inhabitants of Connecticut, as brought into the general assembly in May 1787, were as follows:

Sum total of the single list	L.1,484,901	6	4¼
Assessments	47,790	2	9
One quarter of the fourfolds	1,176	9	4
Total	L.1,533,867	18	5¼

On this sum taxes are levied, so much on the pound, according to the sum proposed to be raised. A tax of two-pence on the pound would raise 12,782l. 4s.

The ordinary annual expences of government before the war amounted to near 4000l. sterling, exclusive of that which was appropriated to the support of schools. In 1811 the revenue was 79,192 dollars. 13

Mineral springs.

At Stafford is a medicinal spring, which is said to be a sovereign remedy for scorbutic, cutaneous, and other disorders. At Guilford is a spring, whose water, it is said, when separated from the fountain, will evaporate even when put into a bottle and tightly corked.

It is difficult to say what is the constitution of this for a charter, and their petition was granted. His majesty, on the 23d of April 1662, issued his letters patent under the great seal, ordaining that the colony of Connecticut should for ever hereafter be one body corporate and politic, in fact and in name, confirming to them their ancient grant and purchase, and fixing their boundaries as follows, viz. "All that part of his Majesty's dominions in New England, in America, bounded east by Narragansett river, commonly called *Narragansett bay*, where the river falleth into the sea; and on the north by the line of Massachusets plantation, and on the south by the sea, and in longitude as the line of the Massachusets colony, running from east to west, that is to say, from the said Narragansett bay on the east, to the South sea on the west part, with the islands thereunto belonging." This charter has ever since remained the basis of the government of Connecticut.

Such was the ignorance of the Europeans respecting the geography of America, when they first assumed the right of giving away lands which the God of nature had long before given to the Indians, that their patents extended they knew not where; many of them were of doubtful construction, and very often covered each other in part, and have produced innumerable disputes and mischiefs in the colonies, some of which are not settled to this day. Connecticut construed her charter literally, and passing over New York, which was then in possession of the subjects of a Christian prince, claimed, in latitude and breadth mentioned therein, to the South sea. Accordingly purchases were made of the Indians, on the Delaware river, west of the western bounds of New York, and within the supposed limits of Connecticut charter, and settlements were made thereon by people from, and under the jurisdiction of, Connecticut. The charter of Pennsylvania, granted to William Penn, in 1681, covered these settlements. This laid the foundation for a dispute, which for a long time was maintained with warmth on both sides. The matter was at last submitted to gentlemen chosen for the purpose, who decided the dispute in favour of Pennsylvania. Many, however, still assert the justice of the Connecticut claim. The state of Connecticut has lately ceded to Congress all their lands west of Pennsylvania, except a reserve of 20 miles square. This cession Congress have accepted, and thereby undubitably established the right of Connecticut to the reserve.

The colony of New Haven, though unconnected with the colony of Connecticut, was comprehended within the limits of their charter, and, as they concluded, within their jurisdiction. But New Haven remonstrated against their claim, and refused to unite with them until they should hear from England. It was not until the year 1665, when it was believed that the king's commissioners had a design upon the New England charters, that these two colonies formed a union, which has ever since amicably subsisted between them.

In 1672, the laws of the colony were revised, and the general court ordered them to be printed; and also, that "every family should buy one of the law books; such as pay in silver, to have a book for 12d. such as pay in wheat, to pay a peck and a half a book: and such as pay in pease, to pay 2s. a book, the pease at 3s. the bushel." Perhaps it is owing to this early and universal spread of law books, that the people of Connecticut are to this day so fond of the law. In 1750, the laws of Connecticut were again revised and published in a small folio volume of 258 pages. Dr Douglas observes, that they were the most natural, equitable, plain, and concise code of laws for plantations hitherto extant. There has been a revision of them since the peace, in which they were greatly and very judiciously simplified.

The years 1675 and 1676 were distinguished by the wars with Philip and his Indians, and with the Narragansetts, by which the colony was thrown into great distress and confusion. The inroads of the enraged savages were marked with cruel murders, and with fire and devastation.

In 1684, the charters of Massachusets bay and Plymouth were taken away in consequence of Quo warrantos which had been issued against them. The charter of Connecticut would have shared the same fate had it not been for ——— Wadsworth, Esq. who having very artfully procured it when it was on the point of being delivered up, buried it under an oak tree in Hartford, where it remained until all danger was over, and then was dug up and reassumed.

Connecticut has ever made rapid advances in population. There have been more emigrations from this than from any of the other states, and yet it is at present full of inhabitants. This increase, under the divine benediction, may be ascribed to several causes. The bulk of the inhabitants are industrious, sagacious husbandmen. Their farms furnish them with all the necessaries, most of the conveniences, and but few of the luxuries of life. They of course are generally temperate, and, if they choose, can subsist with as much independence as is consistent with happiness. The subsistence of the farmer is substantial, and does not depend on incidental circumstances, like that of most other professions. There is no necessity of serving an apprenticeship to the business, nor of a large stock of money to commence it to advantage. Farmers, who deal much in barter, have less need of money than any other class of people. The ease with which a comfortable subsistence is obtained, induces the husbandman to marry young. The cultivation of his farm makes him strong and healthful. He toils cheerfully through the day—eats the fruit of his own labour with a gladsome heart—at night devoutly thanks his bounteous God for his daily blessings—retires to rest, and his sleep is sweet. Such circumstances as these have greatly contributed to the amazing increase of inhabitants in this state.

Besides, the people live under a free government, and have no fear of a tyrant. There are no overgrown estates, with rich and ambitious landlords, to have an undue and pernicious influence in the election of civil officers. Property is equally enough divided, and must continue to be so as long as estates descend as they now do. No person is prohibited from voting, or from being elected into office, on account of his poverty. He who has the most merit, not he who has the most money, is generally chosen into public office. As instances of this, it is to be observed, that many of the citizens of Connecticut, from the humble walks of life, have arisen to the first offices in the state, and filled them with is, not by right of arms, but by right of conquest or acquest; under promise of succession made by Edward the Confessor, and a contract entered into by Harold to support his pretensions to that succession; and by old writers, *conquestus*, *acquisitio*, and *perquisitio*, are frequently used as synonymous terms.

Conquest, in the law of nations, is the acquisition of sovereignty by force of arms, by some foreign prince; who reduces the vanquished under his empire. The right of conquest is derived from the laws of war; and when a people is subjected, the conduct of the conqueror is regulated by four kinds of law. First, the law of nature, which dictates whatever tends to self-preservation; secondly, our reason, which teaches us to use others as we would be treated ourselves; thirdly, the laws of political society, to which nature has not assigned any precise boundary; lastly, the law which is derived from the particular circumstances attending the conquest. Thus, a state conquered by another will be treated in one of the four methods following: Either the conqueror will continue it under its own laws, and will only claim the exercise of civil and ecclesiastical sovereignty; or he will impose a new form of government; or he will destroy the frame of their society, and incorporate the inhabitants with others; or he will exterminate them.

CONRAD II. elected emperor of Germany in 1004. He was obliged to take the field against most of the German dukes who had revolted from him; and he put Ernest duke of Suabia under the ban of the empire. This being one of the earliest instances of such a proscription, the formula is inserted here for its singularity. "We declare thy wife a widow, thy children orphans; and we send thee, in the name of the devil, to the four corners of the world." It was in the reign of this prince that the German fiefs became hereditary. He died in 1039.

Conrad III. emperor of Germany in 1138. The duke of Bavaria opposed his election; and being put under the ban of the empire, and deprived of the duchy, he could not survive his disgrace. The margrave of Austria was ordered by the emperor to take possession of Bavaria; but Welst, uncle to the deceased duke attacked him, and was defeated near the castle of Winsburgh; the battle fought upon this occasion is famous in history, as having given rise to the party names of *Guelphs* and *Gibbelines*, afterwards assumed in Italy. The parole of the day with the Bavarians was *Welsti*, from the name of their general; that of the Imperialists *Werblingen* from a small village where Frederic duke of Suabia, their commander, had been nursed: by degrees these names served to distinguish the two parties; and the Italians, who could not accustom themselves to such rough words, formed from them their Guelphs and Gibbelines. He died in 1152.

Conrad of Lichtenau, or Abbas Uspergensis, was author of an Universal Chronology from the creation to 1229, continued by an anonymous writer to Cha. V. He collected a fine library, and died about the year 1240.

CONRADIN, or Conrad junior, son of Conrad IV. was acknowledged emperor by the Gibbelines, who received him in triumph at Rome: but Pope Alexander IV. had published a crusade against this orphan; and Urban VII. his successor, gave the empire to Charles of Anjou, brother to Louis IX. king of France; and the unfortunate youth, though powerfully supported even by the Turks, lost a battle, in which he was taken prisoner, and was beheaded, by order of his base opponent, publicly at Naples in 1229, in the 18th year of his age. In him ended the race of the dukes of Suabia, which had produced several kings and emperors.

CONSANGUINITY, or Kindred, is defined by the writers on these subjects to be, *vinculum personarum ab eodem stipite descendentium;* "the connexion or relation of persons descended from the same stock or common ancestor." This consanguinity is either lineal or collateral.

Lineal consanguinity is that which subsists between persons of whom one is descended in a direct line from the other; as between John Stiles (the *propositus* in the table of consanguinity) and his father, grandfather, great grandfather, and so upwards in the direct ascending line; or between John Stiles and his son, grandson, great grandson, and so downwards in the direct descending line. Every generation in this direct lineal consanguinity, constitutes a different degree, reckoning either upwards or downwards; the father of John Stiles is related to him in the first degree, and so likewise is his son; his grandsire and grandson, in the second; his great grandsire and great-grandson in the third. This is the only natural way of reckoning the degrees in the direct line; and therefore universally obtains, as well in the civil and canon, as in the common law.

The doctrine of lineal consanguinity is sufficiently plain and obvious; but it is, at the first view, astonishing to consider the number of lineal ancestors which every man has, within no very great number of degrees: and so many different bloods is a man said to contain in his veins, as he hath lineal ancestors. Of these he hath two in the first ascending degree; his own parents; he hath four in the second; the parents of his father and the parents of his mother: he hath eight in the third, the parents of his two grandfathers, and of his two grandmothers; and by the same rule of progression, he hath 128 in the seventh; 1024 in the tenth; and at the 20th degree, or at the distance of 20 generations, every man hath above a million of ancestors, as common arithmetic will demonstrate (A). This lineal consanguinity, we may observe, falls strictly within the definition of *vinculum personarum ab eodem stipite descendentium;* since lineal relations are such as descend one from the other, and both of course from the same common ancestors.

Collateral kindred answers to the same description: collateral

(A) This will seem surprising to those who are unacquainted with the increasing power of progressive numbers; but it is palpably evident from the following table of a geometrical progression, in which the first term is 2, and the denominator also 2; or, to speak more intelligibly, it is evident, for that each of us has two ancestors

Consanguinity.

King Henry VII. who slew Richard III. in the battle of Bosworth, was related to that prince in the fifth degree. Let the *propositus*, therefore, in the table of consanguinity, represent King Richard III. and the class marked E, King Henry VII. Now their common stock or ancestor was King Edward III. the *abavus* in the same table: from him to Edmund duke of York, the *proavus*, is one degree; to Richard earl of Cambridge, the *avus*, two; to Richard duke of York, the *pater*, three; to King Richard III. the *propositus*, four; and from King Edward III. to John of Gaunt (A) is one degree; to John earl of Somerset (B) two; to John duke of Somerset (C) three; to Margaret countess of Richmond (D) four; to King Henry VII. (E) five. Which last-mentioned prince, being the farthest removed from the common stock, gives the denomination to the degree of kindred in the canon and municipal law. Though according to the computation of the civilians (who count upwards from either of the persons related, to the common stock, and then downwards again to the other; reckoning a degree for each person both ascending and descending) these two princes were related in the ninth degree: for from King Richard III. to Richard duke of York is one degree; to Richard earl of Cambridge two; to Edmund duke of York three; to King Edward III. the common ancestor, four; to John of Gaunt five; to John earl of Somerset six; to John duke of Somerset seven; to Margaret countess of Richmond eight; to King Henry VII. nine. See the Table of Consanguinity (Plate CLXIV.), wherein all the degrees of collateral kindred to the *propositus* are computed, as far as the tenth of the civilians and the seventh of the canonists inclusive; the former being distinguished by the numeral letters, the latter by the common ciphers.

Consanguinity, Conscience.

CONSANGUINITY and *Affinity*, degrees of, forbidden in marriage. See MARRIAGE and LAW *Index*.

CONSANGUINITY and *Affinity*, an objection against a judge or a witness. See LAW *Index*.

CONSCIENCE, a secret testimony of the soul, whereby it gives its approbation to things that are naturally good, and condemns those that are evil. See MORAL PHILOSOPHY.

A man of integrity will never listen to any reason, or give way to any measure, or be misled by any inducement, against conscience.—The inhabitants of a great town offered Marshal de Turenne 100,000 crowns, upon condition he would take another road, and not march his troops their way. He answered them, "As your town is not in the road I intend to march, I cannot accept the money you offer me."—The earl of Derby, in the reign of Edward III. making a descent

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ancestors has two descendants who increase in a duplicate ratio, it will follow, that the ratio in which all the descendants increase downwards, must be double to that in which the ancestors increase upwards: but we have seen, that the ancestors increase in a duplicate ratio: therefore, the descendants must increase in a double duplicate; that is, in quadruple ratio.

Collateral Degrees.	*Number of Kindred.*
1	1
2	4
3	16
4	64
5	256
6	1024
7	4096
8	16384
9	65536
10	262144
11	1048576
12	4194304
13	16777216
14	67108864
15	268435456
16	1073741824
17	4294967296
18	17179869184
19	68719476736
20	274877906944

This calculation may also be formed by a more compendious process, viz. by squaring the couples, or half the number of ancestors, at any given degree; which will furnish us with the number of kindred we have in the same degree, at equal distance with ourselves from the common stock, besides those at unequal distances. Thus in the tenth lineal degree, the number of ancestors is 1024; its half, or the couples, amounts to 512; the number of kindred in the tenth collateral degree amounts therefore to 262144, or the square of 512. And, if we will be at the trouble to recollect the state of the several families within our own knowledge, and observe how far they agree with this account; that is, whether, on an average, every man has not one brother or sister, four first-cousins, sixteen second cousins, and so on, we shall find, that the present calculation is very far from being overcharged.

Conservator ‖ Consistentes.

servator in that county; and petty constables are, by the common law, conservators, &c. in the first sense, within their own jurisdiction: so are also the coroner and the sheriff within their own county. The king is the principal conservator of the peace within all his dominions: the lord chancellor, lord treasurer, lord high steward, lord marshal, lord high constable, all the justices of the court of king's bench, by their office, and the master of the rolls, by prescription, are general conservators of the peace through the whole kingdom, and may commit breakers of the peace, and bind them in recognizances to keep it.

Conservator of the Truce, and Safe Conducts, was an officer appointed in every sea port, under the king's letters patent. His charge was to inquire of all offences committed against the king's truce, and safe conducts upon the main sea out of the franchises of the cinque-ports, as the admirals were wont to do, and such other things as are declared anno 3 Hen. V. cap. 6.

CONSERVATORIOS, are musical schools established for the instruction of children in the profession of music. There are four of these at Venice, designed for the education of girls, and three at Naples, for the education of boys. It has been suggested that the operation of castration was performed in the conservatorios; but the practice is absolutely prohibited; and the young castrati are brought from Lucia in Puglia: but before that operation is performed, their voices are tried in a conservatorio. The scholars of the Venetian conservatorios have been chiefly celebrated for taste and neatness of execution; and those of Naples have had the reputation of being the first *contrapuntists*, or composers, in Europe.

CONSERVATORY, a term sometimes used for a green-house or ice-house.

CONSERVE, in *Pharmacy*, a form of medicine contrived to preserve the flowers, herbs, roots, or fruits of several simples, as near as possible, to what they are when fresh gathered. See PHARMACY.

CONSIGNMENT, in *Law*, the depositing any sum of money, bills, papers, or commodities, in good hands; either by appointment of a court of justice, in order to be delivered to the persons to whom they are adjudged; or voluntarily, in order to their being remitted to the persons they belong to, or sent to the places they are designed for.

Consignment of Goods, in *Commerce*, is the delivering or making them over to another; thus, goods are said to be consigned to a factor, when they are sent to him to be sold, &c.; or when a factor sends back goods to his principal, they are said to be consigned to him.

CONSISTENCE, in *Physics*, that state of a body wherein its component particles are so connected or entangled among themselves, as not to separate or recede from each other. It differs from continuity in this, that it implies a regard to motion or rest, which continuity does not, it being sufficient to denominate a thing continuous that its parts are contiguous to each other.

CONSISTENTES, in church-history, a kind of penitents who were allowed to assist at prayers, but who could not be admitted to receive the sacrament.

Consistory.

CONSISTORY (*Consistorium*), signifies as much as *prætorium*, a tribunal: it is commonly used for a council-house of ecclesiastical persons, or place of justice in the spiritual court; a session or assembly of prelates. And every archbishop and bishop of every diocese hath a consistory court held before his chancellor or commissary in his cathedral church, or other convenient place of his diocese, for ecclesiastical causes. The bishop's chancellor is the judge of this court, supposed to be skilled in the civil and canon law; and in places of the diocese far remote from the bishop's consistory, the bishop appoints a commissary to judge in all causes within a certain district, and a register to enter his decrees, &c.

CONSISTORY, at Rome, denotes the college of cardinals, or the pope's senate and council, before whom judiciary causes are pleaded. Du Cange derives the word from *consistorium; i. e. locus ubi consistitur;* used chiefly for a vestibule, gallery, or anti-chamber, where the courtiers wait for admission: and so called *à consistente multitudine*.

The consistory is the first court, or tribunal of Rome: it never meets but when the pope pleases to convoke it: the pope presides in it in person, mounted on a magnificent throne, and habited in his *pontificalia;* on the right are the cardinal-bishops and priests, and on the left the cardinal-deacons. The place where it is held, is a large hall in the apostolical palace, where princes and ambassadors of kings are received. The other prelates, prothonotaries, auditors of the rota, and other officers, are seated on the steps of the throne: the courtiers sit on the ground; ambassadors on the right, and consistorial and fiscal advocates behind the cardinals.

Besides the public consistory, there is also a private one, held in a retired chamber, called the *chamber of papegay;* the pope's throne here being only raised two steps high. Nobody is here admitted but the cardinals, whose opinions are collected, and called *sentences*. Here are first proposed and passed all bulls for bishopricks, abbeys, &c. Hence bishopricks and abbeys are said to be consistorial benefices; in regard they must be proposed in the consistory, the annates be paid to the pope, and his bulls taken. Anciently they were elective; but by the concordat, which abolishes elections, they are appointed to be collated by the pope alone, on the nomination of the prince.

CONSISTORY was also the name of a court under Constantine, where he sat in person, and heard causes: the members of this court were called *comites*.

CONSISTORY is also used among the reformed, for a council or assembly of ministers and elders, to regulate their affairs, discipline, &c.

CONSISTORY, or *Court Christian*, in the English laws, is a council of ecclesiastical persons, or the place of justice in an ecclesiastical or spiritual court. Every archbishop and bishop has a consistory court, held before his chancellor or commissary, either in his cathedral, in some chapel, aisle, or portico, belonging thereto; or in some other convenient place of his diocese, for ecclesiastical causes. The spiritual court was anciently, in the time of the Saxons, joined with the county or hundred court; and the original of the consistory court, as divided from those courts, is found in a law of the Conqueror, by the same authority that appoints them. The *petty constables* have two offices united in them, the one ancient, and the other modern. Their ancient office is that of head-borough, tithing-man, or borsholder; which is as ancient as the time of King Alfred: their more modern office is that of constable merely; which was appointed so lately as the reign of Edward III. in order to assist the high constable. And in general the ancient head-boroughs, tithing-men, and borsholders, were made use of to serve as petty constables, though not so generally, but that in many places they still continue distinct officers from the constables. They are all chosen by the jury at the court-leet; or, if no court-leet be held, are appointed by two justices of the peace.

The general duty of all constables, both high and petty, as well as of the other officers, is to keep the king's peace in their several districts; and to that purpose they are armed with very large powers of arresting and imprisoning, of breaking open houses, and the like: of the extent of which powers, considering what manner of men are for the most part upon these offices, it is perhaps very well that they are generally kept in ignorance. One of their principal duties arising from the statute of Winchester, which appoints them, is to keep watch and ward in their respective jurisdictions. Ward, guard, or *custodia*, is chiefly intended of the day-time, in order to apprehend rioters, and robbers on the highways; the manner of doing which is left to the discretion of the justices of the peace and the constable: the hundred being, however, liable, for all the robberies committed therein by day-light, for having kept negligent guard. Watch is properly applicable to the night only (being called among the Saxons *wach't* or *wactu*); and it begins when ward ends, and ends when that begins: for, by the statute of Winchester, in walled towns the gates shall be closed from sun-setting to sun-rising: and watch shall be kept in every borough and town, especially in the summer season, to apprehend all rogues, vagabonds, and night-walkers, and make them give an account of themselves. The constable may appoint watchmen at his discretion, regulated by the custom of the place; and these, being his deputies, have, for the time being, the authority of their principal.

There are also constables denominated from particular places, as constable of the Tower, of Dover castle, of Windsor castle, of the castle of Caernarvon and many other of the castles of Wales; whose office is the same with that of the castellani, or governors of castles.

Constables of London. The city of London is divided into 26 wards, and the wards into precincts, in each of which is a constable. They are nominated by the inhabitants of each precinct on St Thomas's day, and confirmed, or otherwise, at the court of wardmote. After confirmation, they are sworn into their offices at a court of aldermen, on the next Monday after Twelfth day. Such as are chosen into the office, are obliged to place the king's arms, and the arms of the city, over their doors; and if they reside in alleys, at the ends of such alleys toward the streets, to signify that a constable lives there, and that they may be the more easily found when wanted.

Constables to Justices of the Peace, in Scotland, are the proper officers for executing their orders. They have powers to suppress tumults, and to apprehend delinquents and those who can give no good account of themselves, and carry them to the next justice.

CONSTANCE, a strong town of Germany, in the circle of Suabia, now included in the grand duchy of Baden. It has a handsome bridge, and several fine structures, as well sacred as profane. It carries on a great trade, and is well fortified: but its population in 1810 amounted only to 4420. It is famous for a council held here in 1514, when there were three popes; but they were all deposed, and Martin V. was elected in their room. This council caused Jerome of Prague and John Huss to be burnt, though the emperor Sigismund had given them a safe-conduct; in pursuance of this maxim, "that no faith is to be kept with heretics." They likewise condemned the doctrine of Wickliffe, and ordered his bones to be burned 40 years after he was dead. However, the inhabitants now are Protestants. It is seated on a lake of the same name. E. Long. 9. 10. N. Lat. 47. 38.

CONSTANCE, one of the most considerable and beautiful lakes of Switzerland, which separates it from Suabia, except that part where the city of Constance is seated on its side. It is divided into three parts; the upper or largest part is called Boden see, the middle Bodmer see, and the lower part Zeller see. The first is 37 miles long, and its greatest breadth 15 miles. It is deeper in summer than in winter.

CONSTANCY, in a general sense, denotes immutability, or invariableness. In ethics, or when applied to the human mind, the term implies resolution or steadiness, particularly under sufferings and the trials of adversity.

It was the saying of a heathen philosopher That there cannot be imagined upon earth a spectacle more worthy the regard of the Creator intent on his works, than a brave man superior to his sufferings. Nothing indeed can be more noble or honourable than to have courage enough to execute the commands of reason and conscience; to maintain the dignity of our nature, and the station assigned us; and to be proof against poverty, pain, and death itself, so far as not to do any thing that is scandalous or sinful to avoid them. To be thus, is to be great above title or fortune. This argues the soul of a heavenly extraction, and is worthy the offspring of the Deity.

Of this virtue the following example, related in English history, is here selected, as superior perhaps, all circumstances considered, to any other upon record.

Sir William Askew of Kelsay, in Lincolnshire, had several daughters. His second, named *Anne*, had received a genteel education; which, with an agreeable figure and good understanding, rendered her a very proper person to be at the head of a family. Her father, regardless of his daughter's inclination and happiness, obliged her to marry a gentleman who had nothing to recommend him but his fortune, and who was a most bigotted Papist. No sooner was he convinced of his wife's regard for the doctrines of the reformation from popery, than, by the instigation of his priests, in Europe, that good grapes sometimes produce a bad wine; while, on the other hand, bad grapes will yield a good sort of wine: therefore, towards making wine of a certain quality, besides finer materials, there must be certain conditions and circumstances, which, by a diligent and rational investigation, might probably be explored to the great benefit of mankind.

Such as are apprised in what quantities Constantia wine is consumed in Europe, will perhaps think the above calculation of the produce too limited. This, however, Dr Sparmann assures us, is by no means the case; the overplus being the produce of avarice, which, goaded on by the desire of gain, will always hit upon some method of satisfying the demands of luxury and sensuality. The votaries of these, accustomed to be put off with empty sounds, do not seldom drink with the highest relish an imaginary Constantia, with which, however, this liquor, has nothing in common besides the mere name. It is therefore advisable, even at the Cape itself, to take care, that whilst one has a genuine sample given one to taste, one is not made to pay for a made-up red Constantia, which otherwise is in general sold for half the price. The rich quality of this wine is, according to Barrow, owing partly to the situation and soil, and partly to the care in the manufacture; for ripe fruit only is used, and always entirely freed from the stalks.

CONSTANTINA, a strong and considerable town of Africa, in the kingdom of Algiers, and capital of a territory of the same name. It is the largest and strongest place in all the eastern parts; and it is seated on the top of a great rock. There is no way to it but by steps cut out of the rock; and the usual way of punishing criminals here is to throw them down the cliff. Here are a great many Roman antiquities, particularly a triumphal arch. E. Long. 7. 12. N. Lat. 36. 4.

CONSTANTINA, a town of Spain, in Andalusia, and capital of a small territory of the same name, with a castle seated on a mountain. W. Long. 5. 35. N. Lat. 37. 40.

CONSTANTINE, a kingdom of Barbary of that name, in Africa. It is bounded on the north by the Mediterranean, on the east by the kingdom of Tunis, on the south by Bildulgerid, and on the west by the river Sufegmar, which separates it from the kingdom of Bugia. The country is the New Numidia of the ancients, and had its own king; but it is now a province of Algiers.

CONSTANTINE the Great, the first emperor of the Romans who embraced Christianity. His father, Constantius Chlorus, rendered himself famous by his victorious expeditions to Germany and Britain: upon the abdication of Dioclesian, he shared the Roman empire with Galerius Maximinus in 305, and was at that time at York, where he died in 306; having first caused his son Constantine the Great to be proclaimed emperor by his army, and the English. Galerius at first refused to admit Constantine to his father's share in the imperial throne; but after having lost several battles, he consented in 308. Maxentius, who succeeded Galerius, opposed him: but was defeated, and drowned himself in the Tyber. The senate then declared Constantine chief or first Augustus, and Licinius his second associate in the empire, in 412. These princes published an edict, in their joint names, in favour of the Christians; but soon after Licinius, jealous of Constantine's renown, conceived an implacable hatred against him, and renewed the persecutions against the Christians. Thus brought on a rupture between the emperors, and a battle, in which Constantine was victorious. A short peace ensued; but Licinius having shamefully violated the treaty, the war was renewed; when Constantine totally defeating him, he fled to Nicomedia, where he was taken prisoner and strangled in 323. Constantine, now become sole master of the western and eastern empires, immediately formed the plan of establishing Christianity as the religion of the state; for which purpose, he convoked several ecclesiastical councils: but finding he was likely to meet with great opposition from the Pagan interest at Rome, he conceived the design of founding a new city, to be the capital of his Christian empire; see CONSTANTINOPLE. The glory Constantine had acquired by establishing the Christian religion, was tarnished by the part he took in the persecutions carried on by the Arians, towards the close of his reign, against their Christian brethren who differed from them: seduced by Eusebius of Nicomedia, he banished several eminent prelates; soon after which, he died in 337, the 66th year of his age, and 31st of his reign.

As to the character of Constantine, he was chaste, pious, laborious, and indefatigable; a great general, successful in war, and deserving his success by his shining valour and by the brightness of his genius; a protector of arts, and an encourager of them by his beneficence. If we compare him with Augustus, we shall find that he ruined idolatry, by the same precautions and the same address that the other used to destroy liberty. Like Augustus, he laid the foundation of a new empire; but possessed of less political skill, he could not give it the same stability: he weakened the body of the state by adding to it, in some measure, a second head in the foundation of Constantinople; and transporting the centre of motion and strength too near the eastern extremity, he left without heat, and almost without life, the western parts, which soon became a prey to the barbarians. The Pagans were too much his enemies to do him justice. Eutropius says, that in the former part of his reign he was equal to the most accomplished princes, and in the latter to the meanest. The younger Victor, who makes him to have reigned more than 31 years, pretends, that in the first 10 years he was a hero; in the 12 succeeding ones a robber; and in the 10 last a spendthrift. It is easy to perceive, with respect to these two reproaches of Victor's, that the one relates to the riches which Constantine took from idolatry, and the other to those with which he loaded the church.

CONSTANTINE, emperor of the East in 912, left the care of the empire to his wife Helena, who loaded the people with taxes, and sold all the offices in church and state to the highest bidders; while the emperor employed himself in reading, writing, and the fine arts, till he became as good an architect and painter as he was a bad prince: he wrote several biographical and geographical works, which would have done honour to his name, if he had not neglected his duty to compose them. He died in 959.

Constantine, Constantinople.

CONSTANTINE, *Dracoses*, the son of Emmanuel Paleologus, was placed on the throne by Sultan Amurath in 1448. But Mahomet II. his successor, resolving to dethrone him, laid siege to Constantinople by sea and land, and took it by assault in 1453, after it had held out 58 days. The unfortunate emperor seeing the Turks enter the breaches, threw himself into the midst of the enemy, and was cut to pieces; the children of the imperial house were massacred by the soldiers; and the women reserved to gratify the lust of the conqueror; and thus terminated the dynasty of the Constantines, 1123 years after its establishment at Constantinople.

CONSTANTINE, *Robert*, a learned physician, born at Caen, taught polite literature in that city; and acquired great reputation by his skill in the Greek language, in history, and in medicine. He died in 1603, aged 103. He wrote a dictionary in Greek and Latin, and other works, which are esteemed.

1
Removing the imperial seat to this city the cause of the decline of the western empire.

CONSTANTINOPLE, the modern name of the city of BYZANTIUM in Thrace. It was enlarged and beautified by the Roman emperor Constantine the Great, in the year 330. At the same time he transferred thither the seat of the empire; and this removal is generally thought to have been one of the principal causes of the sudden decline of the western empire after this period.

2
Constantine defeats the Goths,

In the year 332, the Sarmatians implored Constantine's assistance against the Goths, who had made an irruption into their territories, and destroyed every thing with fire and sword. The emperor readily granted their request, and gained a complete victory. Near 100,000 of the enemy perished, either in the battle, or after it with hunger and cold. In consequence of this overthrow, the Goths were obliged to sue for peace; but the ungrateful Sarmatians no sooner found themselves delivered from their enemies, than they turned their arms against their benefactor, and ravaged the provinces of Mæsia and Thrace. The emperor,

3
and the Sarmatians.

receiving intelligence of this treachery, returned with incredible expedition, cut great numbers of them in pieces, and obliged the rest to submit to what terms he was pleased to impose.

4
Is highly respected.

Constantine seems to have been a prince very highly respected, even by far distant nations. In 333, according to Eusebius, ambassadors arrived at Constantinople from the Blemyes, Indians, Ethiopians, and Persians, courting his friendship. They were received in a most obliging manner; and learning from the ambassadors of Sapor king of Persia, that there were great numbers of Christians in their master's dominions, Constantine wrote a letter in their behalf to the Persian monarch.

Next year, the Sarmatians being again attacked by the Goths, found themselves obliged to set at liberty and arm their slaves against them. By this means they indeed overcame the Goths: but the victorious

5
He takes a number of Sarmatians into his army.

slaves turning their arms against their masters, drove them out of the country. This misfortune obliged them, to the number of 300,000, to apply for relief to the Roman emperor, who incorporated with his legions such as were capable of service; and gave settlements to the rest in Thrace, Scythia, Macedon, and Italy. This was the last remarkable action of Constantine the Great. He died on May 15. 337, having divided the empire among his children and nephews, in the following manner. Constantine his eldest son, had Gaul, Spain, and Britain: Constantius, the second, had Asia, Syria, and Egypt; and Constans, the youngest, Illyricum, Italy, and Africa. To his nephew Dalmatius, he gave Thrace, Macedon, and Achaia; and to King Annibalianus, his other nephew, Armenia Minor, Pontus, Cappadocia, and the city of Cæsarea, which he desired might be the capital of his kingdom.

Constantinopolitan history.

6
His death, and division of the empire.

7
All his relations murdered except his three sons and two nephews.

After the death of Constantine, the army and senate proclaimed his three sons emperors, without taking any notice of his two nephews, who were soon after murdered, with Julius Constantius the late emperor's brother, and all their friends and adherents. Thus the family of Constantine was at once reduced to his three sons, and two nephews Gallus and Julian, the sons of Julius Constantius; and of these the former owed his life to a malady, from which no one thought he could recover; and the latter to his infancy, being then at most about seven years of age. The three brothers divided among themselves the dominions of the deceased princes; but did not long agree together. In 340, Constantine having in vain solicited Constans to yield part of Italy to him, raised a considerable army; and under pretence of marching to the assistance of his brother Constantius, who was then at war with the Persians, made himself master of several places in Italy. Hereupon Constans detached part of his army against him; and Constantine, being drawn into an ambuscade near Aquileia, was cut off with his whole forces. His body was thrown into the river Ansa; but being afterwards discovered, was sent to Constantinople, and interred there near the tomb of his father.

8
Constantine invades the dominions of Constans.

9
Is defeated and killed.

10
Constans sole master of the west.

By the defeat and death of his brother, Constans remained sole master of all the western part of the empire, in the quiet possession of which he continued till the year 350. This year Magnentius, the son of one Magnus, a native of Germany, finding Constans despised by the army on account of his indolence and inactivity, resolved to murder him, and set up for himself. Having found means to gain over the chief officers of the army to his designs, he seized on the imperial palace at Autun, and distributed among the populace what sums he found there; which induced not only the city, but the neighbouring country, to espouse his cause. But Constans being informed of what had passed, and finding himself unable to resist the usurper, fled towards Spain. He was overtaken, however, by Gaiso, whom Magnentius had sent after him with a chosen body of troops, and despatched with many wounds, at Helena, a small village situated near the foot of the Pyrenees.

11
Magnentius revolts against him.

12
Constans murdered.

Thus Constantius acquired a right to the whole Roman empire; though one-half of it was seized by Magnentius after the murder of Constans. The former had been engaged in a war with the Persians, in which little advantage was gained on either side; but the Persians now giving no more disturbance, the emperor marched against the usurpers in the west. Besides Magnentius, there were at that time two other pretenders to the western empire. Veteranio, general of the foot in Pannonia, had, on the first news of the death of Constans, caused himself to be proclaimed emperor by the legions under his command. He was

13
Three pretenders to the empire.

In the mean time, however, Dynames having thought proper to forge another letter, the fraud was discovered, and an inquiry set on foot, which brought to light the whole matter. Sylvanus was now declared innocent, and letters sent to him by the emperor confirming him in his post; but these were scarce gone, when certain news arrived at the court of Sylvanus having revolted, and caused himself be proclaimed emperor. Constantius, thunderstruck at this news, dispatched against him Ursicinus, an officer of great integrity, as well as valour and experience in war; who forgetting his former character, pretended to be Sylvanus's friend, and thus found means to cut him off by treachery.

32 Is murdered.

33 Gaul ravaged by the barbarians.

The barbarians, who had hitherto been kept quiet by the brave Sylvanus, no sooner heard of his death, than they broke into Gaul with greater fury than ever. They took and pillaged above forty cities, and among the rest Cologne, which they levelled with the ground. At the same time the Quadi and Sarmatians entering Pannonia, destroyed every thing with fire and sword. The Persians also, taking advantage of the absence of Ursicinus, overran, without opposition, Armenia and Mesopotamia; Prosper and Mausonianus, who had succeeded that brave commander in the government of the east, being more intent upon pillaging than defending the provinces committed to their care. Constantius not thinking it advisable to leave Italy himself, resolved at last to raise his cousin Julian, the brother of Gallus, to the dignity of Cæsar. Julian seems to have been a man of very extraordinary talents; for though before this time he had been entirely buried in obscurity, and conversed only with books, no sooner was he put at the head of an army than he behaved with the same bravery, conduct, and experience, as if he had been all his life bred up to the art of war. He was appointed governor of Gaul; but before he set out, Constantius gave him in marriage his sister Helena, and made him many valuable presents. At the same time, however, the jealous emperor greatly limited his authority; gave him written instructions how to behave; ordered the generals who served under him to watch all his actions no less than those of the enemy; and strictly enjoined Julian himself not to give any largesses to the soldiery.

34 Julian created Cæsar.

Julian set out from Milan on the first of December 355, the emperor himself accompanying him as far as Pavia, from whence he pursued his journey to the Alps, attended only by 360 soldiers. On his arrival at Turin he was first acquainted with the loss of Cologne, which had been kept concealed from the emperor. He arrived at Vienna before the end of the year, and was received by the people of that city and the neighbourhood with extraordinary joy.

35 He sets out for Gaul.

In 356, the barbarians besieged *Autun;* to relieve which place, Julian marched with what forces he could raise. When he came there, he found the siege raised: on which he went in pursuit of the barbarians to Auxerre, crossing with no small danger thick woods and forests, from Auxerre to *Troies*. On his march he was surrounded on all sides by the barbarians, who moved about the country in great bodies; but he put them to flight with a handful of men, cut great numbers of them in pieces, and took some prisoners. From Troies he hastened to Rheims, where the main body of the army, commanded by Marcellus, waited his arrival. Leaving Rheims, he took his route towards Decempagi, now *Dieuse*, on the Seille in Lorrain, with a design to oppose the Germans who were busy in ravaging that province. But the enemy attacking his rear unexpectedly, would have cut off two legions, had not the rest of the army, alarmed at the sudden noise, turned back to their assistance. A few days afterwards he defeated the Germans, though with great loss to his own army; the victory, however, opened him a way to Cologne. This city he found abandoned by the barbarians. They had neglected to fortify it: but Julian commanded the ancient fortifications to be repaired with all possible expedition, and the houses to be rebuilt; after which he retired to Sens, and there took up his winter-quarters. This year also Constantius entered Germany on the side of Rhætia, laid waste the country far and wide; and obliged the barbarians to sue for peace, which was readily granted. The same year he enacted two laws; by one of which it was declared capital to sacrifice, or pay any kind of worship, to idols; the other, granting the effects of condemned persons to belong to their children and relations within the third degree, except in cases of magic and treason; but this last one he revoked two years after.

36 Defeats the barbarians.

37 Repairs the fortifications of Cologne.

38 Idolatry declared capital by Constantius.

In the beginning of the year 357, the barbarians besieged Julian a whole month in Sens; Marcellus, the commander in chief, never once offering to assist him. Julian, however, so valiantly defended himself with the few forces he had, that the barbarians at last retired. After this, Constantius declared Julian commander in chief of all the forces in Gaul; appointing under him one *Severus*, an officer of great experience, and of a quite different disposition from Marcellus. On his arrival in Gaul, Julian received him with great joy, raised new troops, and supplied them with arms which he luckily found in an old arsenal. The emperor, resolving at all events to put a stop to the terrible devastations committed by the barbarous nations, chiefly by the Alemans, wrote to Julian to march directly against them. At the same time he sent Barbatio, who had been appointed general in place of Sylvanus, with a body of 25 or 30,000 men, out of Italy, in order to inclose the enemy between two armies. The Leti, however, a German nation, passing between the armies, advanced as far as Lyons, hoping to surprise that wealthy city; but meeting with a warmer reception than they expected, contented themselves with ravaging the country all round it. On the first notice of this expedition, Julian detached strong parties to guard the passages through which he knew the barbarians must return. Thus they were all cut off except those who marched near the camp of Barbatio; who was so far from cutting off their retreat, that he complained by a letter to Constantius of some officers for attempting it. These officers, among whom was Valentinian, afterwards emperor of the West, were, by the order of Constantius, cashiered for their disobedience. The other barbarians either fortified themselves in the countries which they had seized, stopping up all the avenues with huge trees, or took shelter in the islands formed by the Rhine. Julian resolved first to attack the latter; and with this view demanded some boats of Barbatio: but he, instead of complying

39 The Leti cut off by Julian.

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right by force of arms. This letter was presented to Constantius wrapped up in a piece of white silk; but he, without entering into any negotiation with the ambassador, wrote a letter to Sapor, in which he told him, that as he had maintained the Roman dominions in their full extent, when he was possessed only of the east, he could not suffer them to be curtailed now when he was master of the whole empire. In a few days, however, he sent another letter, with rich presents; being very desirous at least to put off the war till he had secured the northern provinces against the incursions of the barbarians, that he might then employ all the forces of the empire against so formidable an enemy. This embassy proved unsuccessful, as did also another which was sent soon after. The last ambassadors were imprisoned as spies, but afterwards dismissed unhurt.

49 A law against magicians, &c.

By a law of Constantius dated in 358, all magicians, augurs, astrologers, and pretenders to the art of divination, were declared enemies to mankind; and such of them as were found in the court either of the emperor or of Julian, he commanded to be put to the torture, and specified what torments they were to undergo.

In 359, Julian continued his endeavours for relieving the province of Gaul, which had suffered so much from the incursions of the barbarians. He erected magazines in different places, visited the cities which had suffered most, and gave orders for repairing their walls and fortifications properly. He then crossed the Rhine, and pursued the war in Germany with great success, insomuch that the barbarians submitted to such terms as he pleased to impose.

50 Treachery of the Limigantes.

In the mean time, the emperor, having received intelligence that the Limigantes had quitted the country in which he had placed them, hastened to the banks of the Danube, in order to prevent their entering Pannonia. On his arrival he sent deputies, desiring to know what had induced them to abandon the country which had been allotted them. The Limigantes answered, in appearance with the greatest submission imaginable, that they were willing to live as true subjects of the empire in any other place; but that the country he had allotted them was quite uninhabitable, as they could demonstrate if they were but allowed to cross the river, and lay their complaints before him. This request was granted; but while he ascended his tribunal, the barbarians unexpectedly fell upon his guards sword in hand, killed several of them, and the emperor with difficulty saved himself by flight.

51 They are all cut off.

The rest of the troops, however, soon took the alarm, and surrounding the Limigantes, cut them all off to a man.

52 The heathens cruelly persecuted.

This year Constantius instituted a court of inquisition against all those who consulted heathen oracles. Paulus Catena, a noted and cruel informer, was despatched into the east to prosecute them; and Modestus, then count of the east, and equally remarkable for his cruelty, was appointed judge. His tribunal was erected at Scythopolis in Palestine, whither persons of both sexes, and of every rank and condition, were daily dragged in crowds from all parts, and either confined in dungeons, or torn in pieces in a most cruel and barbarous manner by racks, or publicly executed.

53 The Persians begin hostilities.

In 359, Sapor king of Persia began hostilities, being encouraged thereto by the absence of Ursicinus, whom the emperor had recalled, and appointed in his room one Sabinianus, a person very unfit for such an office. During this campaign, however, he made very little progress; having only taken two Roman forts, and destroyed the city of Amida, the siege of which is said to have cost him 30,000 men. On the first news of the Persian invasion, Constantius had thought proper to send Ursicinus into the east; but his enemies prevented him from receiving the supplies necessary for carrying on the war; so that he found it impossible to take any effectual means for stopping the progress of the Persians. On his return, he was unexpectedly charged with the loss of Amida, and all the disasters that had happened during the campaign. Two judges were appointed to inquire into his conduct; but they, being creatures of his enemies, left the matter doubtful. On this Ursicinus was so much exasperated, that he appealed to the emperor, and in the heat of passion let fall some unguarded expressions, which being immediately carried to the emperor, the general was deprived of all his employments.

54 Constantius marches in person against them.

Constantius resolved to march next year in person against the Persians; but in the mean time dreading to encounter so formidable an enemy, he applied himself wholly to the assembling of a mighty army, by which he might be able fully to cope with them. For this purpose he wrote to Julian to send him part of his forces, without considering that by so doing he left the province of Gaul exposed to the ravages of the barbarians. Julian resolved immediately to comply with the emperor's orders; but at the same time to abdicate the dignity of Cæsar, that he might not be blamed for the loss of the province. Accordingly he suffered the best soldiers to be draughted out of his army.

55 Julian proclaimed emperor.

They were, however, very unwilling to leave him, and at last proclaimed him emperor. Whether this was done absolutely against Julian's consent or not is uncertain; but he wrote to the emperor, and persuaded the whole army also to send a letter along with his, in which they acquainted Constantius with what had happened, and entreated him to acknowledge Julian as his partner in the empire. But this was positively refused by Constantius, who began to prepare for war. Julian then, designing to be before-hand with the emperor, caused his troops to take an oath of allegiance to himself, and with surprising expedition made himself master of the whole country of Illyricum, and the important pass separating that country from Thrace. Constantius was thunderstruck with this news; but hearing that the Persians had retired, he marched with all his force against his competitor. On his arrival at Tarsus in Cilicia, he was seized with a feverish distemper, occasioned chiefly by the uneasiness and perplexity of his mind.

56 Constantius marches against him, but dies.

He pursued his march, however, to Mosucrene, a place on the borders of Cilicia, at the foot of Mount Taurus. Here he was obliged to stop by the violence of his disorder, which increased every day, and at last carried him off on the 13th of November 361, in the 45th year of his age.

57 Julian restores the heathen religion.

By the death of Constantius, Julian now became master of the whole Roman empire without a rival. He had been educated in the Christian religion; but secretly apostatized from it long before, and as soon as he saw himself master of Illyricum, openly avowed his apostasy, and caused the temples of the gods to be opened.

Constantinopolitan history. had survived the late defeat, kept within the strong holds of Thrace, without daring so much as to look abroad, much less face the victorious enemy, who moved about the country in great bodies. But notwithstanding this critical situation, the historians of those times give us no account of the transactions of the year 379. Many great battles indeed are said to have been fought, and as many victories obtained by Theodosius; but the accounts of these are so confused and contradictory, that no stress can be laid upon them.

In the month of February 380, Theodosius was seized with a dangerous malady, so that Gratian found himself obliged to carry on the war alone. This emperor, apprehending that the neighbouring barbarians might break into some of the provinces, concluded a peace with the Goths, which was confirmed by Theodosius on his recovery. The treaty was very advantageous to the barbarians; but they disregarding all their engagements, no sooner heard that Gratian had left Illyricum, than they passed the Danube, and breaking into Thrace and
80 Pannonia, advanced as far as Macedon, destroying all
The Goths defeated by Theodosius. with fire and sword. Theodosius, however, drawing together his forces, marched against them; and, according to the most respectable authorities, gained a complete victory; though Zosimus relates, that he was utterly defeated.

The following year, Athanaric, the most powerful of all the Gothic princes, being driven out by a faction at home, recurred to Theodosius, by whom he was received with great tokens of friendship. The emperor himself went out to meet him, and attended him with his numerous retinue into the city. The Gothic prince died the same year; and Theodosius caused him to be buried after the Roman manner with such pomp and solemnity, that the Goths, who attended him in his flight, returned home with a resolution never to molest the Romans any more. Nay, out of gratitude to the emperor, they took upon them to guard the banks of the Danube, and prevent the empire from being invaded on that side.

81 Gratian murdered by Maximus. In 383, one Maximus revolted against Gratian in Britain; and in the end, having got the unhappy emperor into his power, caused him to be put to death, and assumed the empire of the West himself. Gratian had divided his dominions with his brother Valentinian, whom he allowed to reign in Italy and West Illyricum, reserving the rest to himself. Maximus, therefore, immediately after his usurpation, sent deputies to Theodosius, assuring him that he had no designs on the dominions of Valentinian. As Theodosius at that time found himself in danger from the barbarians, he not only forbore to attack Maximus after this declaration, but even acknowledged him for his partner in the empire. It was not long, however, before the ambition of the usurper prompted him to break his promise. In 387, he passed the Alps on a sudden; and meeting with no opposition, marched to
82 Who invades the dominions of Valentinian. Milan where Valentinian usually resided. The young prince fled first to Aquileia; and from thence to Thessalonica, to implore the protection of Theodosius. The latter, in answer to Valentinian's letter, informed him, that he was not at all surprised at the progress Maximus had made, because the usurper had protected, and Valentinian had persecuted, the orthodox Christians. At last he prevailed on the young prince to renounce the Arian heresy which he had hitherto maintained; after which Theodosius promised to assist him with all the forces of the East. At first, however, he sent messengers to Maximus, earnestly exhorting him to restore the provinces he had taken from Valentinian, and content himself with Gaul, Spain, and Britain. But the usurper would hearken 83
to no terms. This very year he besieged and took His success. Aquileia, Quaderna, Bononia, Mutina, Rhegium, Placentia, and many other cities in Italy. The following year he was acknowledged in Rome, and in all the provinces of Africa. Theodosius, therefore, finding a war inevitable, spent the remaining months of this and the beginning of the following year in making the necessary preparations. His army consisted chiefly of Goths, Huns, Alans, and other barbarians, whom he was glad to take into the service in order to prevent their raising disturbances on the frontiers. He defeated Maximus 84 Defeated and put to death by Theodosius.
in two battles, took him prisoner, and put him to death. The usurper had left his son Victor, whom he created Augustus, in Gaul, to awe the inhabitants in his absence. Against him the emperor despatched Arbogastes, who took him prisoner after having dispersed the troops that attended him, and put him to death. The victory was used afterwards by Theodosius with great clemency and moderation.

In 389, Theodosius took a journey to Rome; and, according to Prudentius, at this time converted the senate and people from idolatry to Christianity. The 85 The temples in Alexandria, and throughout all Egypt destroyed
next year was remarkable for the destruction of the celebrated temple of Serapis in Alexandria; which, according to the description of Ammianus Marcellinus, surpassed all others in the world, that of Jupiter Capitolinus alone excepted. The reason of its being now destroyed was as follows. Theophilus, bishop of Alexandria, having begged and obtained of the emperor an old temple, formerly consecrated to Bacchus, but then ruined and forsaken, with a design to convert it into a church, the workmen found among the rubbish several obscene figures, which the bishop, to ridicule the superstition of the Heathens, caused to be exposed to public view. This provoked the Pagans to such a degree, that they flew to arms; and falling unexpectedly upon the Christians, cut great numbers of them in pieces. The latter, however, soon took arms in their own defence; and being supported by the few soldiers who were quartered in the city, began to repel force by force. Thus a civil war was kindled, and no day passed without some encounter. The Pagans used to retire to the temple of Serapis; and thence sallying out unexpectedly seized on such Christians as they met, and dragging them into the temple, either forced them by the most exquisite torments to sacrifice to their idol, or if they refused, racked them to death. As soon as they expected to be attacked by the emperor's troops, they chose a philosopher named *Olympus* for their leader, with a design to defend themselves to the last extremity. The emperor, however, would not suffer any punishment to be inflicted upon them for the lives of those they had taken away, but readily forgave them; however, he ordered all the temples of Alexandria to be immediately pulled down, and commanded the bishop to see his orders put in execution. The Pagans no sooner heard that the

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emperor was acquainted with their proceedings than they abandoned the temple, which was in a short time destroyed by Theophilus; nothing being left except the foundations, which could not be removed on account of the extraordinary weight and size of the stones. Not satisfied with the destruction of the Alexandrian temples, the zealous bishop encouraged the people to pull down all the other temples, oratories, chapels, and places set apart for the worship of the Heathen gods throughout Egypt, and the statues of the gods themselves to be either burnt or melted down. Of the innumerable statues which at that time were to be found in Egypt, he is said to have spared but one, viz. that of an ape, in order to expose the Pagan religion to ridicule. On his return to Constantinople, Theodosius ordered such temples as were yet standing to be thrown down, and the Arians to be everywhere driven out of the cities.

86 Valentinian murdered by Arbogastes, who raises Eugenius to the empire.

In 392, Valentinian, emperor of the West, was treacherously murdered by Arbogastes his general; who, though he might afterwards have easily seized on the sovereignty himself, chose to confer it upon one Eugenius, and to reign in his name. This new usurper, though a Christian, was greatly favoured by the Pagans, who were well apprised that he only bore the title of emperor, while the whole power lodged in Arbogastes, who pretended to be greatly attached to their religion. The aruspices began to appear anew, and informed him that he was destined to the empire of the whole world; that he would soon gain a complete victory over Theodosius, who was as much hated as Eugenius was beloved by the gods, &c. But though Eugenius seemed to favour the Pagans, yet in the very beginning of his reign he wrote to St Ambrose. The holy man did not answer his letter till he was pressed by some friends to recommend them to the new prince; and then he wrote to this infamous usurper with all the respect due to an emperor. Soon after his accession to the empire, Eugenius sent deputies to Theodosius; and they are said to have been received by him in a very obliging manner. He did not, however, intend to enter into any alliance with this usurper, but immediately began his military preparations. In 394, he set out from Constantinople, and was at Adrianople on the 15th of June that year. He bent his march through Dacia, and the other provinces between Thrace and the Julian Alps, with a design to force the passes of these mountains, and break into Italy before the army of Eugenius was in a condition to oppose him. On his arrival at the Alps, he found these passes guarded by Flavianus prefect of Italy, at the head of a considerable body of Roman troops. These were utterly defeated by Theodosius, who thereupon crossed the Alps and advanced into Italy. He was soon met by Eugenius; and a bloody battle ensued, without any decisive advantage on either side. The next day the emperor led his troops in person against the enemy, utterly defeated them, and took their camp. Eugenius was taken prisoner by his own men, and brought to Theodosius, who reproached him with the murder of Valentinian, with the calamities he had brought on the empire by his unjust usurpation, and with putting his confidence in Hercules, and not in the true God; for on his chief standard he had displayed the image of that fabulous hero. Eugenius begged earnestly for his life: but while he lay prostrate at the emperor's feet, his own soldiers cut off his head, and carrying it about on the point of a spear, showed it to those in the camp who had not yet submitted to Theodosius. At this they were all thunderstruck: but being informed that Theodosius was ready to receive them into favour, they threw down their arms and submitted. After this, Arbogastes, despairing of pardon, fled to the mountains; but being informed that diligent search was made for him, he laid violent hands on himself. His children, and those of Eugenius, took sanctuary in churches; but the emperor not only pardoned, but took the opportunity of converting them to Christianity, restored them to their paternal estates, and raised them to considerable employments in the state. Soon after this, Theodosius appointed his son Honorius emperor of the West, assigning him for his share Italy, Gaul, Spain, Africa, and West Illyricum. The next year, as he prepared for his return to Constantinople, he was seized with a dropsy, owing to the great fatigues he had undergone during the war. As soon as he perceived himself to be in danger, he made his will; by which he bequeathed the empire of the East to Arcadius, and confirmed Honorius in the possession of the West. He likewise confirmed the pardon which he had granted to all those who had borne arms against him, and remitted a tribute which had proved very burdensome to the people; and charged his two sons to see these points of his will executed. He died at Milan on the 17th of January 395, in the 16th year of his reign and 50th of his age.

87 Eugenius defeated, taken prisoner, and put to death.

88 Arbogastes lays violent hands on himself.

89 Theodosius dies.

90 Empire usurped by Basiliscus.

From the time of Theodosius to the time when the Roman empire in the west was totally destroyed by the Goths, we find but very little remarkable in the history of Constantinople. At this time the eastern empire was usurped by Basiliscus, who had driven out Zeno the lawful emperor; being assisted in his conspiracy by the empress Verina his sister. Zeno fled into Isauria, whither he was pursued by Illus and Trecondes, two of the usurper's generals; who having easily defeated the few troops he had with him, forced the unhappy prince to shut himself up in a castle, which they immediately invested. But in a short time Basiliscus having disobliged the people by his cruelty, avarice, and other bad qualities, for which he was no less remarkable than his predecessor had been, his generals joined with Zeno, whom they restored to the throne. After his restoration, Zeno having got Basiliscus into his power, confined him in a castle of Cappadocia, together with his wife Zenonides, where they both perished with hunger and cold. This happened in the year 467, after Basiliscus had reigned about 20 months. During the time of this usurpation a dreadful fire happened at Constantinople, which consumed great part of the city, with the library containing 120,000 volumes; among which were the works of Homer, written, as is said, on the great gut of a dragon 120 feet long.

91 Is starved to death.

92 Great fire at Constantinople.

The misfortunes which Zeno had undergone did not work any reformation upon him. He still continued the same vicious courses which had given occasion to the usurpation of Basiliscus. Other conspiracies were formed against him, but he had the good fortune to escape them. He engaged in a war with the

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the Ostrogoths, in which he proved unsuccessful, and was obliged to yield the provinces of Lower Dacia and Mœsia to them. In a short time, however, Theodoric their king made an irruption into Thrace, and advanced within 15 miles of Constantinople, with a design to besiege that capital: but the following year, 485, they retired in order to attack Odoacer king of Italy; of which country Theodoric was proclaimed king in 493. The emperor Zeno died in the year 491, in the 65th year of his age, and 17th of his reign.

93 Decline of the Roman empire, to what owing.

The Roman empire had now for a long time been on the decline: the ancient valour and military discipline, which had for such a long time rendered the Romans superior to other nations, had greatly degenerated; so that they were now by no means so powerful as formerly. The tumults and disorders which had happened in the empire from time to time by the many usurpations, had contributed also to weaken it very much. But what proved of the greatest detriment was the allowing vast swarms of barbarians to settle in the different provinces, and to serve in the Roman empire in separate and independent bodies. This had proved the immediate cause of the dissolution of the western empire; but as it affected the eastern parts less, the Constantinopolitan empire continued for upwards of 900 years after the western one was totally dissolved. The weak and imprudent administration of Zeno, and Anastasius who succeeded him, had reduced the eastern empire still more; and it might possibly have expired in a short time after the western one, had not the wise and vigorous conduct of Justin, and his partner Justinian, revived in some measure the ancient martial spirit which had originally raised the Roman empire to its highest pitch of grandeur.

94 It revives under Justin and Justinian.

Justin ascended the throne in 518. In 521 he engaged in a war with the Persians, who had all along been very formidable enemies to the Roman name. Against them he employed the famous Belisarius; but of him we hear nothing remarkable till after the accession of Justinian. This prince was the nephew of Justin, and was by him taken as his partner in the empire in 527; and the same year Justin died, in the 77th year of his age and 9th of his reign. Justinian being now sole master of the empire, bent his whole force against the Persians. The latter proved successful in the first engagement; but were soon after utterly defeated by Belisarius on the frontiers of Persia, and likewise by another general named *Dorotheus* in Armenia. The war continued with various success during the first five years of Justinian's reign. In the sixth year a peace was concluded upon the following terms: 1. That the Roman emperor should pay to Cosrhoes, the king of Persia, 1000 pounds weight of gold. 2. That both princes should restore the places they had taken during the wars. 3. That the commander of the Roman forces should no longer reside at Daras on the Persian frontiers, but at a place called *Constantina* in Mesopotamia, as he had formerly done. 4. That the Iberians, who had sided with the Romans, should be at liberty either to return to their own country or to remain at Constantinople. This peace, concluded in 532, was styled *eternal;* but in the event proved of very short duration.

95 Justinian's war with the Persians.

About this time happened at Constantinople the greatest tumult mentioned in history. It began among the different factions in the circus; but ended in an open rebellion. The multitude, highly dissatisfied with the conduct of John the *præfectus prætorio* and of Trebonianus then questor, forced Hypatius, nephew to the emperor Anastasius, to accept the empire, and proclaimed him with great solemnity in the forum. As the two above-mentioned ministers were greatly abhorred by the populace on account of their avarice, Justinian immediately discharged them, hoping by that means to appease the tumult: but this was so far from answering the purpose, that the multitude only grew the more outrageous upon it; and most of the senators joining them, the emperor was so much alarmed, that he had thoughts of abandoning the city and making his escape by sea. In this dilemma the empress Theodora encouraged and persuaded him rather to part with his life than the kingdom; and he at last resolved to defend himself to the utmost, with the few senators who had not yet abandoned him. In the mean time, the rebels having attempted in vain to force the gates of the palace, carried Hypatius in triumph to the circus; where, while he was beholding the sports from the imperial throne, amidst the shouts and acclamations of the people, Belisarius, who had been recalled from Persia, entered the city with a considerable body of troops. Being then apprised of the usurpation of Hypatius, he marched straight to the circus; fell sword in hand upon the disarmed multitude; and with the assistance of a band of Heruli, headed by Mundus governor of Illyricum, cut about 30,000 of them in pieces. Hypatius the usurper, and Pompeius another of the nephews of Anastasius, were taken prisoners and carried to the emperor, by whose orders they were both beheaded, and their bodies cast into the sea. Their estates were confiscated, and likewise the estates of such senators as had joined with them; but the emperor caused great part of their lands and effects to be afterwards restored, together with their honours and dignities, to their children.

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96 Great tumult in Constantinople.

Justinian having now no other enemy to contend with, turned his arms against the Vandals in Africa, and the Goths in Italy; both which provinces he recovered out of the hands of the barbarians *. But before his general Belisarius had time to establish fully the Roman power in Italy, he was recalled in order to carry on the war against Cosrhoes king of Persia, who, in defiance of the treaty formerly concluded in 532, entered the Roman dominions at the head of a powerful army. The same year, however, a peace was concluded between the two nations upon the following conditions: 1. That the Romans should, within two months, pay to the Persian king 5000 pounds weight of gold, and an annual pension of 500. 2. That the Persians should relinquish all claim to the fortress of Daras, and maintain a body of troops to guard the Caspian gates, and prevent the barbarians from breaking into the empire. 3. That upon payment of the above-mentioned sum, Cosrhoes should immediately withdraw his troops from the Roman dominions. The treaty being signed, and the stipulated sum paid, Cosrhoes began to march back again; but by the way plundered several cities as if the war had still continued. Hereupon Justinian resolved to pursue the war with the utmost vigour; and for that purpose despatched

* See *Barbary* and *Goths*.

97 Another war with the Persians.

patched Belisarius into the east. But soon after he was obliged to recal him in order to oppose the Goths, who had gained great advantages in Italy after his departure. The Persian war was then carried on with

98 Peace concluded.

indifferent success till the year 558, when a peace was concluded upon the emperor again paying an immense sum to the enemy. The same year the Huns, passing the Danube in the depth of winter, marched in two bodies directly for Constantinople; and laying waste the countries through which they passed, came, without meeting the least opposition, within 150 furlongs of the city. But Belisarius marching out against them with a handful of men, put them to flight; the emperor, however, to prevent them from invading the empire anew, agreed to pay them an annual tribute, upon their promising to defend the empire against all other barbarians, and to serve in the Roman armies when required. This was the last exploit performed by Belisarius, who on his return to Constantinople was disgraced, stripped of all his employments, and confined to his house, on pretence of a conspiracy against the emperor *. In the year 565 a real conspiracy was formed against Justinian, which he happily escaped, and the conspirators were executed; but the emperor did not long survive it, being carried off by a natural death in 566, in the 39th year of his reign.

* See *Belisarius*.

During the reign of Justinian, the majesty of the Roman empire seemed to revive. He recovered the provinces of Italy and Africa out of the hands of the barbarians, by whom they had been held for a number of years; but after his death they were soon lost, and the empire tended fast to dissolution. In 569 Italy was conquered by the Lombards, who held it for the space of 200 years. Some amends, however, was made for the loss by the acquisition of *Persarmenia;* the inhabitants of which, being persecuted by the Persians on account of the Christian religion which they professed, revolted to the Romans. This produced a war between the two nations, who continued to weaken each other, till at last the Persian monarchy was utterly overthrown, and that of the Romans greatly reduced by the Saracens†. These new enemies attacked the Romans in the year 632, and pursued their conquests with incredible rapidity. In the space of four years they reduced the provinces of Egypt, Syria, and Palestine. In 648 they were also masters of Mesopotamia, Phœnicia, Africa, Cyprus, Aradus, and Rhodes; and having defeated the Roman fleet, commanded by the emperor Constans in person, they concluded a peace on condition of keeping the vast extent of territory they had seized, and paying for it 1000 nummi a-year.

99 Decline of the empire after Justinian.

† See *Arabia.*

100 Unsuccessful expedition against the Lombards.

An expedition against the Lombards was about this time undertaken, but with very little success, a body of 20,000 Romans being almost entirely cut off by one of the Lombard generals. In 671 the Saracens ravaged several provinces, made a descent in Sicily, took and plundered the city of Syracuse, and overran the whole island, destroying every thing with fire and sword. In like manner they laid waste Cilicia; and having passed the winter at Smyrna, they entered Thrace in the winter of the year 672, and laid siege to Constantinople itself. Here, however, they were repulsed with great loss: but next spring they renewed their attempt, in which they met with the same bad success; many of their ships being burnt by the *sea-fire*, as it was called, because it burnt under water; and in their return home their fleet was wrecked off the Scyllæan promontory. At last a peace was concluded for 30 years, on condition that the Saracens should retain all the provinces they had seized; and that they should pay the emperor and his successors 3000 pounds weight of gold, 50 slaves, and as many choice horses.

101 Constantinople besieged by the Saracens.

102 Empire invaded by the Bulgarians.

This peace was scarce concluded, when the empire was invaded by a new enemy, who proved very troublesome for a long time. These were the Bulgarians: who breaking into Thrace, defeated the Roman army sent against them, and ravaged the country far and wide. The emperor consented to pay them an annual pension, rather than continue a doubtful war; and allowed them to settle in Lower Mœsia, which from them was afterwards called *Bulgaria*. In 687, they were attacked by Justinian II. who entered their country without provocation, or regarding the treaties formerly concluded with them. But they falling suddenly upon him, drove him out of their country, and obliged him to restore the towns and captives he had taken. In 697, this emperor was deposed; and in his exile fled to Trebelis king of the Bulgarians, by whom he was kindly entertained, and by whose means he was restored to his throne; but soon forgetting this favour, he invaded the country of the Bulgarians, with a design to wrest from them those provinces which he had yielded to them. He was attended in this expedition by no better success than his ingratitude deserved, his army being utterly defeated, and he himself obliged to make his escape in a light vessel to Constantinople. The Bulgarians continued their inroads and ravages at different times, generally defeating the Romans who ventured to oppose them, till the year 800, the seventh of the reign of Nicephorus, when they surprised the city of Sardica in Mœsia, and put the whole garrison, consisting of 6000 men, to the sword. The emperor marched against them with a considerable army: but the enemy retired at his approach; and he, instead of pursuing them, returned to Constantinople. Two years after he entered Bulgaria at the head of a powerful army, destroying every thing with fire and sword. The king offered to conclude a peace with him upon honourable terms; but Nicephorus, rejecting his proposals, continued to waste the country, destroying the cities, and putting all the inhabitants, without distinction of sex or age, to the sword. The king was so much affected with these cruelties which were exercised on his subjects, that he sent a second embassy to Nicephorus, offering to conclude a peace with him upon any terms, provided he would quit his country. But Nicephorus dismissing the ambassadors with scorn, the Bulgarian monarch attacked unexpectedly the Roman camp, forced it, and cut off almost the whole army, with the emperor himself, and a great number of patricians. His successor Michael likewise engaged in a war with the Bulgarians; but being utterly defeated, he was so grieved that he resigned the empire. After this the Bulgarians continued to be very formidable enemies to the empire, till the year 979, when they were attacked by Basilius II. The Bulgarians were at that time governed by a king named *Samuel;* who having ravaged the Roman territories,

103 They defeat Justinian II.

104 Their country cruelly ravaged by Nicephorus.

105 Who is cut off with his whole army.

106 Their country invaded by Basilius II.

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tories, as was the common practice of his nation, Basilius sent against him one Nicephorus Uranus at the head of a powerful army. Uranus, leaving his baggage at Larissa, reached by long marches the Sperchius, and encamped with his whole army over against the enemy, who lay on the opposite bank. As the river was greatly swelled with the heavy rains that had lately fallen, Samuel, not imagining the Romans would attempt to pass it, suffered his troops to roam in large parties about the country in quest of booty. But Uranus having at length found out a place where the river was fordable, passed it in the dead of the night without being perceived. He then fell upon the Bulgarians who were left in the camp, and lay for the most part asleep; cut great numbers of them in pieces; took a great number of prisoners, with all their baggage; and made himself master of their camp. Samuel and his son were dangerously wounded; and would have been taken, had they not all that day concealed themselves among the dead. The next night they stole away to the mountains of Ætolia, and from thence made their escape into Bulgaria. The following year the emperor entered Bulgaria at the head of a numerous and well-disciplined army; defeated Samuel in a pitched battle, and took several strong cities. The emperor himself, however, at last, narrowly escaped being cut off with his whole army; being unexpectedly attacked by the Bulgarians in a narrow pass. From this danger he was relieved by the arrival of Nicephorus Xiphias, governor of Philippopolis, with a considerable body of troops; who falling upon the enemies rear, put them to flight. Basilius pursued them close; and having taken an incredible number of captives, caused their eyes to be pulled out, leaving to every hundred a guide with one eye, that he might conduct them to Samuel. This shocking spectacle so affected the unhappy king, that he fell into a deep swoon, and died two days after. The Roman emperor pursued his conquests, and in the space of two years made himself master of most of the enemies strong holds. He defeated also the successor of Samuel in several engagements; and having at last killed him in battle, the Bulgarians submitted themselves without reserve. The vast treasures of their princes were by Basilius distributed among his soldiers by way of donative. Soon after, the widow of the late king, with her six daughters and three of her sons, surrendered themselves to the Roman emperor, by whom they were received with the utmost civility and respect. This obliging behaviour encouraged the three other sons of the late king, and most of the princes of the blood, who had taken shelter in the mountains, to submit, and throw themselves on the emperor's mercy.

107 His monstrous cruelty.

108 The country subdued.

109 Ibatzes alone holds out.

Ibatzes, however, a person nearly allied to the royal family, who had distinguished himself in a very eminent manner during the whole course of the war, refused to submit, and fled to a steep and craggy mountain, with a design to defend himself there to the last extremity. Basilius endeavoured to cause him submit by fair means, but he equally despised both threats and promises. At the last Eustathius Daphnomelus, whom Basilius had lately appointed governor of Achridus, the chief city of Bulgaria, undertook to secure him by a most desperate and improbable scheme. Without communicating his design to any, he repaired, with two persons in whom he could confide, to the mountain on which Ibatzes had fortified himself. He hoped to pass undiscovered among the many strangers who flocked thither to celebrate the approaching feast of the Virgin Mary, for whom Ibatzes had a particular veneration. In this he found himself mistaken; for he was known by the guards, and carried before the prince. To him he pretended to have something of importance to communicate; but as soon as Ibatzes had retired with him into a remote place, Daphnomelus threw himself suddenly upon him, and with the assistance of the two men whom he had brought with him, pulled out both his eyes, and got safe to an abandoned castle on the top of the hill. Here they were immediately surrounded by the troops of Ibatzes; but Daphnomelus exhorting them now to submit to the emperor, by whom he assured them they would be well received, they congratulated Daphnomelus on his success, and suffered him to conduct the unhappy Ibatzes a prisoner to Basilius. The emperor was no less surprised than pleased at the success of the bold attempt; and rewarded Daphnomelus with the government of Dyrrhachium, and all the rich moveables of his prisoner. After this, having accomplished the entire reduction of Bulgaria, he returned to Constantinople with an incredible number of captives, where he was received by the senate and people with all possible demonstrations of joy.

110 He is taken by a stratagem.

111 The empire invaded by the Turks.

112 Account of them.

All this time the Saracens had at intervals invaded the Roman dominions, and even attempted to make themselves masters of Constantinople. Their internal divisions, however, rendered them now much less formidable enemies than they had formerly been; so that some provinces were even recovered for a time out of their hands, though the weak and distracted state of the empire rendered it impossible to preserve such conquests. But in 1041, the empire was invaded by an enemy, not very powerful at that time indeed, but who by degrees gathered strength sufficient to overthrow both the Roman and Saracen empires. These were the Turks; who having quitted their ancient habitations in the neighbourhood of Mount Caucasus, and passed the Caspian straits, settled in Armenia Major, about the year 844. There they continued an unknown and despicable people, till the intestine wars of the Saracens gave them an opportunity of aggrandizing themselves. About the year 1030, Mohammed the son of Sambrael sultan of Persia, not finding himself a match for Pisaris sultan of Babylon, with whom he was at war, had recourse to the Turks, who sent him 3000 men under the command of Tangrolipix, a leading man among them. By their assistance Mohammed defeated his adversary; but when the Turks desired leave to return home, he refused to part with them. Upon this they withdrew without his consent to a neighbouring desert; and being there joined by several discontented Persians, began to make frequent inroads into the sultan's territories. Against them Mohammed immediately dispatched an army of 20,000 men; who being surprised in the night, were utterly defeated by Tangrolipix. The fame of this victory drew multitudes to him from all parts; so that in a short time Tangrolipix saw himself at the head of 50,000 men. Upon this Mohammed marched against them in person,

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had taken, they hoped by these speeches to induce the people to revolt, and choose a new emperor. This Eudocia was aware of; and therefore determined to prevent the evils that threatened herself and her family, by marrying some person of merit who was capable of defeating her enemies both at home and abroad. At this time one Romanus Diogenes, a person of a most beautiful aspect, extraordinary parts, and illustrious birth, being accused of aspiring to the empire, tried and convicted, was brought forth to receive sentence of death. But the empress, touched with compassion at his appearance, gently upbraided him with his ambition, set him at liberty, and soon after appointed him commander in chief of all her forces. In this station he acquitted himself so well, that the empress resolved to marry him if she could but recover the writing in which her oath was contained out of the hands of the patriarch. In order to this, she applied to a favourite eunuch; who going to the patriarch, told him that the empress was so taken with his nephew named *Bardass*, that she was determined to marry and raise him to the empire, provided the patriarch absolved her from the oath she had taken, and convinced the senate of the lawfulness of her marriage. The patriarch, dazzled with the prospect of his nephew's promotion, readily undertook to perform both. He first obtained the consent of the senate, by representing to them the dangerous state of the empire, and exclaiming against the rash oath which the jealousy of the late emperor had extorted from the empress. He then publicly discharged her from it; restored the writing to her; and exhorted her to marry some deserving object, who being entrusted with an absolute authority, might be capable of defending the empire. The empress, thus discharged from her oath, married a few days after Romanus Diogenes; who was thereupon proclaimed emperor, to the great disappointment of the patriarch.

120 The empress determines to break her oath.

121 She recovers the writing in which it was contained,

122 and marries Romanus Diogenes.

As the new emperor was a man of great activity and experience in war, he no sooner saw himself vested with the sovereign power, than he took upon him the command of the army, and passed over into Asia with the few forces he could assemble, recruiting and inuring them on his march to military discipline, which had been utterly neglected in the preceding reigns. On his arrival in that continent, he was informed that the Turks had surprised and plundered the city of Neocæsarea, and were retiring with their booty. On this news he hastened after them at the head of a chosen body of light-armed troops, and came up with them on the third day. As the Turks were marching in disorder, without the least apprehension of an enemy, Romanus cut great numbers of them in pieces, and easily recovered the booty; after which he pursued his march to Aleppo, which he retook from them, together with Hierapolis, where he built a strong castle.

123 He passes over into Asia.

124 He defeats the Turks.

As he was returning to join the forces he had left behind him, he was met by a numerous body of Turks, who attempted to cut off his retreat. At first he pretended to decline an engagement through fear; but attacked them afterwards with such vigour when they least expected it, that he put them to flight at the first onset, and might have gained a complete victory had he thought proper to pursue them. After this, several towns submitted to him; but the season being now far spent, the emperor returned to Constantinople. The following year he passed over into Asia early in the spring; and being informed that the Turks had sacked the rich city of Iconium, besides gaining other considerable advantages; he marched in person against them. But the Turks, not thinking it advisable to wait his coming, retired in great haste. The Armenians, however, encouraged by the approach of the emperor's army, fell upon the enemy in the plains of Tarsus, put them to flight, and stripped them both of their baggage and the booty they had taken. The spring following the emperor once more entered Asia at the head of a considerable army which he had raised, and with incredible pains disciplined during the winter. When the two armies drew near to each other, Axan, the Turkish sultan, and son of the famous Tangrolipix, sent proposals to Romanus for a lasting and honourable peace. These were imprudently rejected, and a desperate engagement ensued, when, in spite of the utmost efforts of the emperor, his army was routed, and he himself wounded and taken prisoner. When this news was brought to Axan, he could scarcely believe it; but being convinced by the appearance of the royal captive in his presence, he tenderly embraced him, and addressed him in an affectionate manner: "Grieve not (said he), most noble emperor, at your misfortune; for such is the chance of war, sometimes overwhelming one, and sometimes another; you shall have no occasion to complain of your captivity; for I will not use you as my prisoner, but as an emperor." The Turk was as good as his word. He lodged the emperor in a royal pavilion; assigned him attendants, with an equipage suitable to his quality; and discharged such prisoners as he desired. After he had for some days entertained his royal captive with extraordinary magnificence, a perpetual peace was concluded betwixt them, and the emperor dismissed with the greatest marks of honour imaginable. He then set out with the Turkish ambassador for Constantinople, where the peace was to be ratified; but by the way he was informed that Eudocia had been driven from the throne by John the brother of Constantine Ducas, and Psellus a leading man in the senate, who had confined her to a monastery, and proclaimed her eldest son, Michael Ducas, emperor. On this intelligence, Romanus retired to a strong castle near Theodosiopolis, where he hoped in a short time to be joined by great numbers of his friends and adherents. But in the mean time John, who had taken upon him to act as guardian to the young prince, despatched Andronicus with a considerable army against him. Andronicus having easily defeated the small army which Romanus had with him, obliged him to fly to Adana a city in Cilicia, where he was closely besieged, and at last obliged to surrender. Andronicus carried his prisoner into Phrygia, where he fell dangerously ill, being, as was suspected, secretly poisoned. But the poison being too slow in its operation, John ordered his eyes to be put out; which was done with such cruelty that he died soon after, in the year 1067, having reigned three years and eight months.

126 They are again defeated.

127 The Romans defeated and the emperor taken.

128 Eudocia deposed and confined in a monastery.

129 Romanus put to death.

Axan was no sooner informed of the tragical end of his friend and ally, than he resolved to invade the empire

130 The Turks again invade the empire.

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persuaded him to invade the dominions of Robert in Italy. At first Henry met with great success; but was soon overcome, and driven out of that country by Robert. Bohemond, in the mean time, reduced several places in Illyricum; and, having defeated Alexius in two pitched battles, entered Thessaly, and sat down before Larissa. This place, being defended by an officer of great courage and experience in war, held out till the emperor came to its relief. Soon after his arrival, he found means to draw a strong party of Bohemond's men into an ambuscade, and cut them off almost entirely. However, in the battle which was fought a few days after, Bohemond had the advantage; but his troops mutinying and refusing to carry on the war, he was obliged to return to Italy. Alexius taking advantage of his absence, recovered several cities; and being informed that Robert was making great preparations against him, he had recourse once more to the Venetians. By them he was assisted with a powerful fleet, which defeated that of Robert in two engagements; but being soon after surprised by him, they were defeated with the loss of almost their whole navy. Robert is said to have used his victory with great barbarity, putting many of his prisoners to death with unheard-of torments. The Venetians equipped a second fleet; and joining that of the emperor, fell unexpectedly upon Robert's navy, who were riding without the least apprehensions in Buthrotum, sunk most of his ships, and took a great number of prisoners, his wife and younger sons having narrowly escaped falling into their hands. Robert made great preparations to revenge this defeat; but was prevented by death from executing his designs; and, after his decease, his son Roger did not think proper to pursue so dangerous and expensive a war. He therefore recalled his troops, and the places which had been conquered by Robert and Bohemond submitted anew to the emperor.

137 The city surrenders.

138 The war ended by the death of Robert.

139 The Scythian war.

This war was scarce ended, when the Scythians passing the Danube laid waste great part of Thrace, committing everywhere the greatest barbarities. Against them the emperor dispatched an army under the command of Pacurianus and Branas. The latter insisted upon engaging the enemy, contrary to the opinion of his colleague; and his rashness caused the loss of the greater part of the army, who were cut off by the Scythians, together with the two generals. *Talicius*, an officer who had signalized himself on many occasions, was appointed to command the army in their room. He fell upon the enemy as they lay securely in the neighbourhood of Philippopolis, cut great numbers of them in pieces, and obliged the rest to retire in great confusion. The following spring, however, they returned in such numbers, that the emperor resolved to march against them in person. Accordingly he set out for Adrianople, and from thence to a place called *Lardea*. Here, contrary to the advice of his best officers, he ventured a battle; in which he was utterly defeated with the loss of vast numbers of his men, he himself escaping with the utmost difficulty. The next year he was attended with no better success, his army being entirely defeated with the loss of his camp and baggage. In the year following, 1084, the emperor retrieved his credit; and gave the Scythians such an overthrow, that very few escaped the general slaughter.

140 The Romans defeated.

141 They at last defeat the Scythians.

Notwithstanding this disaster, however, they again invaded the empire in 1093. To this they were encouraged by an impostor called *Leo*, who pretended to be the eldest son of Romanus Diogenes. The young prince had been slain in a battle with the Turks; but as the Scythians only wanted a pretence to renew the war, they received the impostor with joy. By a stratagem, however, Leo was murdered; and the Scythians being afterwards overthrown in two great battles, were obliged to submit on the emperor's own terms.

Since the year 1083, the war had been carried on with the Turks with various success; but now an association was formed in the west against these infidels, which threatened the utter ruin of the Turkish nation. This was occasioned by the superstition of the Christians, who thought it a meritorious action to venture their lives for the recovery of the Holy Land, possessed at that time by the Turks and Saracens. Had the western princes been properly assisted by the emperors of the East in this undertaking, the Turks had undoubtedly been unable to resist them; but so far from this, the Latins were looked upon by them as no less enemies than the Turks; and indeed whatever places they took from the infidels, they never thought of restoring to the emperors of Constantinople, to whom they originally belonged, but erected a number of small independent principalities; which neither having sufficient strength to defend themselves, nor being properly supported by one another, soon became a prey to the Turks, In the year 1203, happened a dreadful fire at Constantinople, occasioned by some Latin soldiers. These had plundered a mosque, which the Turks residing in Constantinople had been suffered to build there. For this reason they were attacked by the infidels; who being much superior to them in number, the Latins found themselves obliged to set fire to some houses, in order to make their escape with safety. The flame spreading in an instant from street to street, reduced in a short time great part of the city to ashes, with the capacious store-houses which had been built at a vast expence on the quay. The late emperor Isaac Angelus, who had been restored to his throne by the Latins, died soon after their departure from Constantinople, leaving his son Alexius sole master of the empire. The young prince, to discharge the large sums he had promised the French and Venetians for their assistance, was obliged to lay heavy taxes on his subjects; and this, with the great esteem and friendship showed to his deliverers, raised a general discontent among the people of Constantinople, who were sworn enemies to the Latins. This encouraged John Ducas, surnamed *Murtzuphlus*, from his joined and thick eyebrows, to attempt the sovereignty. Unhappily he found means to put his treacherous designs in execution; and strangled the young prince with his own hands. After this he presented himself to the people; told them what he had done, which he pretended was in order to secure their liberties; and earnestly intreated them to choose an emperor who had courage enough to defend them against the Latins that were ready to oppress and enslave them. On this he was instantly saluted emperor by the inconstant multitude; but this usurpation proved the ruin of the city. The Latins immediately resolved to revenge the death of the

142 The Holy War.

143 Dreadful fire at Constantinople.

144 Murtzuphlus strangles the emperor.

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ravaged the adjacent country, making excursions to the very gates of Constantinople. At last the emperor determined to root them out; and accordingly marched against them with all his forces, the country people flocking to him from all quarters. The Turks at first gave themselves over for lost; but finding the Greeks negligent of discipline, they attacked their army unexpectedly, utterly defeated it, and made themselves masters of the camp. After this unexpected victory, they
154 continued for two years to ravage Thrace in the most terrible manner. At last, however, they were defeated; and being afterwards shut up in the Chersonesus, they were all cut in pieces or taken.

154 They are all cut in pieces or taken.

Soon after new commotions took place in this unhappy empire, of which the Turks did not fail to take the advantage. In 1327 they made themselves masters of most of the cities on the Mæander; and, among the rest, of the strong and important city of Prusa in Bithynia. The next year, however, Othoman, who may justly be styled the founder of the Turkish monarchy, being dead, the emperor laid hold of that opportunity to recover Nice, and some other important places, from the infidels. But these were lost the year following, together with Abydus and Nicomedia; and in 1330 a peace was concluded upon condition that they should keep all their conquests. This peace they observed no longer than served their own purposes; for new commotions breaking out in the empire, they pursued their conquests, and by the year 1357 had reduced all Asia. They next passed the Hellespont under the conduct of Solyman the son, or, as others will have it, the brother of Orchane, the successor of Othoman, and seized on a strong castle on the European side. Soon after the Turkish sultan died, and was succeeded by Amurath. He extended the conquests of his predecessors, and in a short time reduced all Thrace, making Adrianople the seat of his empire. A-
155 murath was slain by treachery in a little time after, and was succeeded by his son Bajazet. This prince greatly enlarged his dominions by new conquests. In a short time he reduced the countries of Thessaly, Macedon, Phocis, Peloponnesus, Mysia, and Bulgaria, driving out the despots or petty princes who ruled there. Elated with his frequent victories, he began to look upon the Greek emperor, to whom nothing was now left but the city of Constantinople and the neighbouring country, as his vassal. Accordingly he sent him an arrogant and haughty message, commanding him to pay a yearly tribute, and send his son Manuel to attend him in his military expeditions. This demand the emperor was obliged to comply with, but died soon after, in the year 1392.

155 Adrianople taken by the Turks.

Manuel no sooner heard of his father's death than he hastened to Constantinople, without taking leave of
156 the sultan, or acquainting him with the reason of his sudden departure. At this Bajazet was so highly offended, that he passed with great expedition out of Bithynia into Thrace, ravaged the country adjoining to Constantinople, and at last invested the city itself, both by sea and land. In this extremity Manuel had recourse to the western princes; who sent him an army of 130,000 men, under the command of Sigismund king of Hungary, and John count of Nevers. But though the western troops proved at first successful, they were in the end defeated with great slaughter by Bajazet, who then returned to the siege with greater vigour than ever. As he found, however, that the citizens were determined to hold out to the last, he applied to John, the son of Manuel's elder brother, who had a better title to the crown than Manuel himself. With him he entered into a private agreement, by virtue of which Bajazet was to place John upon the throne of Constantinople; on the other hand, John was to deliver up the city to the Turks, and remove the imperial city to Peloponnesus, which the sultan promised to relinquish to him and his posterity. At the same time, he sent deputies to the inhabitants of Constantinople, offering to withdraw his army, and cease from further hostilities, provided they expelled Manuel and placed John upon the throne. This proposal rent the city into two factions; but Manuel prevented the mischiefs which were ready to ensue, by a voluntary resignation, upon condition that he should be allowed to retire to whatever place he thought proper with his wife and children.

156 Bajazet besieges Constantinople.

With this condition John readily complied; and Manuel having received him into the city, and conducted him to the palace, set sail for Venice. From thence he went to the courts of all the western princes, to solicit their assistance against the Turks, whose power was grown formidable to all Europe. He was everywhere received with the greatest demonstrations of esteem, and promised large supplies; all Christendom being now alarmed at the progress of the infidels.

In the mean time, Bajazet did not fail to put John in mind of his promise: but the citizens refusing to comply with such a scandalous treaty, the siege was renewed, and the city assaulted with more fury than ever. When it was already reduced to the last extremity, news were brought the sultan that Tamerlane, the victorious Tartar, having overrun all the east with incredible celerity, had now turned his arms against the Turks, and was preparing to break into Syria. Bajazet, alarmed at the danger that threatened him, raised 157
the siege in great haste, and advanced against Tamerlane with a very numerous and well-disciplined army; but the Tartar totally defeated and took him prisoner, after having cut most of his men in pieces: and thus Constantinople was preserved for the present. 158

157 He is defeated and taken prisoner by Tamerlane.

But this relief was of short duration. In 1424 the city was again besieged by Amurath II. The inhabitants defended themselves with great bravery; but must in the end have submitted, had not the emperor prevailed upon the prince of Caramania to countenance an impostor and pretender to the Turkish throne. 159
This obliged Amurath to raise the siege, and march with all his forces against the usurper, whom he soon reduced. Having then no other enemies to contend with, he entered Macedon at the head of a powerful army; and having ravaged the country far and near, he took and plundered Thessalonica, as he did also most of the cities of Ætolia, Phocis, and Bœotia. From Greece he marched into Servia; which country he soon reduced. He next broke into the dominions of the king of Hungary, and besieged the strong city of Belgrade; but here he met with a vigorous repulse, no fewer than 15,000 Turks being slain by the Christians in one sally, which obliged the sultan to drop the enterprise and retire.

158 Amurath besieges Constantinople.

159 The siege raised.

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In his retreat he was attacked by the celebrated John Hunniades, who cut great numbers of his men in pieces, and obliged the rest to fly with precipitation. Not long after he gained a still more complete vic-
160 Success of John Hunniades against the Turks.
tory over the enemy in the plains of Transylvania, with the loss of only 3000 of his own men, whereas 20,000 of the Turks were killed on the field of battle, and almost an equal number in the pursuit. Amurath, who was then at Adrianople, sent an army into Transylvania far more numerous than the former; but they were attended with no better success, being cut off almost to a man by the brave Hungarian. He gain-
161 He is at last defeated.
ed several other victories no less remarkable; but was at last entirely defeated in 1448; and with this defeat ended all hopes of preserving the Roman empire. The unhappy emperor was now obliged to pay an annual tribute of 300,000 aspers to the sultan; and to yield up to him some strong holds which he still held on the Euxine sea. However, as he doubted not but Amurath would soon attempt to become master of the city itself, he renewed the union between the Greek and Latin churches, hoping that this would induce the western princes to assist him in the defence of the city against the Turks. This union produced great disturbances, which the emperor did not long survive, but died in 1448, leaving the empire, now confined within the walls of Constantinople, to his brother Constantine.

Amurath the Turkish sultan died in 1450, and was succeeded by his son Mohammed. In the beginning of his reign he entered into an alliance with Constantine, and pretended a great desire to live in friendship with him and the other Christian princes; but no sooner had he put an end to a war in which he was engaged with Ibrahim king of Caramania, than he built a strong fort on the European side of the Bosphorus, opposite to another in Asia; in both of which he placed strong garrisons. These two castles commanded the straits: and the former being but five miles from the city, kept it in a manner blocked up. This soon produced a misunderstanding between him and
162 Constantinople besieged by Mohammed.
the emperor, which ended in the siege of the city. The siege commenced on the sixth of April 1453, Mohammed's numerous forces covering the plains before it on the land-side, and a fleet of 300 sail blocking it up by sea. The emperor, however, had taken care to secure the haven, in which were three large ships, 20 small ones, and a great number of galleys, by means of a chain drawn across the entrance. Mohammed began the siege by planting batteries as near the city as he could, and raising mounts in several places as high as the walls themselves, whence the besieged were incessantly galled with showers of arrows. He had in his camp a piece of ordnance of prodigious size, which is said to have carried a ball of 100 pounds weight made of hard black stone brought from the Euxine sea. With this vast piece the enemy made several breaches in the walls; which, however, were repaired with incredible expedition by the besieged. But Mohammed, the better to carry on the siege, caused new levies to be made through his extensive dominions, by which his army was soon increased to near 400,000 men; while the garrison consisted only of 9000 regular troops, viz. 6000 Greeks and 3000 Genoese and Venetians. As the enemy continued to batter the walls day and night without intermission, a great part of them was at last beaten down; but while the Turks were busy in filling up the ditch, in order to give the assault, a new wall was built. This threw the tyrant into a prodigious rage, which was greatly heightened when he saw his whole fleet worsted by five ships, four of which were laden with corn from Peloponnesus, and the other with all manner of provisions from the isle of Chios. These opened themselves a way through the whole Turkish fleet; and, to the inexpressible joy of the Christians, at last got safe into the harbour.

The Turks attempted several times to force the haven; but all their efforts proving ineffectual, Mohammed formed a design of conveying 80 galleys over land for the space of eight miles into it. This he accom- 163 He conveys 80 galleys over land into the haven.
plished by means of certain engines, the contrivance of a renegado; and having then either taken or sunk all the ships contained in it, he caused a bridge to be built over it with surprising expedition. By this means the city was laid open to an assault from that side likewise. The place was now assaulted on all sides; and Constantine being well apprised that he could not long hold out against such a mighty fleet and so numerous an army, sent deputies to Mohammed offering to acknowledge himself his vassal, by paying him yearly what tribute he should think proper to impose, provided he raised the siege and withdrew. The tyrant answered that he was determined at all events to become master of the city: but if the emperor delivered it up forthwith, he would yield up to him Peloponnesus, and other provinces to his brothers, which they should enjoy peaceably as friends and allies: but if he held out to the last extremity, and suffered it to be taken by assault, he would put him and the whole nobility to the sword, abandon the city to be plundered by his soldiers, and carry the inhabitants into captivity.

This condition was rashly rejected by the emperor; who thereby involved himself and all his subjects in the most terrible calamity. The siege was renewed with more vigour than ever, and continued till the 25th of
May; when a report being spread in the Turkish camp 164 A mutiny in the Turkish camp.
that a mighty army was advancing in full march to the relief of the city under the conduct of the celebrated John Hunniades, the common soldiers, seized with a panic, began to mutiny, and pressed Mohammed in a tumultuous manner to break up the siege. Nay, they openly threatened him with death, if he did not immediately abandon the enterprise and retire from before the city, which they despaired of being able to reduce before the arrival of the supposed succours. Mohammed was upon the point of complying with their demand, when he was advised by Zagan, a Turkish officer of great intrepidity, and an irreconcileable enemy to the Christian name, to give without loss of time a general assault. To this he said the soldiery, however mutinous, would not be averse, provided the sultan solemnly promised to abandon the city to be plundered by them. As such an advice best suited the humour of Mohammed, he readily embraced it; and caused a proclamation to be published throughout the camp, declaring that he gave up to his soldiers all the wealth of that opulent city, requiring to himself only the empty houses.

The

—A constat is held to be superior to a certificate; because this may err or fail in its contents; that cannot, as certifying nothing but what is evident upon record.

Also the exemplification under the great seal of the inrolment of any letters patent is called a *constat*.

CONSTELLATION, in *Astronomy*, a system of several stars that are seen in the heavens near to one another. Astronomers not only mark out the stars, but, that they may better bring them into order, they distinguish them by their situation and position in respect to each other; and therefore they distribute them into asterisms or constellations, allowing several stars to make up one constellation: and for the better distinguishing and observing them, they reduce the constellations to the forms of animals, as men, bulls, bears, &c.; or to the images of some things known, as of a crown, a harp, a balance, &c.; or give them the names of those whose memories, in consideration of some notable exploit, they had a mind to transmit to future ages.

The division of the stars by images and figures is of great antiquity, and seems to be as old as astronomy itself: for in the most ancient book of Job, Orion, Arcturus, and the Pleiades, are mentioned: and we meet with the names of many of the constellations in the writings of the first poets, Homer and Hesiod.

The ancients, in their division of the firmament, took in only so much as came under their notice, distributing it into 48 constellations; but the modern astronomers comprehend the whole starry firmament, dividing it into three regions. See ASTRONOMY *Index*.

CONSTERNATION is defined by ethical writers to be an excess of horror, owing to the ill government of our admiration and fear: or such an immoderate degree of fear as confounds the faculties, and incapacitates a person for consultation and execution.

CONSTIPATION, in *Medicine*, a hardness of the belly, with great costiveness. See COSTIVENESS.

CONSTITUENT PART, in *Physiology*, an essential part in the composition of any thing, differing little from what is otherwise called *element* or *principle*.

CONSTITUTION, in matters of policy, signifies the form of government established in any country or kingdom.

CONSTITUTION also denotes an ordinance, decision, regulation, or law, made by authority of any superior, ecclesiastical or civil.

Apostolical CONSTITUTIONS, a collection of regulations attributed to the Apostles, and supposed to have been collected by St Clement, whose name they likewise bear.

It is the general opinion, however, that they are spurious, and that St Clement had no hand in them. They appeared first in the 4th age, but have been much changed and corrupted since that time. They are divided into eight books, consisting of a great number of rules and precepts, relating to the duties of Christians, and particularly the ceremonies and discipline of the church. Mr Whiston, in opposition to the general opinion, asserts them to be a part of the sacred writings, dictated by the Apostles in their meetings, and written down from their own mouths by St Clement; and intended as a supplement to the New Testament, or rather as a system of Christian faith and polity. The reason why the Constitutions are suspected by the orthodox, and perhaps the reason also why their genuineness is defended by Mr Whiston, is, that they seem to favour Arianism.

CONSTITUTION, in a physical sense, signifies the particular temperature of the body.

It is curious to observe, says Dr Percival, the revolution which hath taken place, within this century, in the constitutions of the inhabitants of Europe. Inflammatory diseases more rarely occur, and, in general, are much less rapid and violent in their progress than formerly (A); nor do they admit of the same antiphlogistic method of cure that was practised with success 100 years ago. The experienced Sydenham makes 40 ounces of blood the mean quantity to be drawn in the acute rheumatism; whereas this disease, as it now appears in the London hospitals, will not bear above half that evacuation. Vernal intermittents are frequently cured by a vomit and the bark, without venesection; which is a proof that at present they are accompanied with fewer symptoms of inflammation than they were wont to be. This advantageous change, however, is more than counterbalanced by the introduction of a numerous class of nervous ailments, in a great measure unknown to our ancestors; but which now prevail universally, and are complicated with almost every other distemper. The bodies of men are enfeebled and enervated; and it is not uncommon to observe very high degrees of irritability, under the external appearance of great strength and robustness. The hypochondria, palsies, cachexies, dropsies, and all those diseases which arise from laxity and debility, are in our days endemic everywhere; and the hysterics, which used to be peculiar to the women, as the name itself indicates, now attack both sexes indiscriminately. It is evident that so great a revolution could not be effected without a concurrence of many causes; but amongst these (according to Dr Percival), the present general use of tea * holds the first and principal rank. The second place may perhaps be allowed to excess in spirituous liquors. This pernicious custom, in many instances at least, owes its rise to the former, which, by the lowness and depression of spirits it occasions, renders it almost necessary to have recourse to something cordial and exhilarating. And hence proceed those odious and disgraceful habits of intemperance, with which many of the softer sex are now, alas! chargeable.

* See Tea.

CONSTRICTOR, an appellation given to several muscles,

(A) The decrease in the violence of inflammatory diseases may perhaps in part be ascribed to the present improved method of treating them. Moderate evacuations, cool air, acescent diet, and the liberal use of saline and antimonial medicines, are better adapted to check the progress of fevers, than copious bleedings, stimulating purgatives, and profuse sweats excited by theriaca and mithridate.

retinue, and it was requisite before he canvassed for the office to have discharged the functions of quæstor, edile, and prætor. Sometimes these qualifications were disregarded. Val. Corvinus was made a consul in his 23d year, and Scipio in his 24th. Young Marius, Pompey, and Augustus, were also under the proper age, when they were invested with the office, and Pompey had never been quæstor or prætor. The power of the consuls was unbounded, and they knew no superior but the gods and the laws; but after the expiration of their office their conduct was minutely scrutinized by the people, and misbehaviour was often punished by the laws. The badge of their office was the *prætexta*, a robe fringed with purple, afterwards exchanged for the *toga picta* or *palmata*. They were preceded by 12 lictors carrying the *fasces* or bundles of sticks, in the middle of which appeared an axe. The axe, as being the characteristic rather of tyranny than of freedom, was taken away from the *fasces* by Valerius Poplicola, but it was restored by his successor. They took it by turns monthly to be preceded by the lictors while at Rome, lest the appearance of two persons with the badges of royal authority should raise apprehensions in the multitude. While one appeared publicly in state, only a crier walked before the other, and the lictors followed behind without the fasces. Their authority was equal; yet the Valerian law gave the right of priority to the older, and the Julian law to him who had most children; and he was generally called *consul major* or *prior*. As their power was absolute, they presided over the senate, and could convene and dismiss it at pleasure. The senators were their counsellors; and among the Romans the manner of reckoning their year was by the name of the consuls, and by *M. Tull. Cicerone et L. Antonio Consulibus*, for instance, the year of Rome 689 was always understood. This custom lasted from the year of Rome 244 till 1294, or the 541st year of the Christian era. In public assemblies the consuls sat in ivory chairs, and held in their hand an ivory wand called *scipio eburneus*, which had an eagle on its top as a sign of dignity and power. When they had drawn by lot the provinces over which they were to preside during their consulship, they went to the capitol to offer their prayers to the gods, and intreat them to protect the republic; after this they departed from the city arrayed in their military dress and preceded by the lictors. Sometimes the provinces were assigned them without drawing by lot, by the will and appointment of the senators. At their departure they were provided by the state with whatever was requisite during their expedition. In their provinces they were both attended by the 12 lictors, and equally invested with regal authority. They were not permitted to return to Rome without the special command of the senate; and they always remained in the province till the arrival of their successor. At their return they harangued the people, and solemnly protested that they had done nothing against the laws or interest of their country, but had faithfully and diligently endeavoured to promote the greatness and welfare of the state. No man could be consul two following years; yet this institution was sometimes broken, and we find Marius re-elected consul after the expiration of his office during the Cimbrian war. The office of consul, so dignified during the times of the commonwealth, became a mere title under the emperors, and retained nothing of its authority but the useless ensigns of original dignity. Even the duration of the office, which was originally annual, was reduced to two or three months by Julius Cæsar; but they who were admitted on the first of January denominated the year, and were called *ordinarii*. Their successors during the year were distinguished by the name of *suffecti*. Tiberius and Claudius abridged the time of the consulship; and the emperor Commodus made no less than 25 consuls in one year. Constantine the Great renewed the original institution, and permitted them to be a whole year in office.

Consul, at present, is an officer established by virtue of a commission from the king and other princes, in all foreign countries of any considerable trade, to facilitate and dispatch business, and protect the merchants of the nation. The consuls are to keep up a correspondence with the ministers of England residing in the courts whereon their consulate depends. They are to support the commerce and the interest of the nation; to dispose of the sums given and the presents made to the lords and principals of places, to obtain their protection, and prevent the insults of the natives on the merchants of the nation.

CONSUMMATION, the end, period, or completion of any work. Thus, we say, the *consummation* of all things, meaning the end of the world. By the incarnation, all the prophecies are said to be *consummated*. See Prophecy and Accomplishment.

Consummation of Marriage, denotes the last act of marriage, which makes its accomplishment; or the most intimate union between the married pair, &c.

CONSUMPTION, in *Medicine*, a word of very extensive signification, implies all disorders that bring any decay or waste upon the constitution; but is most commonly used for the *phthisis pulmonalis*. See Medicine *Index*.

Consumption, in *Farriery*. See Farriery *Index*.

CONSUS, the pagan god of counsel. He had an altar under ground in the great circus at Rome, to show that counsel ought to be kept secret. See Consualia.

CONTACT, is when one line, plane, or body, is made to touch another; and the parts that do thus touch are called the *points* or *places of contact*.

CONTAGION, in *Physic*, the communicating a disease from one body to another. In some diseases it is only effected by an immediate contact or touch, as in syphilis; in others it is conveyed by infected clothes; and in others it is supposed to be transmitted through the air at a considerable distance, by means of steams or effluvia arising from the sick, as in the plague and other pestilential disorders, in which case the air is said to be contagious, though this has been disputed.

No attempts which have yet been made to investigate the nature of contagion, or to ascertain the properties of contagious matter, have proved successful. But from the means which have been effectually employed either to abate its virulence or to destroy it entirely, this matter may be fairly inferred to be of a chemical nature. We have already detailed the effects of the fumes of muriatic acid in purifying the cathedral of Dijon, which were successfully used by Morveau in sides his wife; and was amazed that all other contracts of civil society should be treated with due regard, whilst that of marriage, the most sacred and inviolable of obligations, was broken through with impunity; and that men should not blush to commit an infidelity with respect to their wives, of which, should their wives be guilty, it would throw them into the utmost anguish and fury.

4. Henry VI. king of England, though unhappy in his family and government, was nevertheless possessed of many virtues. He was so remarkable for his chastity, that before his marriage he would not allow any lady of a suspicious character and unguarded conduct to frequent the court: and having observed one day some ladies with their bosoms uncovered, he turned away his eyes from the indecent object, and reprimanded them smartly in the simple dialect of the times: "Fy, fy (said he), for shame; forsooth ye be to blame."

Rapin.

5. In the reign of King Charles II. when licentiousness was at its height in Britain, a yeoman of the guards refused the mistress of a king. The lady, who was dissatisfied with her royal lover, had fixed her eyes upon this man, and thought she had no more to do than speak her pleasure. He got out of her way. He refused to understand her; and when she pressed him further, he said, "I am married." The story reached the king, with all its circumstances; but they who expected an extravagant laugh upon the occasion were disappointed. He sent for the person: he found him a gentleman, though reduced to that mean station; and "Odds fish, man (says he), though I am not honest enough to be virtuous myself, I value them that are." He gave him an appointment, and respected him for life.

6. In many parts the poorest people are the most virtuous and honest in this respect. In the Swede's dominion, towards the pole, there is no name for adultery. They thought it an offence man could not commit against man; and have no word to express it in their language. The unpolished Lapland peasant, with these thoughts, is, as a human creature, much more respectable than the gay Briton, whose heart is stained with vices, and estranged from natural affection; and he is happier. The perfect confidence mutually reposed between him and the honest partner of his breast, entails a satisfaction even in the lowest poverty. It gilds the humble hearth, and lights the cabin; their homely meal is a sacrifice of thanks, and every breath of smoke arises in incense. If hand be laid upon hand, it is sure affection; and if some infant plays about their knees, they look upon him and upon each other with a delight that greatness seldom knows, because it feels distrust.

CONTINENT, in general, an appellation given to things continued without interruption; in which sense we say, *continent fever*, &c.

CONTINENT, in *Geography*, a great extent of land not interrupted by seas, in contradistinction to island and peninsula, &c. See GEOGRAPHY. Sicily is said to have been anciently torn from the continent of Italy; and it is an old tradition, which some of our antiquaries still have a regard to, that Britain was formerly a part of the continent of France.

The world is usually divided into two great continents, the old and the new. Whether there exists in the southern hemisphere another continent, or the whole be only an immense watery region, is a question that for near three centuries has engaged the attention of the learned as well as the commercial world, and given rise to many interesting voyages and discoveries; concerning which, see the article *SOUTH-Sea*.

CONTINGENT, something casual or unusual.—Hence future contingent denotes a conditional event which may or may not happen, according as circumstances fall out.

CONTINGENT, is also a term of relation for the quota that falls to any person upon a division. Thus each prince of Germany in time of war is to furnish so many men, so much money, and munition, for his contingent.

CONTINUED, or CONTINUAL, in a general sense, means incessant, or proceeding without interruption.

CONTINUED Fever, is such a one as sometimes remits, but never intermits or goes entirely off till its period.

CONTINUED Bass, in *Music*, thus called, says Rousseau, because it is continued through the whole piece. Its principal use, besides that of regulating the harmony, is to support the voice, and preserve the tone.—They pretend that it was one Ludovico Viana, of whom a treatise still remains, who towards the end of the last century first put the continued bass in practice.

CONTINUED Proportion, in *Arithmetic*, is that where the consequent of the first ratio is the same with the antecedent of the second; as $4 : 8 :: 8 : 16$; in contradistinction to discrete proportion.

CONTINUITY, is defined by some schoolmen the immediate cohesion of parts in the same quantum: by others, a mode of body, whereby its extremities become one: and by others, a state of body resulting from the mutual implication of its parts. There are two kinds of continuity, mathematical and physical. The first is merely imaginary, since it supposes real or physical parts where there are none. The other, or physical continuity, is that state of two or more particles, in which their parts are so mutually implicated as to constitute one uninterrupted quantity or continuum.

CONTINUO, in *Music*, signifies the thorough bass, as *basso continuo* is the continual or thorough bass, which is sometimes marked in music-books by the letters B. C.

CONTOBABDITES, a sect in the sixth century. Their first leader was Severus of Antioch; who was succeeded by John the grammarian, surnamed Philoponus, and one Theodosius, whose followers were also called *Theodosians*. Part of them, who were willing to receive a book composed by Theodosius on the Trinity, made a separate body, and were called *Contobabdites*, from some place, which Nicephorus does not mention, but which must apparently have been the place where they held their assemblies. The Contobabdites allowed of no bishops; which is the only circumstance given us concerning them.

CONTOR, CONDOR, or CUNDUR, the American name

name of a species of VULTURE. See ORNITHOLOGY *Index*.

CONTORSION, in general, signifies the action of twisting or wresting a member of the body out of its natural situation. Rope-dancers accustom themselves to contorsions of their limbs from their youth, to render the fibres of their articulations lax, and supple to all kinds of postures.

CONTORSION, in *Medicine*, has many significations. 1. It denotes the iliac passion. 2. An incomplete dislocation, when a bone is in part, but not entirely, forced from its articulation. 3. A dislocation of the vertebræ of the back sidewise, or crookedness of these vertebræ. And, 4. A disorder of the head, in which it is drawn towards one side, either by a spasmodic contraction of the muscles on the same side, or a palsy of the antagonist muscles on the other.

CONTORTÆ, the name of the 30th order in Linnæus's Fragments of a natural method, consisting of plants which have a single petal, which is twisted or bent to one side. This order contains the following genera, viz. echites, cerbera, gardenia, genipa, microcnemum, nerium, periploca, rawolfia, tabernæmontana, vinca, apocynum, asclepias, comeraria, ceropegia, cynanchum, plumeria, stapelia. See BOTANY *Index*.

CONTOUR, in *Painting*, the outline, or that which defines a figure.

A great part of the skill of the painter lies in managing the contours well. Contour, with the Italian painters, signifies the lineaments of the face.

CONTOURNE, in *Heraldry*, is used when a beast is represented standing or running with its face to the sinister side of the escutcheon, they being always supposed to look to the right, if not otherwise expressed.

CONTOURNIATED, a term among antiquaries applied to medals, the edges of which appear as if turned in a lathe. This sort of work seems to have had its origin in Greece; and to have been designed to perpetuate the memories of great men, particularly those who had borne away the prize at the solemn games. Such are those remaining of Homer, Solon, Euclid, Pythagoras, Socrates, and several athletæ.

CONTRA-HARMONICAL *Proportion*, is that relation of three terms, in which the difference of the first and second is to the difference of the second and third, as the third is to the first. Thus, for instance, 3, 5, and 6, are numbers contra-harmonically proportional; for 2 : 1 :: 6 : 3.

CONTRA-Mure, in *Fortification*, is a little wall built before another partition wall, to strengthen it, so that it may receive no damage from the adjacent buildings.

CONTRABAND, in *Commerce*, a prohibited commodity or merchandise, bought or sold, imported or exported, in prejudice to the laws and ordinances of a state, or the public prohibitions of the sovereign. Contraband goods are not only liable to confiscation themselves, but also subject all other allowed merchandise found with them in the same box, bale, or parcel, together with the horses, waggons, &c. which conduct them. There are contrabands likewise, which, besides the forfeiture of the goods, are attended with several penalties and disabilities.

CONTRACT, in a general sense, a mutual consent of two or more parties, who voluntarily promise and oblige themselves to do something; pay a certain sum, or the like. All donations, exchanges, leases, &c. are so many different contracts.

CONTRACT is particularly used, in common law, for an agreement or covenant between two, with a lawful consideration or cause. As, if I sell my horse for money; or covenant, in consideration of 20l. to make you a lease of a farm; these are good contracts, because there is *quid pro quo*.

Usurious CONTRACT, is a contract to pay more interest for money than the law allows. See USURY.

Those contracts are said to be *null* which the law prohibits the making of; such are all contracts between persons incapable of contracting, as minors, religious, lunatics, wives without consent of their husbands, &c.

CONTRACT is also used for the instrument in writing, which serves as a proof of the consent granted, and the obligation passed between the parties.

Among the ancient Romans, contracts, and all voluntary acts, were written, either by the parties themselves, or by one of the witnesses, or by a domestic secretary of one of the parties, whom they called a *notary*, but who was no public person as among us.

The contract, when finished, was carried to the magistrate, who gave it a public authority by receiving it *inter acta*, into the number of acts under his jurisdiction; giving each of the parties a copy thereof, transcribed by his clerks or domestic registers, and sealed with his seal. Which practice passed into France, where it obtained a long time.

CONTRACTILE FORCE, that property or power inherent in certain bodies, whereby, when extended, they are enabled to draw themselves up again to their former dimensions.

CONTRACTION, in *Physics*, the diminishing the extent or dimensions of a body, or the causing its parts to approach nearer to each other; in which sense it stands opposed to dilation or expansion.

CONTRACTION is frequently used by anatomical writers, to express the shrinking up of a fibre, or an assemblage of fibres, when extended.

Convulsions and spasms proceed from a preternatural contraction of the fibres of the muscles of the part convulsed. On the contrary, paralytic disorders generally proceed from a too great laxness of the fibres of the part affected; or from the want of that degree of contraction necessary to perform the natural motion or action of the part. In the first, therefore, the animal spirits are supposed to flow, either in too great a quantity, or irregularly; and, in the last, the animal spirits are either denied a free passage into the part affected, or the tension of the fibrillæ is supposed insufficient to promote the circulation.

CONTRACTION, in *Grammar*, is the reducing of two syllables into one, as *can't* for *cannot*, *should'st* for *shouldest*, &c.

CONTRADICTION, a species of direct opposition, wherein one thing is found diametrically opposite to another.

CONTRADICTORY PROPOSITIONS, are opposite sites, one of which imports a mere and naked denial of the other.

Seeming contradictories is when the members of a period quite disagree in appearance and sound, but perfectly agree and are consistent in sense: thus,

> Cowards die many times before their death:
> The valiant never taste of death but once.
>
> SHAKESPEARE.

CONTRAFISSURE, in *Surgery*, a kind of fracture, or fissure, in the cranium, which sometimes happens on the side opposite to that which received the blow, or at least at some distance from it.

CONTRAINDICATION, in *Medicine*, is an indication which forbids that to be done which the main scope of a disease points out.

Suppose, e. gr. in the cure of a disease a vomit were judged proper; if the patient be subject to a vomiting of blood, it is a sufficient contraindication as to its exhibition.

CONTRARIETY, an opposition between two things, which imports their being contrary to one another; and consists in this, that one of the terms implies a negation of the other, either mediately or immediately; so that contrariety may be said to be the contrast, or opposition of two things, one of which imports the absence of the other, as love and hatred.

CONTRAST; opposition or dissimilitude of figures, by which one contributes to the visibility or effect of the others. See RESEMBLANCE.

CONTRAST, in *Painting* and *Sculpture*, expresses an opposition or difference of position, attitude, &c. of two or more figures, contrived to make variety in a painting, &c.; as where, in a group of three figures, one is shown before, another behind, and another sidewise, they are said to be in contrast.

The contrast is not only to be observed in the position of several figures, but also in that of the several members of the same figures: thus, if the right arm advance farthest, the right leg is to be hindermost; if the eye be directed one way, the arm to go to the contrary way, &c. The contrast must be pursued even in the drapery.

CONTRAST, in *Architecture*, is to avoid the repetition of the same thing, in order to please by variety.

CONTRATE-WHEEL, in watch-work, that next to the crown, the teeth and hoop whereof lie contrary to those of the other wheels, from whence it takes its name. See *WATCH Making*.

CONTRAVALLATION, or *the Line of CONTRAVALLATION*, in *Fortification*, a trench guarded with a parapet, and usually cut round about a place by the besiegers, to secure themselves on that side, and to stop the sallies of the garrison. See FORTIFICATION.

CONTRAVENTION, in *Law*, a man's failing to discharge his word, obligation, duty, or the laws or customs of the place.

CONTRAYERVA. See DORSTENIA, BOTANY *Index*.

CONTRE, in *Heraldry*, an appellation given to several bearings, on account of their cutting the shield contrary and opposite ways: thus we meet with contre-bend, contre-chevron, contre-pale, &c. when there are two ordinaries of the same nature opposite to each other, so as colour may be opposed to metal, and metal to colour.

CONTRIBUTION, the payment of each person's quota of the part he is to bear in some imposition, or common expence. See CONTINGENT, &c.—Contributions are either involuntary, as those of taxes and imposts; or voluntary, as those of expences for carrying on some undertaking for the interest of the community.

CONTRIBUTIONS, in a military sense, are impositions paid by frontier countries to secure themselves from being plundered and ruined by the enemy's army. The peasants till their ground under the faith of contributions, as securely as in the time of profound peace.

CONTRITION, in *Theology*, a sorrow for our sins, resulting from the reflection of having offended God, from the sole consideration of his goodness, without any regard to the punishment due to the trespass, and attended with a sincere resolution of forsaking them. The word is derived from the Latin *conterere*, to break or bruise.

CONTROL is properly a double register kept of acts, issues, &c. of the officers or commissioners in the revenue, army, &c. in order to perceive the true state thereof, and to certify the truth, and the due keeping of the acts subject to the enregisterment.

CONTROLLER, an officer appointed to control or oversee the accounts of other officers; and, on occasion, to certify whether or not things have been controlled.

In Britain we have several officers of this name; as controller of the king's house, controller of the navy, controller of the customs, controller of the mint, &c.

CONTROLLER of the Hanaper, an officer who attends the lord chancellor daily, in term and in seal-time, to take all things sealed in leathern bags from the clerks of the hanaper, and to mark the number and effect thereof, and to enter them in a book, with all the duties belonging to the king and other officers for the same, and so charge the clerk of the hanaper with them.

CONTROLLER of the Household, the second officer under the lord steward. The name of his office comes from the French word *contrerouler*. His office is to control the accounts and reckonings of the Green Cloth, of which board he is always a member. He carries a white staff, and is always one of the privy-council. He has 107l. 17s. 6d. a-year wages, and 1092l. 2s. 6d. board wages.

CONTROLLER of the Pipe, an officer of the exchequer, who makes out a summons twice every year, to levy the farms and debts of the pipe. See PIPE and EXCHEQUER.

CONTROLLERS of the Pells, two officers of the exchequer who are the chamberlain's clerks, and keep a control of pell of the receipts and goings out.

CONTUMACY, in *Law*, a refusal to appear in court when legally summoned, or the disobedience to the rules and orders of a court having power to punish such offence.

CONTUSION, in *Medicine* and *Surgery*, any hurt of the body that is inflicted by a blunt instrument. See SURGERY.

CONVALESCENCE, in *Medicine*, the insensible recovery of health; or that state in which, after the cure of a disorder, the body which has been reduced, has not yet regained its vigour, but begins to resume its powers. Proper aliments conduce to the re-establishment of the languid faculties; but as the tone of the bowels is weakened, the digestive faculty is not equal to its office, which is shown by light sweats over the whole body; and the smallest excess in this respect is oftentimes the occasion of dangerous relapses. A person in this state is like a taper relumined, which the least degree of wind is sufficient to extinguish.

CONVALLARIA, or *Lily of the Valley*, in *Botany*, a genus of plants, belonging to the hexandria class; and in the natural method ranking under *Sarmentaceæ*. See BOTANY *Index*.

CONVENARUM URBS, or *Lugdunum*, in *Ancient Geography*, a town of the Convenæ, a people of Gallia Narbonensis, at the foot of the Pyrenees. Its origin was owing to the Sertorian war, Pompey compelling the robbers of the Pyrenees and fugitive slaves to settle there, (Pliny.) It stood near the head of the Garonne. Now St Bertrand, in Gascony. E. Long. 30. Lat. 43. 15.

CONVENTICLE, a diminutive of convent; denoting, properly, a cabal, or secret assembly, of a part of the monks of a convent, to make a brigue or party in the election of an abbot. From the ill use of these assemblies, the word is come into disrepute; and now stands for any mischievous, seditious, or irregular assembly. F. Doucine observes, the occidentals always esteemed the fifth general council an unlawful conventicle.

The term conventicle is said, by some, to have been first applied in England to the schools of Wickliff, and has been since used to signify the religious assemblies of all in that country who do not conform to the established doctrines and worship of the church of England.

By 22 Car. II. cap. 1. it is enacted, That if any persons of the age of 16 years, subjects of this kingdom, shall be present at any conventicle, where there are five or more assembled, they shall be fined 5s. for the first offence, and 10s. for the second; and persons preaching incur a penalty of 20l. Also suffering a meeting to be held in a house, &c. is liable to 20l. penalty. Justices of peace have power to enter such houses, and seize persons assembled, &c. And if they neglect their duty, they shall forfeit 100l. And if any constable, &c. know of such meetings, and do not inform a justice of peace, or chief magistrate, &c. he shall forfeit 5l. But the 1st W. and M. cap. 18. ordains, that protestant dissenters shall be exempt from penalties: though, if they meet in a house with the doors locked, barred, or bolted, such dissenters shall have no benefit from 1 W. and M. Officers of the government, &c. present at any conventicle, at which there shall be ten persons, if the royal family be not prayed for in express words, shall forfeit 40l. and be disabled (Stat. 10 Anne, cap. 2.)

CONVENTION, a treaty, contract, or agreement between two or more parties.

CONVENTION is also a name given to an extraordinary assembly of parliament, or the estates of the realm, held without the king's writ. Of this kind was the convention parliament which restored Charles II. This parliament met above a month before his return, and sat full seven months after his restoration, and enacted several laws still in force, which were confirmed by stat. 13 Car. II. c. 7. and c. 14. Such also was the convention of estates in 1688, who upon the retreat of King James II. came to a conclusion that he had abdicated the throne, and that the right of succession devolved to King William and Queen Mary; whereupon their assembly expired as a convention, and was converted into a parliament.

Convention of Estates, in Scotland, was partly of the nature of a parliament; but differing in this, that the former could only lay on taxes, while parliament could both impose taxes and make laws.

CONVENTUAL, something belonging to a convent or monastery. See MONASTERY, and COENOBITE.

CONVENTUAL, is particularly used for a religious who actually resides in a convent; in contradistinction to those who are only guests, or are entertained there, or are in possession of benefices depending on the house. See MONK.

CONVENTUS JURIDICI, were courts of justice established in the Roman provinces; with a resort or extent of jurisdiction, circumscribed and confined within certain limits of district, whither all who were of the resort were to repair for justice. The unseasonable affectation of changing forms of war into forms of civil courts, proved the ruin of Varus and of three legions in Germany, (Florus). *Conventum agere* is to hold a court of justice.

CONVERGING or *Convergent Lines*, in *Geometry*, are such as continually approach nearer one another, or whose distances become still less and less. These are opposed to divergent lines, the distances of which become continually greater: those lines which converge one way, diverge the other.

Converging Rays, in *Optics*, those rays that issuing from divers points of an object, incline towards one another, till at last they meet and cross, and then become diverging rays.

Converging Series, a series of terms or quantities that always decrease the farther they proceed, or which tend to a certain magnitude or limit: in opposition to diverging series, or such as become continually larger and larger.

CONVERSATION, or DISCOURSE, signifies an interlocution between two, or among more persons: with this distinction, that conversation is used for any general intercourse of sentiments whatever, whereas a discourse means a conversation limited to some particular subject.

There is no part, perhaps, of social life, which affords more real satisfaction than those hours which one passes in rational and unreserved conversation. That conversation, however, may answer the ends for which it was designed, the parties who are to join in it must come together with a determined resolution to please, and to be pleased.

In

In the conduct of it, be not eager to interrupt others, or uneasy at being yourself interrupted; since you speak either to amuse or instruct the company, or to receive those benefits from it. Give all, therefore, leave to speak in turn. Hear with patience, and answer with precision. Inattention is ill manners; it shows contempt; and contempt is never forgiven.

Trouble not the company with your own private concerns, as you do not love to be troubled with those of others. Yours are as little to them as theirs are to you. You will need no other rule whereby to judge of this matter.

Contrive, but with dexterity and propriety, that each person may have an opportunity of discoursing on the subject with which he is best acquainted. He will be pleased, and you will be informed. By observing this rule, every one has it in his power to assist in rendering conversation agreeable; since, though he may not choose, or be qualified, to say much himself, he can propose questions to those who are able to answer them.

Avoid stories, unless short, pointed, and quite *apropos*. He who deals in them, says Swift, must either have a very large stock, or a good memory, or must often change his company. Some have a set of them strung together like onions; they take possession of the conversation by an early introduction of one, and then you must have the whole rope; and there is an end of every thing else, perhaps, for that meeting, though you may have heard all twenty times before.

Talk often, but not long. The talent of haranguing private company is insupportable. Senators and barristers are apt to be guilty of this fault; and members who never harangue in the house will often do it out of the house. If the majority of the company be naturally silent, or cautious, the conversation will flag, unless it be often renewed by one among them who can start new subjects. Forbear, however, if possible, to broach a second before the first is out, lest your stock should not last, and you should be obliged to come back to the old barrel. There are those who will repeatedly cross upon and break into the conversation with a fresh topic, till they have touched upon all and exhausted none. Economy here is necessary for most people.

Laugh not at your own wit and humour; leave that to the company.

When the conversation is flowing in a serious and useful channel, never interrupt it by an ill-timed jest. The stream is scattered, and cannot be again collected.

Discourse not in a whisper or half-voice, to your next neighbour. It is ill-breeding, and, in some degree, a fraud; conversation-stock being, as one has well observed, a joint and common property.

In reflections on absent people, go no farther than you would go if they were present. "I resolve (says Bishop Beveridge) never to speak of a man's virtues to his face, nor of his faults behind his back:"—A golden rule! the observation of which would, at one stroke, banish flattery and defamation from the earth.

CONVERSE, in *Mathematics*. One proposition is called the *converse* of another, when, after a conclusion is drawn from something supposed in the converse proposition, that conclusion is supposed; and then, that which in the other was supposed, is now drawn as a conclusion from it: thus when two sides of a triangle are equal, the angles under these sides are equal; and, on the converse, if these angles are equal, the two sides are equal.

CONVERSION, in a moral sense, implies a repentance for a temper and conduct unworthy our nature, and unbecoming our obligations to its Author, and a resolution to act a wiser and a better part for the future.

CONVERSION, in *War*, a military motion, whereby the front of a battalion is turned where the flank was, in case the battalion is attacked in the flank.

CONVERSION of Equations, the same with reduction of equations by multiplication. See ALGEBRA.

CONVERT, a person who has undergone a conversion.

CONVERT is chiefly used in respect of changes from one religion, or religious sect, to another. Converts with relation to the religion turned to, are denominated *apostates* with regard to that they have relinquished.

The Jews formerly converted to Christianity in England, were called *conversos*. Henry III. built them a house in London, and allowed them a competent subsistence for their lives; which house was called *domus conversorum*. But the number afterwards increasing, they grew a burden to the crown; upon which they were distributed among the monasteries: and after the expulsion of the Jews under Edward III. the *domus conversorum* was given for keeping of the rolls.

CONVERTS, in a monastic sense, are lay-friars, or brothers, admitted for the service of the house; without orders, and not allowed to sing in the choir. Till the eleventh century, the word was used for persons who embraced the monkish life at the age of discretion; by which they were distinguished from those devoted in their childhood by their parents, called *oblati*. But in the eleventh century, when they began to receive into monasteries illiterate persons, incapable of being clerks, and only destined for bodily labour, the signification of the word was necessarily changed. F. Mabillon observes, that it was John first abbot of Vallombrosa who first introduced these brother converts, distinguished by their state from the monks of the choir, who were then either clerks or capable of becoming so.

CONVEX, an appellation given to the exterior surface of gibbous or globular bodies; in opposition to the hollow inner surface of such bodies, which is called *concave;* thus we say, a convex frieze, lens, mirror, superfices, &c.

CONVEXITY, the exterior surface of a convex, i. e. gibbous and globular thing; in opposition to concavity, or the inner surface, which is hollow or depressed. See CONCAVE.

The word is of particular import in catoptrics and dioptrics; where it is applied to mirrors and lenses.

A convex mirror represents its images smaller than the objects; as a concave one represents them larger: a convex mirror reflects the rays from it, diverging: and therefore disperses and weakens their effect: as a concave one reflects them converging; so as they concur in a point, and have their effect increased; and by how much the mirror is a portion of a smaller sphere by so much does it diminish the objects, and disperse the rays the more. See MIRROR.

A convex lens is either convex on both sides, called a *convexo-convex;* or it is plain on one side and convex on the other, called a *plano-convex;* or concave on one side and convex on the other, called a *convexo-concave*, or *concavo-convex*, as the one or the other surface prevails, i. e. as this or that is a portion of a smaller sphere. All convex lenses inflect the rays of light in their passage, i. e. send them out from their convex surface converging, so that they concur in a point or focus. Hence all convex lenses magnify, i. e. represent their images larger than their objects; and this the more as they are portions of smaller spheres.

CONVEYANCE, in *Law*, a deed or instrument that passes land, &c. from one person to another.

CONVICT, in common law, a person that is found guilty of an offence by the verdict of a jury. See the following article.

CONVICTION, in *Law*. When a jury has given a verdict upon trial, finding the prisoner guilty, he is said to be *convicted* of the crime whereof he stands indicted. See TRIAL.

When the offender is thus convicted, there are two collateral circumstances that immediately arise. 1. On a conviction in general for any felony, the reasonable expences of prosecution are by stat. 25 Geo. II. c. 36. to be allowed the prosecutor out of the country-stock, if he petitions the judge for that purpose; and by statute 17 Geo. II. c. 3. poor persons, bound over to give evidence, are likewise entitled to be paid their charges, as well without conviction as with it. 2. On a conviction of larceny in particular, the prosecutor shall have restitution of his goods by virtue of the statute 21 Hen. VIII. c. 11. For by the common law there was no restitution of goods upon an indictment; because it is at the suit of the king only; and therefore the party was enforced to bring an appeal of robbery, in order to have his goods again. But, it being considered that the party prosecuting the offender by indictment, deserves to the full as much encouragement as he who prosecutes by appeal, this statute was made, which enacts, that if any person be convicted of larceny by the evidence of the party robbed, he shall have full restitution of his money, goods, and chattels, or the value of them out of the offender's goods, if he has any, by a writ to be granted by the justices. And the construction of this act having been in great measure conformable to the law of appeals, it has therefore in practice superseded the use of appeals of larceny. For instance, as formerly upon appeals, so now upon indictments of larceny, this writ of restitution shall reach the goods so stolen, notwithstanding the property of them is endeavoured to be altered by sale in market overt. And though this may seem somewhat hard upon the buyer, yet the rule of law is, that *spoliatus debet ante omnia restituti*, especially when he has used all the diligence in his power to convict the felon. And, since the case is reduced to this hard necessity, that either the owner or the buyer must suffer, the law prefers the right of the owner, who has done a meritorious act by pursuing a felon to condign punishment, to the right of the buyer, whose merit is only negative, that he has been guilty of no unfair transaction. And it is now usual for the court, upon the conviction of a felon, to order, without any writ, immediate restitution of such goods as are brought into court, to be made to the several prosecutors. Or else, secondly, without such writ of restitution, the party may peaceably retake his goods wherever he happens to find them, unless a new property be fairly acquired therein. Or, lastly, if the felon be convicted and pardoned, or be allowed his clergy, the party robbed may bring his action of trover against him for his goods, and recover a satisfaction in damages. But such action lies not before prosecution; for so felonies would be made up and healed: and also recaption is unlawful, if it be done with intention to smother and compound the larceny; it then becoming the heinous offence of *theft-bote*.

It is not uncommon, when a person is convicted of a misdemeanour, which principally and more immediately affects some individual, as a battery, imprisonment or the like, for the court to permit the defendant to *speak with the prosecutor*, before any judgment is pronounced; and if the prosecutor declares himself satisfied, to inflict but a trivial punishment. This is done to reimburse the prosecutor his expences, and make him some private amends, without the trouble and circuity of a civil action. But it is surely a dangerous practice; and, though it may be entrusted to the prudence and discretion of the judges in the superior courts of record, it ought never to be allowed in local or inferior jurisdictions, such as the quarter-sessions; where prosecutions for assaults are by this means too frequently commenced, rather for private lucre than for the great ends of public justice. Above all, it should never be suffered, where the testimony of the prosecutor himself is necessary to convict the defendant; for by this means the rules of evidence are entirely subverted; the prosecutor becomes in effect a plaintiff, and yet is suffered to bear witness for himself. Nay, even a voluntary forgiveness by the party injured, ought not, in true policy, to intercept the stroke of justice. "This (says an elegant writer who pleads with equal strength for the *certainty*, as for the lenity of punishment) may be an act of good nature and humanity, but it is contrary to the good of the public. For although a private citizen may dispense with satisfaction for his private injury, he cannot remove the necessity of public example. The right of punishing belongs not to any one individual or particular, but to the society in general, or to the sovereign who represents that society; and a man may renounce his own portion of this right, but he cannot give up that of others."

CONVICTION, in *Theology*, expresses the first degree of repentance, wherein the sinner becomes sensible of his guilt, of the evil nature of sin, and of the danger of his own ways.

CONVOCATION, an assembly of the clergy of England, by their representatives, to consult of ecclesiastical matters. It is held during the session of parliament, and consists of an upper and a lower house. In the upper sit the bishops, and in the lower the inferior clergy, who are represented by their proctors; consisting of all the deans and archdeacons, of one proctor for

for every chapter, and two for the clergy of every diocese, in all 143 divines; viz. 22 deans, 53 archdeacons, 24 prebendaries, and 44 proctors of the diocesan clergy. The lower house chooses its prolocutor; whose business it is to take care that the members attend, to collect their debates and votes, and to carry their resolutions to the upper house. The convocation is summoned by the king's writ, directed to the archbishop of each province, requiring him to summon all bishops, deans, archdeacons, &c.

The power of the convocation is limited by a statute of Henry VIII. They are not to make any canons or ecclesiastical laws without the king's license; nor when permitted to make any, can they put them in execution, but under several restrictions. They have the examining and censuring all heretical and schismatical books and persons, &c. but there lies an appeal to the king in chancery, or to his delegates. The clergy in convocation, and their servants, have the same privileges as members of parliament.

Since the year 1665, when the convocation of the clergy gave up the privilege of taxing themselves to the house of commons, they seldom have been allowed to do any business; and are generally prorogued from time to time till dissolved, a new one being generally called along with a new parliament. The only equivalent for giving up the privilege of taxing themselves, was their being allowed to vote at elections for members to the house of commons, which they had not before.

CONVOLUTION, a winding motion, proper to the trunks of some plants, as the convolvulus, or bindweed; the claspers of vines, bryony, &c.

CONVOLVULUS, BIND-WEED; a genus of plants of the pentandria class, and in the natural method ranking under the 20th order, *Campanaceæ*. See BOTANY and MATERIA MEDICA *Index*.

CONVOY, in naval affairs, one or more ships of war, employed to accompany and protect merchant ships, and prevent their being insulted by pirates, or the enemies of the state in time of war.

CONVOY, in military matters, a body of men that guard any supply of men, money, ammunition, or provisions, conveyed by land into a town, army, or the like, in time of war.

CONUS, a CONE, in *Botany;* a species of fruit or scaly seed-vessel, so termed by Tournefort and other botanists. Linnæus has substituted STROBILUS in its place.

CONUS, the *Cone-shell*, a genus of shells. See CONCHOLOGY *Index*.

CONVULSION, a preternatural and violent contraction of the membranous and muscular parts of the body. See MEDICINE *Index*.

CONWAY, a market-town of Caernarvonshire in North Wales, situated near the mouth of a river of the same name, 15 miles west of St Asaph. W. Long. 3. 50. N. Lat. 53. 20.

CONYZA, FLEABANE; a genus of plants of the syngenesia class, ranking under the 49th natural order, *Compositæ*. See BOTANY *Index*.

CONZA, a town of the kingdom of Naples in Italy, situated in the farther principate, on the river Offanto, 50 miles south-east of the city of Naples. E. Long. 15. 39. N. Lat. 41. 0. It is the see of an archbishop.

COOK, SIR ANTHONY, descended from Sir Thomas Cook lord mayor of London, was born in 1506, and supposed to have been educated at Cambridge. He was so eminent for his learning, piety, and prudence, that the guardians of King Edward VI. appointed him to be his chief instructor in learning, and to form his manners. He had four daughters; and being resolved to have sons by education, lest he should have none by birth, he taught his daughters those lessons by night that he had instilled into the prince by day; he was happy in his endeavours, as they proved learned in Greek and Latin, and equally distinguished by virtue, piety, and good fortune. Mildred was married to the great Lord Burleigh: Ann to Sir Nicholas Bacon, lord keeper of the great seal; Elizabeth to Sir John Russel, son and heir of Francis earl of Bedford; and Catharine to Sir Henry Killigrew. He lived in exile during the Marian persecution; and returning on the accession of Queen Elizabeth, spent the rest of his days in peace and honour, dying in 1576.

COOK, *Captain James*, one of the ablest and most celebrated navigators of any country, was the son of James Cook, a labourer or servant in husbandry, and supposed to have been a native of the county of Northumberland, and was born on the 27th of October 1728, at the village of Marton in the north riding of Yorkshire. He was one of nine children, all of whom are now dead except a daughter, who married a fisherman of Redcar. He received the first rudiments of education from the schoolmistress of the village; and afterwards, on his father's removal to Great Ayton, he was put to a day-school, at the expence of Mr Skottow his father's employer, where he was instructed in writing and in a few of the first rules of arithmetic. Before the age of thirteen he was bound apprentice to Mr W. Sanderson, haberdasher or shopkeeper at Straiths, about ten miles from Whitby: but some disagreement taking place between him and his master, he indulged his own inclination in binding himself apprentice to Messrs Walkers of Whitby, who had several vessels in the coal trade; and after serving a few years longer in the situation of a common sailor, he was at length raised to be mate of one of Mr Walker's ships. During all this period it is not recollected that he exhibited any thing peculiar either in his abilities or conduct.

Early in the year 1755, when hostilities broke out between France and England, Cook entered on board the Eagle of sixty guns, to which vessel Sir Hugh Palliser was soon after appointed, who soon distinguished him as an active and diligent seaman; and his promotion was forwarded by a letter of recommendation which was written by Mr Osbaldeston, member for Scarborough, at the request of several neighbours, in Mr Cook's favour. On the 15th of May 1759, he was appointed master of the Mercury, which soon after sailed to America, and joined the fleet under Sir Charles Saunders at the memorable siege of Quebec. His interest with the admiralty appears even then to have been very strong; for on Mr Osbaldeston's letter he was appointed master of the Grampus sloop; but the proper master having unexpectedly returned to her,

her, the appointment did not take place. Four days after, he was made master of the Garland; when upon inquiry it was found that he could not join her, as the vessel had already sailed: and the next day, May 15th 1759, he was made master of the Mercury. On this occasion he was recommended by Captain Palliser to a difficult and dangerous service, viz. to take the soundings of the river St Lawrence, between the island of Orleans and the north shore, which he performed in the most complete manner; and soon afterwards he was employed to survey the most dangerous parts of the river below Quebec: these were his first efforts with the pencil. After this expedition he was appointed, on the 22d of September, master of the Northumberland, stationed at Halifax, where he first read Euclid, and applied to astronomy and other branches of science. In the year 1762, he was with the Northumberland, assisting at the recapture of Newfoundland; and in the latter end of the same year he returned to England, and married, at Barking in Essex, Miss Elizabeth Batts. Early in 1763, when Admiral (then Captain) Greaves was appointed governor of Newfoundland, Mr Cook went out with him to survey the coasts of that island. At the end of the season he returned to England; but in the beginning of 1764, Sir Hugh Palliser being appointed governor of Newfoundland and Labradore, Mr Cook accompanied him in the same capacity of surveyor, and had the Granville schooner to attend him on that business: in this situation he continued till 1767.

While Mr Cook remained on this station, he had an opportunity of exhibiting publicly a specimen of his progress in the study of astronomy, in a short paper printed in the 57th volume of the Philosophical Transactions, entitled "An observation of an eclipse of the sun at the island of Newfoundland, August 5. 1766, with the longitude of the place of observation deduced from it." Mr Cook's observation was made at one of the Burgeo islands near Cape Ray, in N. Lat. 47° 56′ 19″; and by the comparisons of it made by Mr Mitchel, with an observation of Dr Hornsby at Oxford, it appeared to have been accurately done; and Mr Cook at that time obtained the character of an able astronomer.

In the mean time, a spirit for geographical discoveries, which had gradually declined since the beginning of the 17th century, began to discover itself anew. Two voyages of this kind had been performed in the reign of George II. the one under Captain Middleton, the other by Captains Moore and Smyth, with a view to discover a north-west passage through Hudson's Bay to the East Indies. Two others, under Captains Byron, Wallis, and Carteret, had been undertaken soon after the conclusion of the peace in 1763, by order of his present majesty; and before the return of these navigators, who were ordered to sail round the world, another voyage was resolved upon for astronomical purposes. It having been calculated that a transit of Venus over the sun's disk would happen in 1767, a long memorial to his majesty was presented by the Royal Society; in which they set forth the great importance of making proper observations on this phenomenon; the regard that had been paid to it by the different courts of Europe; and intreating, among other things, that a vessel might be fitted out, at the expence of government, for conveying proper persons to some of the Friendly islands, in order to make the necessary observations. This being complied with on the part of his majesty, Alexander Dalrymple, Esq. an eminent member of the Royal Society, was appointed to take the command of the bark appropriated for the purpose. In the execution of the project, however, an unexpected difficulty occurred. Mr Dalrymple, sensible of the impossibility of guiding a vessel through unknown and dangerous seas without any proper command over the crew, demanded a brevet commission as captain of the vessel, in the same manner as had formerly been granted to Dr Halley in a voyage of discovery made by him. This commission Sir Edward Hawke absolutely refused to sign; declaring, when pressed upon the subject, that he would rather suffer his right hand to be cut off, than trust any of his majesty's ships to a person who had not been properly bred to the service; and in this proceeding he seemed to be justified by the mutinous behaviour of Dr Halley's crew; who, denying the legality of his authority over them, had involved him in a very disagreeable dispute, and which was attended with pernicious consequences. Mr Dalrymple, on the other hand, being equally determined in his refusal to proceed without the authority in question, there was a necessity for finding out some person of science who might also be free from the objection made by Sir Edward Hawke. Mr Cook therefore was proposed by Mr Stephens; and his recommendation being seconded by Sir Hugh Palliser, he was immediately appointed to direct the expedition; and on this occasion was promoted to the rank of lieutenant in his majesty's service.

Mr Cook's commission as lieutenant was dated May 25. 1768; a vessel of 370 tons, named the *Endeavour*, was provided for him; and while the necessary preparations were making for the voyage, Captain Wallis returned. It having been recommended to this gentleman to fix upon a proper place for making the astronomical observations, he had accordingly chosen the island named by him *George's Island*, but since known by the name of *Otaheite;* judging also that Port Royal harbour in it would afford an eligible situation. This proposal being accepted, directions for the purpose were accordingly given to Mr Cook, with whom Mr Charles Green was joined in the astronomical part; the latter having been assistant to Dr Bradley in the royal observatory at Greenwich, and thus judged to be every way qualified for the office. The lieutenant was likewise accompanied by Mr Banks, now Sir Joseph Banks, Dr Solander, &c. The principal design of the voyage was, as has already been hinted, to make observations on the transit of Venus; but this being done, Mr Cook was directed to make further discoveries in the Pacific ocean; and on the 30th of July 1768, he set sail on his expedition. An account of the voyage, and the discoveries made during the time of it, is given in the next article; here it is sufficient to observe, that throughout the whole Mr Cook approved himself an able seaman; and from his behaviour both to his own people and to the savage nations he occasionally met with, showed a most exact regard to the rules both of justice and humanity. On his first arrival at Otaheite, the following regulations were drawn up for his people, which he took care should be punctually obeyed.

1. To

1. To endeavour, by every fair means, to cultivate a friendship with the natives, and to treat them with all imaginable humanity. 2. A proper person or persons to be appointed to treat with the natives for provisions, fruits, &c. and no other person belonging to the ship to do so without leave. 3. Every person on shore to attend punctually to his duty, and to pay proper attention to his tools or arms; and if lost through negligence, to have the full value charged against his pay, with such farther punishment inflicted as occasion might require. 4. The same penalty to be inflicted on every one who should embezzle, trade with or offer to trade with, any part of the ship's stores; and, 5. No iron to be given in exchange for any thing but provisions. His rigid adherence to these rules was manifested in several instances, particularly by severely punishing the ship's butcher, who had threatened the life of a woman, wife to one of the chiefs of the island, for refusing a stone hatchet on the terms he proposed. On erecting their observatory, in order to go through the astronomical operations, an accident happened which had like to have disconcerted the whole scheme. This was the loss of their quadrant, which had been stolen by some of the natives; but, chiefly through the exertions of Mr Banks, it was recovered, and the observations made accordingly. Scarce was this accomplished, however, before another theft of the natives demanded the most serious consideration of the commander. Some of them taking advantage of the attention of the officers being otherwise engaged, took the opportunity of breaking into one of the store-rooms, and stealing from thence a bag of spike nails of no less than an hundred weight. This was a most important affair; for as those nails were of great estimation among the Indians, the possession of such a quantity must undoubtedly have much lessened their value, and thus rendered provisions of every kind greatly dearer on the island than before. One of the thieves therefore being discovered, was punished with 200 lashes; notwithstanding which he obstinately refused to discover any of his accomplices. Repeated thefts committed afterwards required all the wisdom and resolution of Mr Cook to conduct himself in a proper manner. After due consideration, he judged it to be a matter of importance to put an end to these practices at once, by doing something which might engage the natives themselves to prevent them for their common interest. This, however, he was not at present able to accomplish; nor indeed did it seem possible to prevent them without using firearms, which from motives of humanity he still determined to avoid. At last, after a stay of three months, when preparing to take his leave, the most disagreeable adventure took place that he had hitherto met with. This was the desertion of two of his people, who having married young women of that country, determined to take up their residence in it. Mr Cook was now obliged to seize some of the chiefs, and to inform them that they could not obtain their liberty unless the deserters were recovered. This at last produced the desired effect; the deserters were given up, and Mr Cook set sail, along with Tupia, (who had formerly been the prime minister to Oberea, a princess of the island) and a boy of 13 years of age, both of whom were desirous of accompanying him to England.

While Mr Cook proceeded to visit others of the South sea islands, Tupia occasionally served as an interpreter. On his arrival in New Zealand, Mr Cook found the people extremely hostile and insolent. At their very first meeting one of the natives having threatened to dart his lance into the boat, was shot dead. Another, having carried off Mr Green's hanger, was fired at with small shot; and upon his still refusing to restore it, was fired at with ball and killed. This, however, produced very little effect on the rest, who offered to make an attack upon them, till several muskets were fired with small shot, which wounded three or four more. Next day the commander, having determined to force some of the natives on board, in order to conciliate their affections by kind treatment, directed his men to follow two canoes whom he perceived under way before him. One made her escape, but the other not observing the boats in pursuit was overtaken; on which the savages plied their oars so briskly, that the ship's boats were not able to keep up with them. Tupia, whose language the New Zealanders understood, called to them to return, with assurances that no hurt should be done them; but they continued their flight without minding him. A musket was then fired over their heads with a view to intimidate them, but upon this they prepared to fight; and on the coming up of the boats began the attack with so much vigour, that the lieutenant's people were obliged to fire upon them with ball, by which four out of seven that were in the boat were killed, and the other three jumped into the water, and were taken on board.

This part of Mr Cook's conduct seems inconsistent with that humanity for which he was in general so eminently distinguished; he was aware of the censure, and makes the following apology. "These people certainly did not deserve death for not choosing to confide in my promises, or not consenting to come on board my boat, even if they had apprehended no danger; but the nature of my service required me to obtain a knowledge of their country, which I could no otherwise obtain but by forcing into it in an hostile manner, or gaining admission through the confidence and good will of the people. I had already tried the power of presents without effect; and I was now prompted by my desire to avoid farther hostilities, to attempt to get some of them on board; the only method we had left of convincing them that we intended them no harm, and had it in our power to contribute to their gratification and convenience. Thus far my intentions certainly were not criminal; and though in the contest, which I had not the least reason to expect, our victory might have been complete without so great an expence of life; yet in such situations, when the command to fire has once been given, no man can pretend to restrain its excess, or prescribe its effect."

Notwithstanding the disaster just mentioned, to which the three New Zealanders, who were taken on board, had been witnesses, they were soon conciliated, and began to sing with a degree of taste that surprised the English gentlemen. They were boys, the oldest about 19 and the youngest about 11; but no kindness which called, by which means he said that he had seen a merchant ship brought from Virginia to London after she had sprung a leak that admitted more than four feet water in an hour. The expedient being approved of, it was put in execution in the following manner. He took a lower studding-sail, and having mixed a large quantity of oakum and wool together, stitched them down by handfuls as lightly as possible; the whole being afterwards spread over with the dung of the sheep and other filth. The sail was then hauled under the ship's bottom by means of ropes which kept it extended. When it came under the leak, the wool and oakum, with part of the sail, were forced inwards by the pressure of the water, which thus prevented its own ingress in such an effectual manner, that one pump, instead of three, was now sufficient to keep it under. Thus they got the ship into a convenient port on the coast of New Holland, where they had an opportunity of repairing the injury. Here they discovered that their preservation had not been owing entirely to the expedient above mentioned; for one of the holes was in a great measure filled up by a piece of rock which had broken off and stuck in it; and this hole was so large, that had it not been filled up in the manner just mentioned, they must undoubtedly have perished notwithstanding all the assistance that could have been derived from the pumps.

The dangers they sustained in navigating this coast were innumerable, insomuch, that for very near three months they were obliged to have a man constantly in the chains heaving the lead. They were always entangled among rocks and shoals, which could not have failed to destroy a less experienced navigator; and even Mr Cook, with all his sagacity, could not sometimes have extricated himself, had it not been for the favourable interposition of some natural events, which no human penetration could foresee or have the least dependence upon. Of this we shall only give the following instance. Having at last, as they thought, got safely over the vast reefs of sunk rocks with which the coast of New Holland is surrounded, they flattered themselves that all danger was past, and the vast swell of the water convinced them that they were now in the open ocean. The remembrance of former dangers, however, induced them frequently to take the precaution of sounding; notwithstanding which, in the latitude of about $14\frac{1}{2}°$ S. they found themselves one morning only about a mile distant from the most hideous breakers, though the sea all around was unfathomable. Their situation was rendered the more dreadful by its being a dead calm, at the same time that they were carried towards the rock with such rapidity, that by the time they had got the ship's head turned by means of the boats, she was scarcely 100 yards distant from it. Their only resource then was to tow the ship, if possible, by means of the boats and pinnace, out of a situation so very perilous; but all their efforts would have been unsuccessful, had not a breeze of wind sprung up, which, though too light to have been noticed at any other time, was found to second their efforts so effectually, that the ship began to move perceptibly from the reef in an oblique direction: during the time that this breeze lasted, which was not more than ten minutes, they had made a considerable way. A dead calm succeeding, they began to lose ground, and in a little time were driven within 200 yards of the rocks: but fortunately the breeze returned, and lasted ten minutes more; during which time a small opening was perceived in the reef at the distance of about a quarter of a mile. The mate being sent out to examine this opening, reported that it was not more than the length of the ship in breadth, but that there was smooth water within. On this it was determined to push into it by all means. The attempt failed of success; as just, when they had brought the ship with great labour to the mouth of the opening, they found a current setting out from it by reason of the tide now beginning to ebb. But though their hopes were disappointed in getting through the opening, they were, by the current setting out from it, driven in a very short time to the distance of a quarter of a mile from the rocks; and by dint of towing and other exertions, they were got by noon to the distance of two miles. This temporary deliverance, however, afforded but small prospect of being ultimately relieved. They had still no other expectation than of being forced back into their former situation by the return of the tide; but happily they now perceived another opening about a mile to the westward. Mr Hicks the lieutenant being sent to examine this opening, returned with an account of its being narrow and hazardous, but capable of being passed. To this place therefore the ship was directed by every possible means; and a light breeze happening to spring up, they fortunately reached it, and were instantly hurried through with great rapidity by the current of the returning tide; which, had it not been for this opening, would undoubtedly have dashed them to pieces against the rocks.

From the time they quitted the coast of New Holland till their arrival at Batavia in the island of Java, our navigators met with no other danger but what is common in sea voyages. They were obliged to stay for some time at this place to repair their damages; and on viewing the condition of the ship, found they had more reason than ever to admire the manner in which they had been preserved. Both the false keel and main-keel were greatly injured; great part of the sheathing was torn off; several of the planks were much damaged, and among these there were two, and half of another, which for six feet in length were not above the eighth part of an inch in thickness, besides being penetrated with worms quite to the timbers. Here the crew were excessively annoyed by sickness, which obliged them to remain much longer than they would otherwise have done: and it is worthy of notice, that every one of the crew was ill excepting the sail-maker, an old man between 70 and 80 years of age, and who was drunk every night. Poor Tupia, with his boy Tayeto, fell sacrifices to the unhealthiness of the climate, as well as the surgeon, three seamen, and Mr Green's servant. Nor did the evil stop here; for on their setting out from Batavia, the seeds of disease which had been received there broke out in the most violent and fatal manner, insomuch that in the course of about six weeks there died one of Mr Bank's assistants, by name Mr Sporing, Mr Parkinson his natural history painter, Mr Green the astronomer, the boatswain, carpenter, and mate, Mr Monkhouse the midshipman, the corporal of the marines, two of the carpenter's

Cook.

equally salutary on the health of the people, he employed them in brewing beer from it. This was done while they continued at Dusky Bay, in order to supply the want of vegetables, which were not to be procured there; but on removing to Queen Charlotte's Sound, they were more fortunate. Captain Cook himself went to look out for antiscorbutic vegetables; and returned in a very short time with a boat-load of scurvy-grass, celery, &c. These were boiled with the pease and wheat; and though some of the people disliked them at first, they soon became so sensible of their good effects, that they cheerfully followed the example of the rest: and the freedom of the crew from the scurvy and other distempers was by every one attributed to the New Zealand spruce beer and vegetables. From this time forward the captain had scarce occasion to give orders for gathering vegetables when they came to any land.

During this voyage Captain Cook experienced another narrow escape from shipwreck. Being becalmed at the distance of half a league from a reef of rocks near Osnaburgh island, it was found necessary to order out the boats to tow off the ships; but this was found impossible. The calm continuing, and the situation of our navigators becoming every moment more dangerous, the captain attempted to get through an opening in the reef which he had judged practicable; but on approaching it, found that there was not sufficient depth of water; at the same time that the draught of the tide through it forced the ship thither in a manner scarce to be resisted. One of the warping machines, with about 400 fathoms of rope, was then ordered out, but did not produce any effect. They were within two cables length of the breakers, and no bottom could be found for casting anchor. Having no other resource, however, they did drop an anchor; but before it took hold, the Resolution was in less than three fathoms water, and struck at every fall of the sea, which broke violently close under her stern, threatening destruction to every one on board. At last the tide ceasing to act in the same direction, the boats were ordered to try to tow off the vessel; in which being assisted by the land breeze, which fortunately sprung up at that instant, they with much labour succeeded.

Having spent a considerable time in the South Sea islands, Captain Cook returned to New Zealand, and from thence set sail for the southern part of the continent of America. Here he explored all the islands in the neighbourhood, and then returned to England, where he arrived in safety on the 30th of July 1774, having been absent three years and 18 days; and in all that time lost only one man, who died of a consumption probably begun before he set out on the voyage.

The reception our navigator now met with was suited to his merit. He was immediately raised to the rank of post captain, and soon after unanimously elected a member of the Royal Society; from whom he received the prize of the gold medal for the best experimental paper that had appeared throughout the year. It was the custom of Sir John Pringle, at the delivery of this medal, annually, to make an elaborate discourse, containing the history of that part of science for which the medal was given; and, as the subject of Captain Cook's paper (the means of preserving the health of seamen) was analogous to the profession of Sir John Pringle himself as a physician, he had the greater opportunity of displaying his eloquence on the occasion. The speech he made was in the highest degree honourable to Captain Cook. He remarked that the society had never more meritoriously bestowed the medal than on the person who now received it. "If (says he) Rome decreed the civic crown to him who saved the life of a single citizen, what wreaths are due to the man who, having himself saved many, perpetuates in your Transactions the means by which Britain may now in the most distant voyages, preserve numbers of her intrepid sons, her mariners; who braving every danger, have so liberally contributed to the fame, to the opulence, and to the maritime empire of the country." These honourable testimonies of the public regard, however, Captain Cook did not receive, being already embarked on another voyage, from which he never returned.

The third voyage of this celebrated navigator was not undertaken by any express command of his majesty. Captain Cook had already done so much, that it was thought but reasonable he should now spend the remainder of his life in quiet; and in order to enable him to do this in a more comfortable manner, besides his rank of post-captain in the navy, he was also made a captain in Greenwich. Still, however, there were some points in the science of geography which had very much engaged the attention of the public, and were indeed of such importance as to become a national concern. These were to discover the connection between Asia and America, and to determine whether there was not a possibility of shortening the passage to the East Indies by sailing round the northern parts of the continents of Europe and Asia. Many attempts, indeed, had already been made by various navigators of different nations; but all of them had failed, and, what was worse, had left the point still undetermined. An act of parliament had been passed in 1745, by which a reward of 20,000l. was held out to the ships of any of his majesty's subjects for accomplishing this important voyage, but without mentioning any thing of those belonging to his majesty; and this reward was further confined to the finding out of the north-west passage to the East Indies through Hudson's bay. In the year 1776, however, both the errors just mentioned were corrected. It was now enacted, "That if any ship belonging to any of his majesty's subjects, or to his majesty, shall find out, and sail through, any passage by sea between the Atlantic and Pacific oceans, in any direction or parallel of the northern hemisphere, to the northward of the 52d degree of northern latitude; the owners of such ships if belonging to any of his majesty's subjects, or the commanders, officers, and seamen, of such ships belonging to his majesty, shall receive, as a reward for such discovery, the sum of 20,000l.

It was not, as has already been hinted, now deemed proper to solicit Captain Cook to undergo fresh dangers by undertaking a voyage of this kind; nevertheless, as he was universally looked upon to be the fittest person in the kingdom for the purpose, the eyes of every one were tacitly fixed upon him: he was consulted on every thing relating to it, and solicited

cited to name the person whom he judged most proper to conduct it. To determine this point, Captain Cook, Sir Hugh Palliser, and Mr Stephens, were invited to the house of Lord Sandwich to dinner; where, besides the consideration of the proper officer for conducting the expedition, many things were said concerning the nature of the design. They enlarged upon its grandeur and dignity, its consequences to navigation and science, and the completeness it would give to the whole system of discoveries; until at last Captain Cook was so much inflamed by the representation of the importance of the voyage, that he started up, and declared that he would conduct it himself. This was what the parties present had desired, and probably expected; his offer was therefore instantly laid before the king, and Captain Cook appointed commander of the expedition by the 10th of February 1776. At the same time it was agreed, that on his return from the voyage, he should be restored to his place at Greenwich; and if no vacancy occurred during the interval, the officer who succeeded him was to resign in his favour. The instructions he now received were, that he should attempt the high latitudes between the continents of Asia and America, and if possible return to England along the northern coasts of Asia and Europe. This was most probably the result of the captain's own deliberations, and what had been suggested by him to Lord Sandwich and other people in power. He was particularly desired to sail first into the Pacific ocean through the chain of newly discovered islands which he had lately visited. After having crossed the equator, and passed into the northern parts of the ocean just mentioned, he was then to hold such a course as might tend to settle many interesting points of geography, and produce some intermediate discoveries, before he arrived at the main scene of operation. With regard to this principal object, he was ordered, immediately on his arrival on the coast of New Albion, to proceed northward as far as the latitude of 65 degrees, without losing any time in exploring creeks or rivers previous to his arrival in that latitude; and for his further encouragement, the act of 1745, offering a premium for the discovery of the passage, was amended in the manner above mentioned. That nothing might be wanting which could promote the success of the grand expedition, Lieutenant Pickersgill was sent out, in 1776, with directions to explore the coasts of Baffin's bay; and the next year Lieutenant Young was commissioned not only to examine the western parts of that bay, but to endeavour to find a passage on that side from the Atlantic to the Pacific ocean. Nothing, however, was performed by either of these gentlemen which in the least could promote Captain Cook's success. Two vessels were provided as in the former voyage, viz. the Resolution and the Discovery; the command of the former being given to Captain Cook, and of the latter to Captain Charles Clerke. The only thing in which the appointment of the Discovery differed from that of the Resolution was, that the former had no marine officer on board. Every degree of attention was bestowed, as in the former voyage, upon the proper victualling and other necessaries for the two ships; and that the inhabitants of those countries which our navigator intended to visit might derive some permanent benefit from the intercourse they had with him, it was determined to send abroad a breed of domestic animals, and likewise a quantity of useful seeds, to be left in proper places. With this view, a bull, two cows with their calves, and several sheep, with hay and corn for their subsistence, were taken on board; and it was likewise proposed to take in others at the Cape of Good Hope. A large assortment of iron tools and trinkets was also sent out; and, in short, every thing that could be judged proper either to conciliate the good will of the natives or to prove serviceable to them, was provided for the voyage, as well as every convenience for the ship's companies. In the former voyage Captain Cook had brought along with him a native of one of the South sea islands, named *Omai*, who resided in England during the interval between the second and third voyages, and was now happy at getting an opportunity of returning to his own country. Though he could by no means complain of the entertainment he had met with in England, the idea of returning home loaded with treasure, which might enable him to make a figure among his countrymen, soon overcame all uneasy sensations, which the leaving of his English friends might excite. His majesty had taken care to furnish him with every thing that could possibly be of use when he came to his native country; and he had besides received several valuable presents from Lord Sandwich, Sir Joseph Banks, and several ladies and gentlemen of his acquaintance; so that nothing was omitted which could possibly be done to convey, by his means, to the inhabitants of the South Sea islands, an idea of the British power and greatness.

Every thing being prepared for the voyage, our navigator set sail from the Nore on the 25th of June 1776; but by reason of some delay in receiving his instructions, did not leave Plymouth till the 12th of July. He had not been long at sea before he began his operations for preserving the health of his people; which were found equally efficacious in this as in the former voyage. Finding his stock of provender for the animals on board likely to run short, he touched at Teneriffe, in order to procure a supply, having judged that to be a more proper place than Madeira for the purpose. On sailing from thence he ran a great risk of running upon some sunk rocks on the island of Bonavista; but in this, as well as on other occasions of danger, he behaved with the same judgment, coolness, and presence of mind, that distinguished him throughout the whole course of his life. On the 12th of August he arrived before Port Praya, in one of the Cape de Verd islands named *St Jago;* but not finding it necessary to go in there, he continued his voyage to the southward. The weather now becoming gloomy and rainy, required a continuance of the methods he had already practised for preserving the health of his people; and, as formerly, they were attended with the greatest success. In this voyage, the effect of these precautions was the more remarkable, as at this time the seams of the vessel were opened to such a degree as to admit the rain, so that scarce any person on board could lie dry in his bed; and all the officers in the gun room were driven out of their cabins by the water which came through the sides. Such was the humanity of the commander, however, that while the ships continued at sea, he would not trust

trust the workmen over their sides to repair the defects, though caulkers were employed in the inside as soon as settled weather returned. On the 1st of September our navigators crossed the equator, and on the 18th of October anchored in Table bay at the Cape of Good Hope. Here they met with a violent tempest, the effects of which were felt both on sea and land. It lasted three days, and the Resolution was the only ship in the bay that rode out the storm without dragging her anchors. On shore the tents and observatory were destroyed, and the astronomical quadrant narrowly escaped irreparable damage. The Discovery, which had been some time later in sailing from England, was driven off the coast, and did not arrive till the 10th of November.

While they remained in this place, a disaster happened which threatened the loss of most of their live stock. The bull and two cows had been put ashore to graze among other cattle; but Captain Cook had been advised to keep the sheep, 16 in number, near the tents, where they were penned in every night. Some dogs having got in among them in the night-time, killed four, and dispersed the rest. Six of them were recovered the next day, but the two rams and two of the finest ewes in the flock were missing. The captain applied to Baron Plettenberg the governor; but all his endeavours were unsuccessful, until he employed some of the meanest and lowest of the people, fellows whose character was, that for a ducatoon they would cut their master's throat, burn the house over his head, and bury him and his whole family in ashes. This is mentioned as an instance how far the boasted policy of the Dutch government at the Cape of Good Hope falls short of its alleged perfection. After all, two of the finest ewes in the flock were missing, and never could be recovered. The captain, therefore, to repair this loss, and to make an addition to his original stock, purchased two young bulls, two stone horses, two mares, two heifers, two rams, several ewes and goats, with some rabbits and poultry; when, having finished all his business, he set sail on the 30th of November, though it was not till the 3d of December that he got clear of land. Soon after his putting to sea, he had the misfortune to lose several of the goats, especially the males, together with some sheep; and it was with the utmost difficulty that the rest of the cattle were preserved, by reason of the ship tossing and tumbling about in a very heavy sea. Having explored some desolate islands in the southern seas, Captain Cook set sail for New Zealand. During this part of the voyage, our navigators were involved in so thick a fog, that, according to the authors of Captain Cook's life, "they sailed 300 leagues in the dark." The first land they afterwards reached was New Holland; where having remained till the 30th of January 1777, they set sail for New Zealand, and on the 12th of February they anchored in Queen Charlotte's Sound. Here the people were shy and timorous, on account of their having formerly destroyed 10 of Captain Furneaux's people, who had been sent ashore to gather vegetables. The cause of the quarrel could not be known, as none of the party were left alive to tell the news. Lieutenant Burney, who went ashore in quest of them, found only some fragments of their bodies; from which it appeared that they had been killed and eaten by the savages. It was not the intention of Captain Cook, at this distance of time, to resent the injury; he even refused to put to death a chief named *Kahoora*, who, as he was informed by the natives themselves, had killed Mr Rowe the commander of the party. He was, however, particularly careful that no opportunity should now be given the savages of committing such an action with impunity; and with this view a boat was never sent on shore without being well armed, and the men under the command of such officers as could be depended upon. The New Zealanders were no sooner assured of Captain Cook's pacific disposition, than they threw aside their fears and suspicions, and entered into a commercial intercourse with the people. It would have been the less excusable in Captain Cook to have revenged at this time the massacre of Mr Rowe's party, as he was assured that the quarrel originated from some petty thefts of the savages, which were too hastily resented on the part of the British; and had it not been for this, no mischief would have happened.

On the 25th of February our navigator left New Zealand, taking with him, at the request of Omai, two boys, the eldest about 18 and the youngest about 10. These were soon cured of their passion for travelling, being both violently sea-sick; but as it was then too late to repent, they expressed their grief in loud and almost continual lamentation; and this in a kind of song which seemed to consist of the praises of their native country, whence they were now to be separated for ever. By degrees, however, the sea-sickness abated, their lamentations became less frequent, and at last ceased entirely; their native country was forgotten, and they appeared to be as firmly attached to their new friends the English as if they had been born among them.

So much time was now spent in sailing up and down in the Pacific ocean, where several new islands were discovered, that Captain Cook judged it impossible to accomplish any thing for this year in the high northern latitudes; for which reason he determined to bear away for the Friendly islands, in order to supply himself with those necessaries which he had found impossible to be got at any of the islands which he had just discovered. In his run thither several new islands were visited; and in prosecuting these discoveries our navigator once more narrowly escaped being shipwrecked. The danger at this time arose from a low sandy island, which the Resolution was very near running upon. From this she was only saved by the circumstance of all the men having been accidentally called upon deck to put the vessel about, and most of them being at their stations when the danger was discovered. Soon after this both ships struck upon some sunk coral rocks, but happily were got off without damage.

After a stay of between two and three months, Captain Cook took leave of the Friendly islands on the 13th of July 1777; and on the 12th of August reached Otaheite, where he introduced Omai to his country people, and whose reception by them is particularly related under the next article. Here the captain found the people of Otaheite ready to engage in a war with those of Eimeo; but though strongly solicited by the former to assist them in an expedition against

against their enemies, he refused to take any concern in the affair, alleging, by way of excuse, that the people of Eimeo had never offended him. This seemed to satisfy most of the chiefs; but one, named *Towha*, was so much displeased, that Captain Cook could never regain his favour. He even threatened, that as soon as the captain should be gone, he would make war upon Otoo, one of the princes of these islands whom he knew to be in strict friendship with him; but from this he was deterred by the captain's threatening to return and chastise him if he made any such attempt. As a mark of Otoo's friendship, he gave our navigator a canoe, which he desired him to carry to the king of Britain, having nothing else, as he said, worth his acceptance.

From Otaheite Captain Cook proceeded to Eimeo, where, on account of some thefts committed by the natives, he was obliged to commence hostilities, by burning a number of their war canoes, and even some houses. These transactions gave him much concern; and the more that he had been so much solicited to make war on these people by his friends at Otaheite, to whose intreaties he had refused to listen. From Eimeo he proceeded to Huaheine, where he saw Omai finally settled, and left with him the two New Zealand youths already mentioned. The youngest of these was so much attached to the English, that it was necessary to carry him out of the ship and put him ashore by force. During his stay on this island, the captain was obliged to punish a thief with greater severity than he had ever done before, viz. by causing his head and beard to be shaved, and his ears cut off. Some other disagreeable transactions took place, particularly the desertion of two of his people, who were not recovered without the greatest difficulty. In the course of his exertions for their recovery, he found it necessary to detain the son, daughter, and son-in-law of the chief of an island named *Otaha*. This had almost produced very serious consequences, the natives having formed a plot for carrying off Captain Cook himself, as well as Captain Clerk and Mr Gore. With regard to the commander, they were disappointed by his own caution and vigilance: but Messrs Clerke and Gore were in particular danger; and it was only owing to the circumstance of one of them having a pistol in his hand as they walked together on shore, that they were not seized.

Having left the Society islands, and discovered a new group, which in honour of his patron the earl of Sandwich, our commander named the *Sandwich Isles*, he set out on the 2d of January 1778 on his voyage northward. In this he was very successful, ascertaining the vicinity of the continents of Asia and America, which had never been done, or but very imperfectly, before. From these desolate regions he returned to the island of Oonalashka; whence, having refitted and taken in provisions, he returned to the southward, and on the 26th of November reached the Sandwich islands, where he discovered a new one named *Mowee*, and on the 30th of the same month another of much larger extent, named *O-why-hee*. Seven weeks were spent in exploring the coasts of this island; and during all this time he continued to have the most friendly intercourse with the people, who, however, appeared to be much more numerous and powerful than those of any island our navigators had yet touched at. Several of the chiefs and principal people had attached themselves greatly to the commander, and in general the people appeared to be much more honest in their dispositions than any whom he had ever visited. But by the time he had finished his circumnavigation of the island and cast anchor in a bay called *Karakakooa*, matters were greatly altered. An universal disposition to theft and plunder had now taken place; and in this it was evident that the common people were encouraged by their chiefs, who shared the booty with them. Still, however, no hostilities were commenced: the greatest honours were paid to the commander; and, on his going ashore, he was received with ceremonies little short of adoration. A vast quantity of hogs and other provisions were procured for the ships; and on the 4th of February 1779, they left the island, not without most magnificent presents from the chiefs, and such as they had never before received in any part of the world. Unluckily they met with a storm on the sixth and seventh of the same month; during which the Resolution sprung the head of her foremast in such a manner that they were obliged to return to Karakakooa bay to have it repaired. As they returned, Captain Cook had an opportunity of showing his humanity to the people, by the relief he afforded to some of their canoes which had suffered in the storm. The same friendly intercourse which had formerly been held with the natives now commenced, and Captain Cook was treated with the usual honours; but on the 13th of this month it was unhappily broken off on the following account. One of the natives being detected in stealing the tongs from the armourer's forge in the Discovery, was dismissed with a pretty severe flogging; but this example was so far from being attended with any good effect, that in the afternoon another, having snatched up the tongs and a chissel, jumped overboard with them and swam for the shore. The master and midshipman were instantly dispatched in pursuit of him; but he escaped on board a canoe, which paddled away so quickly that the cutter could not come near it. A chief named *Pareah*, who was at this time on board the Resolution, understanding what had happened, promised to go ashore, and get back the stolen goods; but before this could be done, the thief had made his escape into the country. Captain Cook, who was at that time ashore, had endeavoured to intercept the canoe when it landed, but was led out of the way by some of the natives who pretended to be his guides. The tongs and chissel, however, were brought back to the master as he advanced to the landing place, but he being now joined by some of the rest of the people in the pinnace, could not be satisfied with the recovery of the stolen goods, but insisted upon having the thief or the canoe which carried him by way of reprisal. On his preparing to launch this last into the water, he was interrupted by Pareah, who insisted that it was his property, and that he should not take it away. As the officer paid no regard to his remonstrances, Pareah, who seems to have been a very strong man, seized him, pinioned his arms behind, and held him fast by the hair of the head. On this one of the sailors struck the chief with an oar; on which, quitting the officer, he instantly snatched the oar out of the man's hand,

hand, and broke it in two across his knee. The Indians then attacked the sailors with stones, and soon drove them to their boats, to which they were forced to swim, as they lay at some distance from the shore. The officers who could not swim retired to a small rock, where they were closely pursued by the Indians; and here the master narrowly escaped with his life, till Pareah returned and obliged the Indians to give over their attacks. The gentlemen, sensible that Pareah's presence alone could protect them, entreated him to remain with them till they could be brought off in the boats. On his refusal, the master set out to the place where the observatories had been erected, for farther assistance; but Pareah, who met him, and suspected his errand, obliged him to return. In the mean time, the multitude had begun to break in pieces the pinnace, after having taken every thing out of her that was loose: on the return of Pareah, however, they were again dispersed, and some of the oars restored, after which the gentlemen were glad to get off in safety. Before they reached the ship Pareah overtook them in a canoe, and delivered the midshipman's cap which had been taken from him in the scuffle; he also joined noses with them in token of friendship, and desired to know whether Captain Cook would kill him on account of what had happened. They assured him that he would not, and made signs of reconciliation on their part. On this he left them and paddled over to the town of Kavaroah; and that was the last time that he was seen by the English. In the night-time the sentinels were much alarmed by shrill and melancholy sounds from the adjacent villages, which they took to be the lamentations of the women. Next day it was found that the large cutter of the Discovery had been carried off in the night-time; on which Captain Cook ordered the launch and small cutter to go under the command of the second lieutenant, and to lie off the east point of the bay in order to intercept all the canoes that might attempt to get out, and if necessary to fire upon them. The third lieutenant of the Resolution was despatched to the western part of the bay on the same service; while the master was sent in pursuit of a large double canoe already under sail, and making the best of her way out of the harbour. He soon came up with her, and by firing a few shots, obliged her to run on shore, and the Indians to leave her. This was the canoe belonging to a chief named *Omea*, whose person was reckoned equally sacred with that of the king; and to the neglect of securing him we may attribute the succeeding disaster. Captain Cook now formed the resolution of going in person to seize the king himself in his capital of Kavaroah; and as there was reason to suppose that he had fled, it was his design to secure the large canoes, which on that account he caused to be hauled up on the beach. With this view he left the ship about seven o'clock in the morning of Sunday the 14th of February, being attended by the lieutenant of marines, a serjeant, corporal, and seven private men. The crew of the pinnace, under the command of Mr Roberts, were also armed: and as they rowed towards the shore, the captain ordered the launch to leave her station, at the opposite point of the bay, in order to assist his own boat. Having landed with the marines at the upper end of the town, the Indians flocked round him, and prostrated themselves before him. No sign of hostility, nor even much alarm, appeared; the king's sons waited on the commander as soon as he sent for them, and by their means he was introduced to the king, who readily consented to go on board; but in a little time the Indians began to arm themselves with long spears, clubs, and daggers, and to put on thick mats which they use as defensive armour. This hostile appearance was greatly augmented by an unlucky piece of news which was just now brought by a canoe, viz. that one of the Indian chiefs had been killed by the people in the Discovery's boats. On this the women, who had hitherto sat on the beach conversing familiarly, and taking their breakfasts, removed, and a confused murmur ran through the crowd. An old priest now appeared with a cocoa-nut in his hand, which he held out as a present to Captain Cook, singing all the while, and making a most troublesome noise, as if he meant to divert the attention of the captain and his people from observing the motions of the Indians, who were now everywhere putting on their armour. Captain Cook beginning to think his situation dangerous, ordered the lieutenant of the marines to march towards the shore, as he himself did, having all the while hold of the king's hand, who very readily accompanied him, attended by his wife, two sons, and several chiefs. The Indians made a lane for them to pass; and as the distance they had to go was only about 50 or 60 yards, and the boats lay at no more than five or six yards distance from land, there was not the least apprehension of the catastrophe which ensued. The king's youngest son Keowa went on board the pinnace without the least hesitation, and the king was about to follow, when his wife threw her arms about his neck, and, with the assistance of two chiefs, forced him to sit down. The captain might now have safely got aboard, but did not immediately relinquish the design of taking the king along with him. Finding at last, however, that this could not be accomplished without a great deal of bloodshed, he was on the point of giving orders for the people to reimbark, when one of the Indians threw a stone at him. This insult was returned by the captain, who had a double barrelled piece, by a discharge of small shot from one of the barrels. This had little effect, as the man had a thick mat before him; and as he now brandished his spear, the captain knocked him down with his musket. The king's son, Keowa, still remaining in the pinnace, the detaining him would have been a great check upon the Indians; but unluckily Mr Roberts, who commanded the pinnace, set him ashore at his own request soon after the first fire. In the mean time another Indian was observed in the act of brandishing his spear at the commander; who thereupon was obliged to fire upon him in his own defence. Missing his aim, however, he killed one close by his side: upon which the serjeant observing that he had missed the man he aimed at, received orders to fire also, which he did, and killed him on the spot. This repressed the foremost of the Indians, and made them fall back in a body; but they were urged on again by those behind, and discharged a volley of stones among the marines, who immediately returned it by a general discharge of their muskets; and this was instantly followed

Cook's Discoveries. southern regions was experienced in such a manner as had nearly proved fatal to some of the gentlemen who sailed along with him. Dr Solander, Mr Banks, Mr Monkhouse the surgeon, and Mr Green the astronomer, with their attendants and servants, set out on a botanical expedition while the ship lay at anchor in the bay of Good Success. It was then the middle of summer, and the morning on which they set out was as mild and warm as it usually is in the month of May in England: but having ascended a mountain for the purpose of botanizing, they were surprised by such storms of snow and hail that they could not get back that night. Dr Solander, who warned them of their danger, that people when about to perish with cold were seized with a violent inclination to sleep, was the first who seemed likely to fall a victim to it; and it was not in the power of his companions to keep him from sitting down for that purpose. He was awakened in a few minutes; but during this short interval his feet had become so much diminished by the contraction of the vessels, that his shoes fell off from them when he was again made to rise.

6 Miserable state of the natives. Even these dreary regions, however, are not without inhabitants, whom our voyagers justly concluded to be the lowest of the human species. Indeed, considering the little convenience they have, it is wonderful how they can resist the severity of the climate, for they are almost without clothing; they dwell in miserable hovels, which admit both the wind and snow or rain; and they have not any utensil for dressing their food. Nevertheless, these miserable creatures, as they appeared to our navigators, seemed to have no wish to possess more than they enjoyed; and they were absolutely indifferent about every thing that was offered them, except large beads, which they would take as ornaments. Hence Dr Hawkesworth, who wrote the account of the voyage, concludes, that these people may be on a level with ourselves with respect to the real happiness they enjoy.

7 Islands discovered between Cape Horn and Otaheite. On the 26th of January 1769 our navigators left Cape Horn; and from that time to the first of March, during which they run no less than 660 leagues, met with no current by which the ship was affected. Hence it is probable, that during all this time they had never been near any land, the currents of the ocean being usually met with in the neighbourhood of islands. Several islands, however, were discovered before they reached Otaheite, on which they bestowed the names of Lagoon Island, Thrumb-cap, Bow Island, the Groups, Bird Island, and Chain Island. All these seemed to be inhabited, and were covered with a most delightful verdure; which appeared to the greater advantage, as our navigators had for a long time seen no land but the dreary hills and wastes of Terra del Fuego.

8 Transit of Venus observed. Having arrived at Otaheite, they set about observing the transit of Venus over the sun, which indeed was the main purpose for which the voyage had been undertaken. The anxiety which they underwent when the time of the expected phenomenon approached may easily be imagined, as the whole depended on the circumstance of a clear sky, which though more readily to be expected in that climate than one more to the northward, was still a matter of uncertainty. In consequence of some hints which had been given by the earl of Morton, Captain Cook determined to send out two parties to different places to make the observations; by which means there would be a chance of success, even if those at Otaheite should fail. For this purpose he sent Mr Gore in the long boat to Eimeo, a neighbouring island, along with Mr Monkhouse, Mr Banks, and Mr Sporing, who were furnished with proper instruments by Mr Green the astronomer. Messrs Hicks, Clerke, Pickersgill, and Saunders, were sent in the pinnace to a convenient spot to the eastward of the main observatory, where they were likewise ordered to make observations with such instruments as they had. The day on which the transit happened was the 3d of June 1769, when they had the satisfaction to see the sun rise without a cloud; and as the weather continued equally clear throughout the day, there was the best opportunity of making the observations in a proper manner. All of them saw an atmosphere or dusky cloud round the planet, which disturbed their observation, and probably caused them to differ from each other more considerably than they would otherwise have done. According to Mr Green, the times of ingress and egress of the planet were as follow:

Morning.	h.	min.	sec.
First external contact, - -	9	25	42
First internal contact, or total immersion,	9	44	4
Afternoon.			
Second internal contact, - -	3	14	8
Second external contact, or end of the transit,	3	32	10

From these observations the latitude of the observatory was found to be 17° 29′ 15″ S. and the longitude 149° 32′ 30″ W. of Greenwich. Several curious remarks were made both on the country itself, and on the inhabitants. Mr Banks, in an excursion up the country, discovered many traces of volcanic fire; the stones, like those of Madeira, had evidently the appearance of being burnt, and the very clay on the hills had the same appearance. 9 Otaheite a volcanic island.

10 Account of the natives. The natives, though addicted to thieving, appeared in general harmless and friendly, and very ready to supply the ship with necessaries in exchange for such things as they wanted. The articles on which they set the greatest value were hatchets, axes, large nails, spikes, looking-glasses, and beads. They were also fond of fine linen, whether white or printed; but an axe of the value of half a crown would buy more provisions than a piece of cloth of the value of 20 shillings. They are very fickle and inattentive; so that it was not possible to engage them to pay any regard to the worship of the Deity which they saw performed before them; nor would they attend to any explanation of it that was given them. They are not, however, destitute of a religion of their own; and are particularly careful of the repositories of the dead, which they will not allow to be violated on any account. Of this Captain Cook had an instance, when some of his people offered to take down an inclosure of one of those repositories. They were violently opposed by the natives, who sent a messenger to acquaint them that they would never suffer any such thing; and the only insult that ever was offered to an Englishman by the people of this island was on a similar account. From Otaheite our navigators carried

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with them Tupia, formerly high priest of the country, and prime minister to Queen Oberea. From his practice it appeared, that the priests of Otaheite, as well as elsewhere, take care to place themselves a step nearer the Deity than the common people, and to use the deceptions too frequently put in practice by such mediators. While on board the Endeavour, he frequently prayed to his god *Tane* for a wind; and according to his own account never failed of success. This, however, he took care to ensure; for he never began his prayers till he perceived the breeze already on the water, and so near that it must reach the ship before they could well be ended. It was observed likewise of the people of Otaheite, that they had their bards or minstrels, who went about the country with musical instruments. The band whom they saw at this time consisted of two players on flutes and three drummers; the latter accompanying the flutes with their voices. Their songs were made extempore, and the English themselves were generally the subject.

11 Society Islands discovered.

From Otaheite our navigators sailed towards a neighbouring island named *Tethuora;* but finding it small, low, and without any settled inhabitants, the captain chose rather to direct his course towards Huaheine and Ulietea, which he was informed were well inhabited. These had never been visited by any European ship; but the inhabitants, though peaceable and friendly, were very slow and cautious in trading, so that the captain was obliged to bring out his hatchets to market; a commodity which he had hoped might have been concealed from those who had never seen an European ship before. On his arrival at Ulietea he found, by the discourse of Tupia, that the inhabitants of a neighbouring island named *Bolabola* were of such a martial disposition as to be the terror of those of Huaheine, Ulietea, and others; insomuch, that he apprehended great danger to our navigators should they touch at an island which the Bolabola men had lately conquered. This, however, had so little effect upon Captain Cook, that he not only landed on the island already mentioned, but took possession, in his majesty's name, of Bolabola itself, together with Ulietea, Huaheine, and another named Otaha, which were all visible at once.

12 Wretched appearance of the king of Bolabola.

During their stay here they paid a visit to Opoony, the formidable monarch of Bolabola; whom, to their surprise, they found a feeble wretch, withered and decrepid, half blind with age, and so stupid that he seemed scarce to be possessed of a common degree of understanding. About these islands they spent six weeks, bestowing upon them the name of the *Society Isles*, on account of their being so near to each other. They are six in number, Ulietea, Huaheine, Bolabola, Otaha, Tubai, and Maurna. The smaller ones in their neighbourhood are Tethuora, Eimeo, Tapoamanoa, Oatara, Opururu, Tamou, Toahoatu, and Whennuaia.

13 Oheteroa island discovered.

Leaving the Society Islands, which are situated between Lat. 16. 10. and 16. 55. S. and between 150. 57. and 152. W. from the meridian of Greenwich, they fell in with the island of Oheteroa, situated in S. Lat. 22. 27. and W. Long. 150. 47.; but this was found to be destitute of any harbour or safe anchorage, and the disposition of the inhabitants so hostile that they could not by any means be conciliated, so that no attempts were made to land. From Tupia Captain Cook learned that there were several islands in the neighbourhood, which our navigator conjectured to be Boscawen and Keppel's islands, discovered by Captain Wallis; but without spending more time in exploring these, he set sail to the southward in search of a continent.

14 Comet of 1769 observed.

Our voyagers left Oheteroa on the 15th of August 1769, and on the 30th had a view of the comet which appeared that year; its tail subtending an angle of 42 degrees. This proved a new source of apprehension to Tupia, who instantly cried out, that as soon as it was seen at Bolabola, the people of that country would attack those of Ulietea, who would undoubtedly be obliged to fly with precipitation to the mountains to save their lives. On the 6th of October they discovered land, which, from its size, and the enormous mountains observable on it, was supposed by the gentlemen on board to be part of *Terra Australis incognita;* but, on farther examination, it was found to be part of New Zealand.

15 They arrive at New Zealand.

Here the inhabitants were found to speak a dialect of the language of Otaheite, so that they could understand Tupia, and he them; yet so extremely hostile were their dispositions, that not the smallest intercourse could be held with them; nor could any thing necessary for the ships be procured excepting wood; so that the name Captain Cook thought proper to bestow on this part of the country was *Poverty Bay*. By the natives it is called *Taoneroa*, and lies in S. Lat. 38. 42. and W. Long. 181. 36. During the time of his stay in this part of the world, the captain circumnavigated almost the whole country of New Zealand, which he found to consist of two islands separated from each other by a narrow strait, which, from its discoverer, has obtained the name of *Cook's Strait*. In some places the disposition of the inhabitants was as favourable as could be wished; so that Dr Solander, Mr Banks, and other gentlemen, had an opportunity of exploring the country in some degree, with a view to discover its natural productions.

16 Rock of an extraordinary shape.

In one of their excursions, as they passed through a valley, the hills on each side of which were very steep, they were suddenly struck with the sight of a very extraordinary natural curiosity. It was a rock perforated through its whole substance, so as to form a rude but stupendous arch or cavern, opening directly to the sea. This aperture was 75 feet long, 27 broad, and 45 in height, commanding a view of the bay and the hills on the other side, which were seen through it; and opening at once to the view, produced an effect far superior to any of the contrivances of art.

17 Natural products of the country.

On that part of the coast, which, from having observed a transit of Mercury, they named *Mercury Bay*, oysters were found in such plenty, that they might have loaded not only their boats, but even their ships, with them. They were about the same size with those met with in this country; and on account of their being found in such plenty, and likewise that the adjacent country abounds with conveniencies, Captain Cook was at great pains to point out the situation of the place. By his observations the latitude of Mercury Bay is 36. 48. 28. S.

Leaving this bay, our commander proceeded to explore other parts of the country, which by his account seems to abound with rivers. Two large ones were met with in Mercury Bay; one of which, from the

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the abundance of oysters found at its mouth, was called *Oyster river;* the other they named *Mangrove river*, from the number of mangrove trees growing there. A third, which they called *Thames*, was met with in that part called the Bay of Islands, up which they sailed 14 miles. Its banks were everywhere adorned with lofty trees, which they had likewise observed in other parts of the country. They were too heavy for masts, but would make the finest planks imaginable; and as they resembled the pitch pine, the timber of which is lightened by tapping, the carpenter was of opinion, that they might thus be rendered more proper for masts than any European timber. One of these trees measured 19 feet 8 inches in circumference at the height of six feet from the ground, and was no less than 89, with very little taper, to the branches: so that the lieutenant supposed it must contain 356 feet of solid timber. In Queen Charlotte's Sound the country was little more than one vast forest, with plenty of excellent water, and the coast abounding with fish. As the ship lay at the distance of only a quarter of a mile from the shore, they were agreeably entertained with the singing of an infinite number of small birds, which formed a melody greatly superior to any thing they had ever heard before. The music of these little choristers seemed to be like small bells, most exquisitely toned, though probably the distance and intervention of the water had a considerable effect in heightening it. They began to sing about two in the morning, and continued their song till sunrise, after which they were silent all the day, resembling in this respect the nightingales of our country.

18 General description of the country.

The time which Captain Cook spent in exploring the coasts of New Zealand was not less than six months. By his researches it was shown to consist of two large islands, the most northerly of which is called *Eaheinomauwe*, and the most southerly *Tovy* or *Tavai Poenammoo;* though it is not certain whether the whole southern island or only a part of it is comprehended under this name. This island seems to be barren and mountainous, but *Eaheinomauwe* has a much better appearance; and it was universally believed by the gentlemen on board, that all kinds of European grain, as well as garden plants and fruits, would flourish in the greatest abundance and perfection; and from the vegetables found here it was concluded that the winters are not more severe than those of England, and it was known by experience, that the summer was not hotter, though the heat was more equal than in this country. Here are no quadrupeds except dogs and rats; and the latter are so scarce, that they escaped the notice of many on board. The birds are not numerous, and the gannet is the only one of the European kind that was observed. The insects are equally scarce; but the sea makes abundant recompense for this scarcity of land animals; every creek swarms with fish, equally delicious with those in this country. The forests are of vast extent, and filled with excellent timber trees; the largest, straightest, and cleanest that Mr Cook had ever seen. There is here one plant which answers the purposes of both hemp and flax, and excels all others of the kind that have been met with in any other part of the world.

19 Proper place for settling a colony there.

If the settling of New Zealand therefore should ever be deemed an object worthy of the attention of Great Britain, Captain Cook was of opinion, that the best place for establishing a colony would be either on the banks of the Thames or in the Bay of Islands; each of these places having the advantage of an excellent harbour. Settlements might be extended, and a communication made with the inland parts of the country by means of the river; and vessels easily constructed of the excellent timber with which the country everywhere abounds.

20 Account of the inhabitants.

The inhabitants of New Zealand are in a very barbarous state, and have a degree of ferocity unknown to the inhabitants of the South Sea islands, though they seem to have the same origin. During their residence there, our navigators had the most convincing evidences of their being cannibals, and accustomed to devour the bodies of their slain enemies. Notwithstanding these barbarous practices, however, they seemed to enjoy a state of uninterrupted health. In all the visits made to their towns, none was ever perceived who had the least bodily complaint, not even the slightest eruption on the skin. This extraordinary degree of health was likewise manifested by the ease with which their wounds were healed without the smallest application, as well as by the number of old men with which the island abounded. Many of these, by the loss of their hair and teeth, seemed to be extremely old, but none of them were decrepid; and though inferior in strength to the young men, they came not behind them in the least with regard to cheerfulness and vivacity. The universal and only drink of the New Zealanders is water.

Our navigator had now explored three-fourths of that part of the globe where the southern continent was supposed to lie, without being able to find it; and his voyage had demonstrated, that the lands seen by former navigators could not have been parts of such a continent, though, as he had never proceeded farther to the southward than 40 degrees, the arguments for it were not as yet entirely overthrown.

21 Discoveries at New Holland.

Mr Cook, however, did not at this time proceed farther in the search of such a continent, but sailed from New Zealand to the coast of New Holland, where he anchored in Botany Bay on the 20th of April. Here he found a few savage inhabitants more barbarous and degenerate than any that had yet been observed. Their language was harsh and dissonant, totally unintelligible even to Tupia: they appeared to have little curiosity, and set no value upon any present that could be made them. The most remarkable circumstance in this country seems to be its extreme scarcity of water; not a single stream of any consequence having ever been observed by any navigator. Some were of opinion indeed, that Moreton's bay, in S. Lat. 26. 59. and W. Long. 206. 28. opens into a river; though the only reason they had for this opinion was, that the sea looked paler in that part than usual, and the land at the bottom part of the bay could not be seen. At this time, however, the matter could not be determined by experiment, on account of the wind being contrary. The scarcity of water here is the more surprising, on account of the vast extent of the country, and likewise its having abundance of tolerably high hills. In this island there were found many curious plants and animals; and it

22 Magnetic needle surprisingly affected.

was found, that in several places the magnetical needle was affected to such a degree, as to vary its position even to 30 degrees. At one time it varied no less than

Cook's Discoveries. main-mast of one of the Dutch East Indiamen was split and carried away close by the deck, the main-top-mast and top-gallant-mast being shivered to pieces. This ship lay so near the Endeavour, that the latter would probably have shared the same fate, had it not been for the conducting chain, which fortunately was just put up. The explosion shook her like an earthquake, the chain at the same time appearing like a line of fire. The stroke seemed to have been directed to the Dutch vessel by an iron spindle at the mast head: which practice our commander discommends, but strongly inculcates the use of the electrical chain.

31 Death of Tupia. On their landing at Batavia, Tupia was confined by sickness, so that he appeared quite lifeless and dejected when put into the boat: but on his arrival at land recovered his spirits surprisingly. The scene, to him so new and extraordinary, seemed to produce an effect similar to what is produced by enchantment. His attention was particularly engaged by the various dresses of the people: and being informed that at Batavia every one appeared in the dress of his own country, he expressed a desire of likewise appearing in the garb of Otaheite. Having therefore been furnished with South sea cloth from the ship, he equipped himself with great quickness and dexterity. After the first flow of spirits had subsided, however, he soon began to feel the fatal effects of the climate; and his boy Tayeto, whose spirits had been still more elevated on his arrival, was attacked with an inflammation of the lungs, and in a little time fell a victim to the disease. Tupia himself did not long survive him, and his death was not attributed solely to the unwholesomeness of the climate. Having been accustomed from his infancy to subsist chiefly upon vegetable food, and particularly on ripe fruit, he had soon contracted the disorders incident to a sea life, and could scarce have been expected to reach England, even if the unwholesome climate of Batavia had been out of the question.

32 Prince's island, a proper place for ships to touch at. The Endeavour left Batavia on the 27th of December 1770, and on the 5th of January 1771 reached Prince's island. This place had been formerly much frequented by the India ships, but of late entirely deserted on account of the supposed bad quality of the water: but this our navigator has discovered to be a mistake; and that, though the water near the sea is brackish, it may be had of excellent quality by going a little way up the country. He is of opinion, that this island is a more proper place for ships to touch at than either North Island or New Bay, because neither of these can afford other refreshments, which may be had at Prince's island.

The rest of the voyage affords but little interesting matter. The Cape of Good Hope, which was their next stage, has been so fully described by former navigators that there was little room for addition. At St Helena the commander made some remarks on the rigorous treatment of the slaves, which was represented as worse than that of the Dutch either at Batavia or the Cape of Good Hope. In the account of his second voyage, however, this accusation was retracted.

33 Second voyage. Captain Cook's second voyage was undertaken in an especial manner to determine finally the question concerning the existence of a southern continent. It commenced in the year 1772; and, as in the former, he proceeded first to Madeira. From thence he proceeded to St Jago, one of the Cape de Verd islands; where an opportunity was taken of delineating and giving such a description of Port Praya, and the supplies to be there obtained, as might be of use to future navigators. On the 8th of September he crossed the line in 8° west longitude, and had the satisfaction to meet with good weather, though he had been informed that he had sailed at an improper time of the year, in consequence of which he would probably be becalmed. From his account, however, it appears, that though in some years such weather may be expected, it is by no means universally the case. 34 Calms not always to be feared near the equinoctial. In this part of the ocean he had also an opportunity of observing the cause of the luminous property of sea-water, which in his former voyage had been attributed to insects. Mr Forster being of a different opinion, the matter was again particularly inquired into, but the result was entirely conformable to the former determination. 35 Luminous quality of sea water further determined. Some buckets of water being drawn up from alongside the ship, were found to be filled with those insects of a globular form, and about the size of a small pin's head. No life indeed could be perceived in them; but Mr Forster was thoroughly convinced of their being living animals when in their proper element.

36 Ice islands. Proceeding southward in quest of a continent, they fell in with ice islands in S. Lat. 50. 40. and two degrees of longitude east from the Cape of Good Hope. One of these was so much concealed by the haziness of the weather, that it could not be seen at the distance of more than a mile. Captain Cook judged it to be about 50 feet in height and half a mile in circumference; its sides rising in a perpendicular direction, and the sea breaking against them with great violence. Two days after, they passed six others, some of which were two miles in circumference and 60 feet in height; yet such was the strength and violence of the waves that the sea broke quite over them. On the 14th they were stopped by a vast field of low ice, of which they could perceive no end. In different parts of this field there were seen islands, or hills of ice like those already described, and some of the people imagined that they saw land over them; but upon a narrow examination this was found to be a mistake. On getting clear of the field of ice they again fell in with loose islands; and as it was a general opinion that these are only formed in bays and rivers, our navigators concluded that they could not be at a great distance from land. They were now in the latitude of 55° 40′ south; and as they had sailed for more than 30 leagues along the edge of the ice without finding any opening, the captain determined to run 30 or 40 leagues farther to the eastward, in hopes of then getting to the southward. If in this attempt he met with no land or other impediment, his design was to stretch behind the ice altogether, and thus determine the matter at once. In a short time, however, it became evident that the field of ice along which they had sailed so long, did not join with any land; and the captain now came to a resolution of running as far to the west as the meridian of Cape Circumcision. In the prosecution of this design he met with a very severe storm, which was rendered the more dangerous by the pieces of loose ice among

Cook's Discoveries. hood; but there was not at present any time to spend in searching for it. Proceeding farther on in his voyage, however, he fell in with a cluster of islands, supposed to be those discovered by M. Bougainville; and named by him the *Dangerous Archipelago*. To four of these Captain Cook gave the names of *Resolution*, *Doubtful*, *Furneaux*, and *Adventure Islands*. Resolution Island is situated in S. Lat. 17. 24. W. Long. 141. 39. Doubtful Island in S. Lat. 17. 20. W. Long. 141. 38. Furneaux Island in S. Lat. 17. 5. W. Long. 143. 16. and Adventure Island in S. Lat. 17. 14. and W. Long. 144. 30.

43 New islands discovered.

44 Mistake concerning the women of Otaheite.

No discovery of any great consequence was made at the island of Otaheite or those in its neighbourhood, excepting that the captain had an opportunity of correcting the opinion, which till now had prevailed, of the excessive dissoluteness and immodesty of the women of Otaheite; and which had been enlarged upon by Dr Hawkesworth more than seemed to be consistent with decency. The charge, however, according to the accounts of this second voyage, is far from being indiscriminately true, even of the unmarried females of the lower class. Some additions were made to the knowledge of the geography of those islands; and from Huaheine Captain Furneaux took on board of his ship one of the natives of Ulietea, named *Omai*, afterwards so much spoken of in England. Captain Cook at first appeared dissatisfied with his choice of this youth, as being inferior in rank to many others, and having no particular advantage in shape, figure, or complexion; however, he had afterwards reason to be better pleased. During the captain's residence at Otaheite, he used his utmost endeavours to discover whether the venereal disease was endemic among them, or whether it had been imported by Europeans; but in this he could not meet with any perfectly satisfactory account, though it was universally agreed, that if it had been introduced by Europeans, it must have been by the French under M. Bougainville.

45 Harvey's island discovered.

Captain Cook having left Ulietea on the 17th of September 1773, directed his course westward, with an inclination to the south. In this course he discovered land in S. Lat. 19. 8. and W. Long. 158. 54. to which he gave the name of *Harvey's Island*. From thence he proceeded to the island of Middleburg, where he was treated in the most hospitable manner possible. To such an excess did the people carry their generosity, that they seemed to be more fond of giving away their goods than in receiving any thing for them; insomuch that many, who had not an opportunity of coming near the boats, threw over the heads of others whole bales of cloth, and then retired, without either waiting or asking for any thing in return. From Middleburg he proceeded to Amsterdam island, where the beauty and cultivation of the island afforded the most enchanting prospect. There was not an inch of waste ground; the roads were no wider than what was absolutely necessary, and the fences were not above four inches thick. Even this was not absolutely lost; for many of these contained useful trees or plants.

46 South sea islands generally surrounded with coral rocks.

It is observable of the isles of Middleburg and Amsterdam, as well as of most others in the South sea, that they are guarded from the waves by a reef of coral rocks, which extend about one hundred fathoms from the shore. Thus they are effectually secured from the encroachments of the ocean; by which they would probably soon be swallowed up, as most of them are mere points in comparison of the vast quantity of water which surrounds them. Here he left a quantity of garden vegetable seeds and pulse, which it was not doubted would be taken care of by the industrious inhabitants. In the last-mentioned islands our navigators found no animals but hogs and fowls; the former being of the same kind with those usually seen in the other islands of the South sea; but the latter greatly preferable, equalling those of Europe in their size, and even preferable in respect of the goodness of their flesh.

On the 7th of October, Captain Cook left the island of Amsterdam, with a design to pay another visit to New Zealand, in order to take in wood and water for his voyage in quest of a southern continent. The day after he left Amsterdam he fell in with the island of Pilstart, formerly discovered by Tasman, and situated in S. Lat. 26'. W. Long. 175. 59. thirty-two leagues distant from the east end of Middleburg. On his arrival at New Zealand, he exerted himself as much as possible to leave a proper assortment of vegetables and animals for the benefit of the inhabitants. One of the first things he did, therefore, was to make a present to a chief, who had come off in a canoe, of a quantity of the most useful garden seeds, such as cabbage, turnips, onions, carrots, parsneps, and yams; together with some wheat, French and kidney beans, and pease. With the same person also he left two boars, two sows, four hens, and two cocks. This present, however valuable in itself, seems to have been but indifferently received; for the chief was much better satisfied with a spikenail half the length of his arm than with all the rest; notwithstanding which, he promised to take care of the seeds, and not to kill any of the animals. On inquiring about those animals left in the country in the former part of his voyage, the captain was informed, that the boar and one of the sows had been separated, but not killed. The other he saw in good condition, and very tame. The two goats, he was informed, had been killed by a native of the name of Gaubiah. The gardens had met with a better fate; all the articles being in a very flourishing condition, though left entirely to nature, excepting the potatoes. Captain Cook, however, still determined to supply these islanders with useful animals, put on shore a boar, a young sow, two cocks and two hens, which he made a present of to the adjacent inhabitants. Three other sows and a boar, with two cocks and hens, he ordered to be left in the country without the knowledge of the Indians. They were carried a little way into the woods, and there left with as much food as would serve them for 10 or 12 days, in order to prevent them from coming down to the coast in quest of it, and thus being discovered.

47 Another visit to New Zealand.

A second separation from the Adventure had now taken place; notwithstanding, which, Captain Cook set out alone with his vessel in quest of a southern continent; and such was the confidence put in him by the sailors, that all of them expressed as much satisfaction and alacrity as if not only the Adventure, but ever so many ships had been in company. 48 Voyage in quest of a southern continent.

On the 26th of November the captain set sail from New Zealand; and on the 12th of December began to fall

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island would soon be stocked with these useful animals; though it was otherwise with the sheep, all of which had died except one. On this occasion, also, the captain furnished the natives with cats, of which he gave away twenty; so that there was little danger of the stock of these animals decaying. During his residence at this time, he had an opportunity of making some computation of the number of inhabitants on the island, which he supposed to be no less than 200,000.

56 Huaheine, Ulietea, Howe island, &c.

Huaheine and Ulietea islands were next visited, but without any remarkable occurrence. From the latter our commander set sail on the 5th of June 1774; and next day came in sight of Howe island, discovered by Captain Wallis, and situated in S. Lat. 16. 46. and W. Long. 154. 8. On the 16th a new island, named *Palmerstone Island*, was discovered, in S. Lat. 18. 4. W. Long. 163. 10.; and four days after, another was observed in S. Lat. 19. 1. W. Long. 169. 37. As it was evidently inhabited, the captain determined to land; but found the people so extremely hostile, that no intercourse could be had: nay, he himself was in danger of losing his life by a lance thrown by one of the natives, which passed close over his shoulder. From the extreme hostility of the people of this island, it was named by Captain Cook *Savage Island*. It is of a round shape, pretty high, and has deep water close to the shore, but has no good harbour.

57 Rotterdam island.

Passing by a number of small islands, Captain Cook next anchored at that of Anamocka or Rotterdam, discovered by Tasman. It is situated in 20. 15. S. Lat. and 174. 31. W. Long. Its form is triangular, each side extending about three and a half or four miles. From the north-west to the south it is encompassed by a number of small islands, sand banks, and breakers; of which no end can be seen from the island on the northern side, and may possibly be as far extended as Amsterdam or Tongataboo. While the captain remained on this island, he learned the names of more than 20 of the adjacent isles, some of which were in sight, between the north-west and north-east. Two of these, which lie more to the eastward than the others, are named *Amattafoa* and *Oghoo*. They are remarkable for their height; and from a great smoke visible about the middle of Ammatafoa, it was

58 Supposed volcano.

supposed to have a volcano. The island of Rotterdam, Middleburg, or Eaoowe, with Pilstart, form a group extending about three degrees of longitude, and two of latitude. The whole group was named *The Friendly Isles* by Captain Cook, on account of the friendship which seemed to subsist among the inhabitants, and their courteous behaviour to strangers. The people of Rotterdam island are similar to those of Amsterdam; but the island is not in such a high state of cultivation as Amsterdam, nor do its fruits come to such perfection. It is also inferior in the articles of cloth, matting, &c. which are accounted the wealth of these parts.

59 New Hebrides visited.

From Rotterdam island our navigator continued his course to the westward, where he first discovered a small island in S. Lat. 19. 48. W. Long. 178. 2. It was named Turtle island, from the great number of these animals found upon it. Sixteen days after he fell in with the cluster of islands named by M. Bougainville the *Great Cyclades*. The first island on which he landed was Mallicollo, where, though the people were at first very hostile, they were soon conciliated, and a friendly intercourse took place. The language of these people is considerably different from that of the other South sea islands; they are diminutive in their persons, and of ugly features; their hair black or brown, short and curling, but less soft than that of the negroes. They had no name for a dog in their language, and had never seen the animal; so that they were extremely fond of a dog and bitch, of which Captain Cook made them a present. The harbour in this island, in which the ship came to an anchor, was named Sandwich harbour, and lies on the north-east side, in S. Lat. 16. 25. 20. E. Long. 167. 57. 53. It is very commodious for the carrying on any operations at land, having a good depth of water, and many other advantages.

60 Shepherd's isles.

The next discovery was that of the group named *Shepherd's Isles*, in honour of Dr Shepherd, Plumian professor of astronomy at Oxford. Numbers more were every day observed; of which one peaked rock, named the *Monument*, was uninhabited, being apparently inaccessible to any other creature but birds. Sandwich island is of a considerable extent, and exhibits a most beautiful prospect. It is surrounded with other smaller islands, the principal of which were named *Montague* and *Hinchinbrooke*. At Erromango they found the people hostile and treacherous; and from a skirmish they had with them near a promontory on the north-east point of the island, it was named *Traitor's Head*. Its situation is in S. Lat. 10. 43. E. Long. 169. 28.

61 Tanna island.

From Erromango our navigators proceeded to Tanna, an island they had formerly discovered at a distance, and which is surrounded by some others, three of which are named *Immer*, *Footoona* or *Erronan*, and *Anatom*. At Tanna they staid for some time, on account of their wanting some quantity of wood. A vol-

62 Volcano.

cano was seen about the middle of this island, which burned with great violence, particularly in moist and wet weather; but notwithstanding the friendly terms on which they were with the natives, the latter would never allow them to approach this mountain. There were some spots on the sea-coast which emitted a hot and sulphureous smoke; and the people also expressed much uneasiness when these were approached or meddled with. The port which the ship entered in this island was named *Resolution Harbour*, and is situated in S. Lat. 19. 32. $25\frac{1}{2}$. E. Long. 169. 44. 35. It is a small creek three quarters of a mile long, and about half as broad. It is extremely convenient, having plenty of wood and water close to the shore. Among the vegetable productions of this island, there is reason to suspect the nutmeg tree to be one, a pigeon having been shot, in the craw of which was a wild nutmeg. The inhabitants are two distinct races of people, and speak two different languages; one that of the Friendly Islands, the other peculiar to Tanna and those in the neighbourhood. The people are very

63 Dexterity of the inhabitants in the use of their lances.

expert in the use of their weapons; on which Mr Wales makes the following remarks: "I must confess I have often been led to think the feats which Homer represents his heroes as performing with their spears, a little too much of the marvellous to be admitted in an heroic poem, I mean when confined

Cook's Discoveries. within the strait stays of Aristotle; nay, even so great an advocate for him as Mr Pope acknowledges them to be surprising; but since I have seen what these people can do with their wooden spears, and them badly pointed, and not of an hard nature, I have not the least exception to any one passage in that great poet on this account. But if I see fewer exceptions, I can find infinitely more beauties in him, as he has, I think, scarcely an action, circumstance, or description of any kind whatever relating to a spear, which I have not seen and recognised among these people; as their whirling motion and whistling noise as they fly; their quivering motion in the ground when they fall; their meditating their aim when they are going to throw; and their shaking them in their hand as they go along."

The archipelago, in which Captain Cook had now remained a considerable time, is situated between 14. 29. and 20. 4. S. Lat. and between 165. 41. and 170. 21. E. Long. extending 125 leagues in the direction of N. N. W. ½ W. and S S. E. ½ E. The principal islands are the Peak of the Etoile, Terra del Espiritu Santo, Mallicollo, St Bartholomew, the isle of Lepers, Aurora, Whitsuntide isle, Ambrym, Paoom, Apee, Three Hills, Sandwich, Erromango, Tanna, Immer, and Anatom. They were first discovered in 1606 by Quiros, who supposed them to be part of a southern continent; nor were they visited from that time till the year 1768, when M. Bougainville bestowed upon them the name of the *Great Cyclades*, as already mentioned. This gentleman, however, besides landing in the isle of Lepers, only discovered that the country was not connected, but consisted of islands. Captain Cook examined the whole in such an accurate manner, ascertaining the situation of many of the islands, and discovering such numbers of new ones, that he thought he had an undoubted right to impose a new name upon them, and therefore called them the *New Hebrides*.

64 New Caledonia discovered. From the New Hebrides Captain Cook set sail for New Zealand, in order to prosecute his voyage in search of a southern continent, but in three days discovered a large island, which he named *New Caledonia;* and which, next to New Zealand, is the largest in the Pacific ocean. It lies between 19. 37. and 22. 30. S. Lat. and between 163. 37. and 167. 14. E. Long. lying N. W. ½ W. and S. E. ½ E. extending about 87 leagues in that direction, though its breadth does not anywhere exceed 10 leagues. The natives are strong, active, well made, and seem to be a middle race between those of Tanna and the Friendly Isles; and the women were more chaste than those of the islands farther to the eastward. The island afforded a considerable variety of plants for the botanists, and some excellent timbers of the species of the pitch pine, for masts and spars. The wood is close-grained, white, and tough; and very fit for the purpose. One of the small islands surrounding the large one was named the *Isle of Pines*, from the quantity of these trees found upon it; and another, from the number and variety of plants it afforded, had the name of *Botany Island*. The coast, however, was so dangerous, that our navigator, having no more time to spare, was obliged to leave some part of it unexplored, though the extent was determined, as has been already related. Mr Forster was of opinion, that the language of this people is totally different from that of any other of the South Sea islands.

65 Norfolk island. Proceeding from New Caledonia, our navigator next fell in with an island about five leagues in circumference, and of a good height, situated in S. Lat. 29. 2. 30. and E. Long. 168. 16.; on which he bestowed the name of *Norfolk Island*. It was entirely uninhabited. Various trees and plants common in New Zealand were observed here, particularly the flax plant, which is more luxuriant in this island than in any part of New Zealand. The chief produce of the island is a kind of spruce-pine, many of the trees of which are 10 or 12 feet in circumference. The palm cabbage likewise abounds here; and the coasts are well stocked with excellent fish. On the 18th of October they arrived at Queen Charlotte's Sound in New Zealand; 66 Arrival at New Zealand; the situation of which was now ascertained by Mr Wales with the utmost accuracy, its latitude being found 41. 5. 56½. S. and its longitude 174. 25. 7½. E. On examining the gardens which had been made, it was found that they were in a thriving condition, though they had been entirely neglected by the natives. Some of the cocks and hens were supposed to be still in existence, as a new laid hen's egg was found, though none were seen.

On the 10th of November Captain Cook set sail from New Zealand in search of a southern continent; but having traversed a vast extent of sea for 17 days, from S. Lat. 43. 0. to 55. 48. he gave up all thoughts of finding any more land in this part of the ocean, and therefore determined to steer directly for the west entrance of the straits of Magellan, with a design of coasting the southern part of Terra del Fuego quite round Cape Horn to Le Maire's Straits. As the world had hitherto received but very imperfect accounts of this coast, he thought a survey of it would be of more advantage to navigation and geography than any thing he could expect to meet with in a higher latitude. On the 17th of December he reached the 67 at Terra del Fuego. coast of Terra del Fuego, and in three days more anchored in a place to which he gave the name of *Christmas Sound*. The land appeared desolate beyond any thing he had hitherto experienced. It seems to be entirely composed of rocky mountains, without the least appearance of vegetation. These mountains terminate in horrid precipices, the craggy summits of which spire up to a vast height; so that scarcely any thing in nature can have a more barren and savage prospect than the whole of the country. In the course of his voyage along this coast, he could not but observe, that at no time had he ever made one of such length where so little occurred of an interesting nature. Barren and dreary, however, as the coast was, it was not totally destitute of accommodations about Christmas Sound. Fresh water and wood for fuel were found about every harbour; and the country everywhere abounds with fowl, particularly geese.—A considerable number of plants were also found upon it, almost every species of which was new to the botanists. In passing by Cape Horn, it was wished to 68 Remarks on a voyage round Cape Horn. determine whether it belonged to the land of Terra del Fuego, or to a small island south from it; but this was found impracticable on account of the foggy weather and dangerous sea. Its latitude was now

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now determined to be 55. 58. S. and its longitude 67. 46. W. The coast appeared less dreary here than on the western side of Terra del Fuego; for though the summits of some of the hills were rocky, the sides and valleys seemed covered with a green turf and wooded in tufts. In passing this cape a remark was made by the captain, that if he were on a voyage round Cape Horn, to the west, and not in want of wood or water, or any other thing which might make it necessary to put into port, he would sail a considerable way to the southward, so as to be out of the reach of land altogether. By this method he would avoid the currents, whose force, he was of opinion, would be broken at 10 or 12 leagues distance from the shore, and farther off would be entirely destroyed. The extent of Terra del Fuego, and consequently of Magellan's Straits, was found to be less than what is commonly laid down in maps and charts, and the coasts, in general, less dangerous than has been usually represented; though this must undoubtedly have been owing in a great measure to the weather, which happened to be remarkably temperate.

69 Surprising concord of the animals in these parts.

In one of the small islands near Staten Land, and which, from their being discovered on new year's day, were called *New Year's Isles*, a remarkable harmony was observed among the animals of different species with which these desolate regions abound. The sea-lions occupy the greatest part of the sea-coast; the bears occupy the inland; the shags are posted in the highest cliffs; the penguins in such places as have the best access to and from the sea; and the other birds choose more retired places. Occasionally, however, all these animals were seen to mix together like domestic cattle and poultry in a farm yard, without one attempting to hurt the other in the least. Even the eagles and vultures were frequently observed sitting together on the hills among the shags, while none of the latter, either old or young, appeared to be disturbed at their presence. It is probable, therefore, that these birds of prey subsist by feeding on the carcases of the animals which die naturally or by various accidents, and which must be very numerous, from the immense quantity existing on the island.

70 Farther discoveries in the southern regions.

Our navigator now set out in quest of that extensive coast laid down in Mr Dalrymple's chart, and in which is marked the gulf of St Sebastian; but when he came into the place where it is supposed to lie, neither land nor any certain signs of it could be met with. Some islands, however, were discovered, particularly Willis's island, in S. Lat. 54. 0. W. Long. 38. 23.; another named *Bird Island* and *South Georgia*, situated between 53. 57. and 54. 57. S. Lat. and between 38. 13. and 35. 34. W. Long. All these were covered with snow and ice to a great height. Not a tree was to be seen, not even a shrub, nor were there any rivulets or streams of water: the only vegetables to be met with were a coarse strong-bladed grass, wild burnet, and a kind of moss. A considerable quantity of seals and penguins were met with, whose flesh, though very coarse, was preferred by the ship's company, even by Captain Cook himself, to the salt provisions, which were now greatly decayed. The most southerly land discovered by our navigator was that on which he bestowed the name of *Southern Thule*, and which is situated in S. Lat. 59. 13. 30. W. Long. 27. 45. This was still more desolate than South Georgia, being forsaken even by the seals and penguins which abounded on it. Not a single herb of any kind was seen upon it, but vast high and barren mountains, the tops of some of which reached above the clouds; and it may be remarked, that this seems to be the only part of the world, hitherto discovered, entirely unfit for the support of animal life.

71 Of the existence of a southern continent.

Southern Thule was discovered on the 31st of January 1775; and from this to the 6th of February several other islands were discovered, and named *Cape Bristol*, *Cape Montague*, *Saunders's Isles*, *Candlemas Isle*, and *Sandwich's Land*. With regard to this last, Captain Cook was undetermined whether it was a group of islands or part of a continent lying near the pole, as, after all his disappointments, he was still inclined to think that such a continent has an existence, on account of the vast quantity of ice met with in the southern seas, and which from its great height appears to be formed in bays and gulfs of the land, and not in the ocean itself. The greatest part of the southern continent, however, if it has any existence, must be within the polar circle, where the sea is so encumbered with ice, that the land must be inaccessible (A.) One thing only remained to complete what he wished to accomplish, and that was to determine the existence of Bouvet's land.

72 Voyage in quest of Bouvet's land.

In this inquiry he spent 16 days; but having run for 13 of these directly in the latitude assigned to that land, and found no appearance of it, or of Cape Circumcision, he concluded that neither of them had any existence, but that the navigators had been deceived by the appearance of ice islands. On his way home, however, he determined to direct his course in such a manner as to fall in with the islands of Denia and Marseveen.

73 Of the isles of Denia and Marseveen.

These are laid down in Dr Halley's variation chart in latitude 41. 30. S. and about 4. 0. E. from the meridian of

(A) The existence of a southern continent, however, which Cook's voyage was supposed to have nearly disproved, seems to have been at length ascertained. In February 1819, Mr William Smith, master of the brig Williams of Blythe, in a voyage from Buenos Ayres to Valparaiso, conceiving that Cape Horn might be more easily weathered by preserving a more southerly course than usual, proceeded as far as Lat. 62° 40′. Here, in 60° of west longitude, he observed high land; but fearing to risk the ship by remaining on the coast, he proceeded on his voyage. On a second voyage to the Pacific, following the same course, he again found the land. The place first observed was an island, behind which, at the distance of three leagues, he saw an extensive range of high land, which he concluded to be a continent. He afterwards went ashore on the main land, and observed the general direction of the coast from longitude 56° to 65°, about 250 miles. He named the country New South Shetland. On the coast he found the spermaceti whale in abundance; and seals and sea otters were numerous. Besides penguin, and various sea fowls, there were also abundance of land fowls, and fresh-water ducks were observed. The soil was bare and rocky, but at a distance from the water he saw trees growing, which seemed to resemble the Norway pine. The climate was found to be less severe than Captain Cook's observations had led them to expect. See *Edinburgh Philosophical Journal*, No 6. October 1820.

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beads; nor did they seem to be acquainted even with the use of fish-hooks. Here they found the stories of the ancient fauns and satyrs lying in hollow trees realized. Some huts covered with bark, and of a most wretched construction, were indeed found near the shore; but the most commodious habitations were afforded by the largest trees. These had their trunks hollowed out by fire to the height of six or seven feet; and there was room enough in one of them for three or four persons to sit round a hearth made of clay; and it may justly seem surprising, that notwithstanding the extreme violence offered to the vegetative powers of the tree by forming this habitation, it still continued to flourish in consequence of one side being left entire. The people, notwithstanding their extreme barbarity, were supposed to proceed from the same stock with those of the South sea islands. As in one of their visits the natives had seized upon two pigs which had been brought ashore, apparently with an intention to kill them, the commander determined to make them a present of those animals; though from their excessive stupidity and inattention there was no probability of their allowing them to propagate, if they had been put directly into their hands. To prevent this, Captain Cook ordered the two they had attempted to seize, being a boar and a sow, to be carried about a mile within the head of the bay, and saw them left by the side of a fresh-water rivulet. He was prevented from leaving any other species by a consideration of the barbarity of the inhabitants.

83 Visit to New Zealand.

From New Holland our navigator proceeded to New Zealand, where he arrived on the 12th of February 1777, and anchored in Queen Charlotte's sound. Here he was desirous of leaving a further supply of animals; but the inhabitants had hitherto shown such carelessness about those which had been left, that he durst not venture to leave any other than two goats, a male and female with kid, and two hogs, a boar and sow. He was informed, however, that one chief had several cocks and hens in his possession, so that there was some probability of these animals being allowed to multiply; and as ten or a dozen hogs had at different times been left by Captain Cook, besides those put on shore by Captain Furneaux, it seems also to be likely that this race of creatures will increase either in a wild or domestic state, or both. The gardens had still been almost totally neglected, and some of them destroyed. Those which remained, however, produced cabbages, onions, leeks, purslain, radishes, and a few potatoes. These last had been brought from the Cape of Good Hope, and were so greatly meliorated by the change of soil, that with proper cultivation they seemed to bid fair for excelling those of other countries.

Our navigator's next course was towards the island of Otaheite; in the run to which he discovered the island of Mangea, situated in S. Lat. 22. 57. E. Long. 201. 53. From thence he proceeded to Wateoa, where Omai, on his way home, recognised three

84 Extraordinary preservation of some of the natives of Otaheite.

of his countrymen, natives of the Society islands, who had arrived here by the following accident. About 12 years before, 20 of the natives of Otaheite had embarked in a canoe, in order to visit the neighbouring island of Ulietea. A violent storm arose, which drove them out of their course, and they suffered incredible hardship by famine and fatigue, so that the greatest part of them perished. Four men continued hanging by the side of the vessel for four days after it was overset, when they were at last brought within sight of the people of this island. The latter immediately sent out their canoes, and brought them ashore, treating them afterwards with so much kindness, that the three who now survived expressed no desire of returning to their own country, though they had now an opportunity, but chose rather to remain where they were. This island is situated in S. Lat. 20. 1. E. Long. 201. 45. and is about 6 leagues in circumference. The inhabitants are said to be equally amiable in their persons and dispositions.

Visiting a small island named *Wenooa-ete*, or *Otakootaia*, situated in S. Lat. 19. 15. and E. Long. 201. 37. our commander found it without inhabitants, though there were undoubted marks of its being occasionally frequented. Harvey's island, which in his former voyage had been destitute of inhabitants, was now found to be well peopled; but the inhabitants showed such an hostile disposition that no refreshments could be procured; for which reason it was determined to steer for the Friendly islands, where there was a certainty of 85

Palmerstone island a proper place of refreshment, but without water.

meeting with an abundant supply. In his way thither he touched at Palmerstone island, from a small isle near which a supply of 1200 cocoa nuts was obtained, besides abundance of fish and birds of various kinds. Had this island been capable of furnishing water, the captain would have preferred it to any of the inhabited ones for the purpose of procuring refreshments, as they could be had in any quantity without molestation from the petulance of the inhabitants. As water at this time happened to be a scarce article, our navigator was obliged to supply himself from the showers which fell, and which afforded as much in an hour as he could procure by distillation in a month.

During the time of residence at the Friendly islands, our navigator visited one named *Hepaee*, at which no European ship had ever touched before. Here he was entertained in a friendly manner, supplied with refreshments, and left some useful animals. Great additions were made to the geography of these islands, and many curious remarks made on the inhabitants and natural products. It was observed by Mr Anderson, that the people had very proper notions of the immateriality and immortality of the human soul; and he thought himself authorized to assert, that they did not worship any part of the visible creation. 86

Reception of Omai at Otaheite.

Passing by a small island named *Toobouai*, about five or six miles in extent, and situated in S. Lat. 23. 25. E. Long. 210. 37. our navigator now arrived at Otaheite. Here Omai met with his relations, some of whom received him with apparent indifference; but his meeting with an aunt and a sister was marked with expressions of the most tender regard. It was Huaheine, however, that was destined for the place of Omai's final residence, and thither the captain repaired on purpose to settle him. The affair was conducted with great solemnity; and Omai brought with him a suitable assortment of presents to the chiefs, went through a great number of religious ceremonies, and made a speech, the subject of which had been 87

He is settled at Huaheine.

dictated to him by Captain Cook. The result of the negotiation was, that a spot of ground was assigned him,

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dangers and distresses formerly experienced in those seas which are within the actual line of commerce and navigation.

The interests of science, as well as of commerce, are highly indebted to the labours of our illustrious navigator. Before his time almost half the surface of the globe was involved in obscurity and confusion: but now such improvements have been made, that geography has assumed a new face, and become in a manner a new science; having attained such completeness as to leave only some less important parts to be explored by future voyagers. Other sciences besides geography have been advanced at the same time. Nautical astronomy, which was in its infancy when the late voyages were undertaken, is now brought to much greater perfection; and, during Captain Cook's last expedition, many even of the petty officers could take the distance of the moon from the sun, or from a star, the most delicate of all observations, with sufficient accuracy; and the officers of superior rank would have been ashamed to have it thought that they did not know how to observe for, and compute, the time at sea: a thing before hardly mentioned among seamen. It must, however, be remembered, that a great part of the merit in this respect is due to the board of longitude. In consequence of the attention of that board to the important object just mentioned, liberal rewards have been given to mathematicians for perfecting the lunar tables and facilitating calculations: and artists have been amply encouraged in the construction of watches, and other instruments better adapted to the purposes of navigation than any that formerly existed.

A vast addition of knowledge has been gained with respect to the ebbing and flowing of the tides; the direction and force of the currents at sea; the nature of the polarity of the needle, and the cause of its variations. Natural knowledge has been increased by experiments on the effects of gravity in different and very distant places; and from Captain Cook's having penetrated so far into the southern regions, it is now ascertained, that the phenomenon usually called the *aurora borealis*, is not peculiar to high northern latitudes, but belongs equally to all cold climates, whether north or south.

No science, however, perhaps stands more indebted to these voyages than that of botany. At least 1200 new species of plants have been added to those formerly known; and every other department of natural history has received large additions. Besides all this, there have been a vast many opportunities of observing human nature in its different situations. The islands visited in the middle of the Pacific ocean are inhabited by people who, as far as could be observed, have continued unmixed with any different tribe since their first settlement. Hence a variety of important facts may be collected with respect to the attainments and deficiencies of the human race in an uncultivated state, and in certain periods of society. Even the curiosities brought from the newly discovered islands, and which enrich the British museum and the late Sir Ashton Lever's (now Mr Parkinson's) repository, may be considered as a valuable acquisition to this country, and affording no small fund of instruction and entertainment.

There are few inquiries more generally interesting than those which relate to the migrations of the various colonies by which the different parts of the earth have been peopled. It was known in general, that the Asiatic nation called the *Malayans*, possessed in former times much the greatest trade of the Indies, and that their ships frequented not only all the coasts of Asia, but even those of Africa likewise, and particularly the large island of Madagascar; but that from Madagascar to the Marquesas and Easter island, that is, nearly from the east side of Africa till we approach the west coast of America, a space including almost half the circumference of the globe, the same nation of the oriental world should have made their settlements, and founded colonies throughout almost every intermediate stage of this immense tract, in islands at amazing distances from the mother continent, is a historical fact that before Captain Cook's voyages could not be known, or at least but very imperfectly. This is proved, not only by a similarity of manners and customs, but likewise by the affinity of language; and the collections of words which have been made from all the widely diffused islands and countries visited by Captain Cook, cannot fail to throw much light on the origin of nations, and the manner in which the earth was at first peopled.

Besides this, information has been derived concerning another family of the earth formerly very much unknown. This was the nation of the Esquimaux or Greenlanders, who had formerly been known to exist only on the north-eastern part of the American continent. From Captain Cook's accounts, however, it appears, that these people now inhabit also the coasts and islands on the west side of America opposite to Kamtschatka. From these accounts it appears also, that the people we speak of have extended their migrations to Norton sound, Oonalashka, and Prince William's sound; that is, nearly to the distance of 1500 leagues from their stations in Greenland and the coast of Labradore. Nor does this curious fact rest merely on the evidence arising from the similitude of manners; for it stands confirmed by a table of words, exhibiting such an affinity of language as must remove every doubt from the mind of the most scrupulous inquirer.

From the full confirmation of the vicinity of the two great continents of Asia and America, it can no longer be supposed ridiculous to believe, that the latter received its inhabitants from the former; and by the facts recently discovered, a degree of further evidence is added to those which might formerly be derived from nature concerning the authenticity of the Mosaic accounts. It is not indeed to be doubted, that the inspired writings will stand the test of the most rigorous investigation; nor will it ever be found, that true philosophy and divine revelation, can militate against each other. The rational friends of religion are so far from dreading the spirit of inquiry, that they wish for nothing more than a candid and impartial examination of the subject, according to all the lights which the improved reason and enlarged science of man can afford.

Another good effect of the voyages of Captain Cook is, that they have excited in other nations a zeal for similar undertakings. By order of the French government, Mess. de la Peyrouse and de Langle sailed from Brest in August 1785, in the frigates Boussole and Astrolabe, on an enterprise, the purpose of which was

Cook's Discoveries. urged, that the mischief was already irreparable; that the natives, by reason of their former friendship, had a strong claim to the regard of the English; and that the more particularly, as the late calamitous accident did not appear to have taken its rise from any premeditated design; they urged also the ignorance of the king concerning the theft, and the mistake of the islanders who had armed themselves on a supposition that some attempt would be made to carry off the king. To all this was added, that the ships were in want of refreshments, particularly water; that the Resolution's foremast would require seven or eight days before it could be properly repaired; and as the spring was fast advancing, the speedy prosecution of the voyage to the northward ought now to be the only object; that a vindictive contest with the natives might not only justify an imputation of needless cruelty, but would occasion great delay in the equipment of the ships.

In consequence of the prevalence of these sentiments lenient measures were adopted, though the behaviour of the natives continued to be very insolent. A great body still kept possession of the shore; many of whom came off in their canoes within pistol-shot of the ships, and provoking the people by every kind of insult and defiance. A train of negotiations for Captain Cook's body took place; in which the natives showed the most hostile and treacherous disposition, and, as afterwards appeared, had cut the flesh from the bones and burnt it. A piece of about ten pounds weight was brought by two natives at the hazard of their lives, who gave information that the rest had been burnt, and that the bones were in the possession of the king and some of the principal chiefs. Information was given, at the same time, that the chiefs were very desirous of war, in order to revenge the death of their countrymen.

Thus it appeared that the pacific plan had answered no good purpose. No satisfactory answer had been given to the demands made of the bodies of the slain; nor was any progress made in the great work intended, viz. a reconciliation with the natives; they still remained on shore in an hostile posture, as if determined to oppose any endeavours that might be made by our people to land; at the same time that a landing was become absolutely necessary, in order to complete the stock of water. Had this spiritless conduct been persisted in, there is not the least doubt that neither this purpose or any other could have been effected. The insolence of the natives became every day greater and greater: insomuch that one of them had the audacity to come within musket shot of the Resolution, and after throwing several stones, waved Captain Cook's hat over his head, while his countrymen on shore were exulting and encouraging his audacity. By this insult the people were so highly enraged, that coming on the quarter-deck in a body, they begged that they might no longer be obliged to put up with such reiterated provocation, but might be allowed to make use of the first opportunity of revenging the death of their captain. The necessity of more vigorous measures, therefore, being now apparent, a few discharges of the

108 His remains at last obtained. great guns, with the burning of a village and some other acts of severity, at last produced the mangled remains of Captain Cook. They were wrapped up in a bundle, in which were found both his hands entire, which were easily known by a scar in one of them dividing the fore-finger from the thumb the whole length of the metacarpal bone. Along with these was the skull, but with the scalp separated from it, and the bones of the face wanting; the scalp, with the ears adhering to it, and the hair cut short; the bones of both the arms, and the skin of the fore-arms hanging to them; the bones of the thighs and legs joined together, but without the feet. The ligaments of the joints were observed to be entire; the whole showing evident marks of being in the fire, except the hands, which had the flesh remaining upon them, and were cut in several places and crammed with salt, most probably for the purpose of preserving them. The skull was not fractured; but the scalp had a cut in the back part of it. The lower jaw and feet were wanting, having been seized by different chiefs.

Having accomplished the purposes of their stay in this place, Captain Clerke set sail from Karakakooa bay in O-why-hee towards Mowee, with a design to explore the coasts of that island more fully than had been done, but were unable to accomplish their purpose; nor indeed was it in their power to accomplish any discovery of consequence among these islands. The only intelligence worth mentioning which they were able to procure was, that wars had ensued about the property of the goats which were left by Captain Cook on the island of Oneeheow, as has been already mentioned, and that during the contest all these poor animals, who had already begun to multiply, were destroyed; so that the benevolent attempts of our illustrious navigator in favour of these islanders had proved abortive. 109 Unsuccessful attempts to make farther discoveries.

On quitting the island of Oneeheow, our navigators set sail for another named Modoopappa, which they were assured by the natives lay within five hours sailing of Tahoora, a small island in the neighbourhood of Oneeheow. In this they proved unsuccessful; on which it was determined to steer for the coast of Kamtschatka. In the passage thither they arrived at the place where De Gama is said to have discovered a great extent of land; but of this they could discover no appearance. This imaginary continent is said to have been discovered by a navigator called John de Gama, but who seems also to have been imaginary, as no person can find out either the country where he lived, or the time when he made the discovery. We are informed by Muller, that the first account of it was published by Texeira in a chart of 1649, who places it between the latitude of 44 and 45 degrees, and about 160. east longitude, and calls it "land seen by John de Gama, in a voyage from China to New Spain." By the French geographers it is removed five degrees farther to the east. When they arrived at Kamtschatka they were entertained in the most hospitable manner, and furnished with every thing that could be procured in that desert and barren region. "In this wretched extremity of the earth (says the narrator of the voyage), beyond conception barbarous and inhospitable, out of the reach of civilization, bound and barricaded with ice, and covered with summer snow, we experienced the tenderest feelings of humanity, joined to a nobleness of mind and elevation of sentiment which would have done honour to any clime 110 Their favourable reception at Kamtschatka.

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the island of St Lawrence, and another which was supposed to lie between it and Anderson's island. The latter being entirely unknown to Captain Clerke, he was inclined to have approached it, but was unable to effect his purpose. All these islands, as well as the coast of the Tschutski on the continent, were covered with snow, and had a dismal appearance.

In the preceding year Captain Cook had determined the situation of the islands of St Diomede to be in 65° 48′ latitude; but now being somewhat at a loss to reconcile this with the position of the continent, they stood for some time over to the latter, till fully convinced of the accuracy of the former observation. At this time they approached within two or three leagues of the eastern cape of Asia, which is an elevated round head of land extending about five miles from north to south, and forms a peninsula connected with the continent by a narrow isthmus of low land. It has a bold shore, and three lofty detached spiral rocks are seen off its northern part. It was still encompassed with ice, and covered with snow. Here they found a strong current setting to the northward, which at noon had occasioned an error in the computation of the latitude of no less than 20 miles. A similar effect had been observed the preceding year in passing this strait. On steering to the north-east the weather cleared up, so that they had a view of the eastern cape of Asia, Cape Prince of Wales on the western coast of America, with a remarkable peaked hill on the latter, and the two islands of St Diomede lying between them. Here they met with great numbers of very small hawks, having a compressed bill rather large in proportion to the body; the colour dark brown, or rather black, the breast whitish, and towards the abdomen of a reddish hue.

116
Are stopped by the ice.

On the 6th of July, at 12 o'clock, the ships were in N. Lat. 67. 0. E. Long. 191. 6. when having already passed many large pieces of ice, and observed that in several places it adhered to the continent of Asia, they were suddenly stopped about three in the afternoon by an extensive body, which stretched towards the west. By this their hopes of reaching any higher latitude than what had been attained last year were considerably diminished; but finding the course obstructed on the Asiatic side, they proceeded to the north-eastward, in order to explore the continent of America between the latitudes of 68 and 69°; which had last year been found impracticable on account of the foggy weather; but in this also they were partly disappointed; for on the 7th, about six in the morning, they met with another large body of ice stretching from north-west to south-east; but not long afterwards, the horizon becoming clear, they had a view of the American coast at the distance of about ten leagues, extending from north-east by east, to east, and lying between N. Lat. 68° and 68° 20′. As the ice was not very high, the view extended a great way over it, so that they could perceive it exhibiting a compact solid surface, and apparently adhering to the land. Soon after the weather became hazy, so that they lost sight of the land; and it being impossible to get nearer, they continued to steer northward close by the side of the ice. This course was continued till next morning, during which time the ships passed some drift wood; but the morning following, the winding shifting to the north, they were obliged to stand to the westward. At two in the afternoon they were again close to an immense expanse of ice; which from the mast-head seemed to consist of very large compact bodies, united towards the exterior edge, though in the interior parts some pieces floated in the water; it extended from west-south-west to north-east by north. There was now a necessity for steering towards the south, as the strong northerly winds had drifted down such numbers of loose pieces that they had encompassed the ships for some time, and it was impossible to avoid very severe strokes while sailing among them. Thus, however, they reached the latitude of 69. 12. and E. Long. 188. 5.; but having now sailed almost 40 leagues to the west along the edge of the ice without perceiving any opening, Captain Clerke determined to bear away south by east, the only quarter which was clear at present, and to wait till the season was somewhat farther advanced before any further attempts were made. The intermediate time he proposed to employ in surveying the bay of St Lawrence, and the coast situated to the southward of it; as it must be a great satisfaction to have a harbour so near in case of the ship's receiving any damage from the ice; and the captain was also desirous of paying another visit to the Tschutski, especially in consequence of the accounts of them that had been 117
given by Major Behm. In this navigation they killed several sea-horses, and had an opportunity of observing the strength of parental affection in those monstrous animals. On the approach of the boats towards the ice, all of them took their young ones under their fins, and attempted to make their escape with them into the sea. Some whose cubs were killed or wounded, and left floating upon the surface of the water, rose again, and carried them down, sometimes just as they were on the point of being taken into the boat; and could be traced bearing them to a considerable distance through the water, which was stained with their blood. They were afterwards observed bringing them at intervals above the surface, and again plunging under its surface with an horrid bellowing; and one female, whose young one had been killed and taken on board, became so furious, that she struck her tusks through the bottom of the cutter.

Remarkable affection of the sea-horses towards the young.

118
The ships finally stopped by ice.

Our navigators still found themselves disappointed in their attempts. On approaching the coast of the Tschutski, they met with a large and compact body of ice, extending to the north-east, south-west, and south-east, as far as the eye could reach; so that they were again obliged to sail back to the northward. Here also their course was soon stopped; for, on the 13th, being in N. Lat. 69. 37. and about the middle of the channel between the two continents, they once more fell in with a compact body of ice, of which they could perceive no limit. Captain Clerke therefore determined to make a final attempt on the coast of America, the passage northward having been found last year practicable much farther on that than the Asiatic side. Thus they attained the latitude of 70. 8. at the distance, as was supposed, of 25 leagues from the coast of America; and some days after got about three minutes farther to the northward, about the distance of seven or eight leagues from the Icy Cape. This, however, was the utmost limit of the voyage to the north-east; and they were soon obliged to relin-

quish

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appearance whether viewed from the north or south. Should the weather happen to be sufficiently clear to admit a view of the mountains both on the sea coast and in the neighbourhood, the situation of Awatska bay, may be known by the two high ones to the south of it. That nearest the bay is in the form of a sugar-loaf, the other flat at top, and not quite so high. Three very conspicuous mountains appear on the north side of the bay; of which that to the west appears to be the highest; the next, being a volcano, is readily known by the smoke which it emits; the third is the most northerly, and might properly be called a cluster of mountains, as it presents several flat tops to view. When got within the capes, the entrance of the bay of Awatska to the north is pointed out by a light-house on a perpendicular headland. Many sunken rocks lie to the eastward of this headland, stretching two or three miles into the sea; and which with a moderate sea or swell will always show themselves. A small round island lies four miles to the south of the entrance, principally composed of high pointed rocks, one of which is very remarkable. The entrance into the bay is at first about three miles wide, and one and a half in the narrowest part; the length is four miles in a north-west direction. Within the mouth is a noble bason about 25 miles in circumference; in which are the harbours of Rakoweera to the east, Tarcinska, the west, and St Peter and St Paul to the north.

125 Account of the voyage from the time of leaving Kamtschatka.

On leaving Kamtschatka, it was unanimously judged improper to make any attempt to navigate the seas between the continent of Asia and Japan. Instead of this, it was proposed to steer to the eastward of that island, and in the way thither to sail along the Kuriles; examining particularly those that are situated nearest to the northern coast of Japan, which are said to be considerable, and neither subject to the Russians nor Japanese. In case they should have the good fortune to meet with some secure and commodious harbour in one of these islands, it was supposed that they might prove of considerable importance, as convenient places for shelter for subsequent navigators, who might be employed in exploring these seas, as the means of producing a commercial intercourse among the adjacent dominions of the two above mentioned empires. The next object was to take a survey of the coasts of the islands of Japan; after which they designed to sail for the coasts of China as far north as possible, and then sail along it southward to Macao.

In pursuance of this plan, they sailed along the coast of Kamtschatka, till they came to the southern point called *Cape Lopatka*, whose situation they determined to be in Lat. 51. 0. E. Long. 156. 45. To the north-west they observed a very lofty mountain, whose summit was lost in the clouds; and the same instant the first of the Kurile islands, named *Shoomska*, made its appearance in the direction of west, half south. The passage betwixt the southern extremity of Cape Lopatka and the island of Shoomska, though only one league in breadth, is extremely dangerous, both on account of the rapidity of the tides, and of the sunk rocks which lie off the cape. In the course of this voyage, they had occasion to observe, that a violent swell from the north-west frequently took place, though the wind had been for some time in the western quarter; a circumstance for which they seem to have been altogether unable to account.

Cook's Discoveries ‖ Coop.

The tempestuous weather which now occurred, prevented any discoveries from being made among the Kurile isles; however, they again sailed over the space assigned to the land of De Gama, without being able to find it; and, from comparing several accounts of the Russian navigators with one another, it was judged extremely probable, that the land of Jeso, so frequently laid down in former maps, is no other than the most southerly of the Kurile isles. On coming in view of the coast of Japan, they had the mortification to find that they could not approach the land by reason of the tempestuous weather and bad state of the ships; the coasts of these islands being extremely dangerous. Passing from thence in quest of the Bashee islands, they found amazing quantities of pumice-stone floating in the sea; so that they seemed inclined to believe, with Mr Muller, that if there had formerly been any part of the continent, or large island, called the *Land of Jeso*, it must have disappeared in a volcanic convulsion; which also must have been the case with that called the *Company's Land* and *Staten Island*. Though they had not the good fortune to find the Bashee islands, they discovered one in 24. 48. N. Lat. 141. 20. E. Long. which from its appearance, and the sulphureous smell emitted by it, they named *Sulphur island*. After this nothing remarkable occurred till their arrival at Canton in China, where having staid for some time in order to put their ships in repair, they at last set sail for Britain; but through stress of weather were driven as far north as Stromness in Orkney. From thence Captain Gore sent a dispatch to the lords of the admiralty to inform them of his arrival; and on the 4th of October 1780, the ships reached the Nore, after an absence of four years, two months, and twenty-two days.

COOKERY, the art of preparing and dressing victuals for the table: An art, in its simplest and ordinary modes, sufficiently familiar to every housekeeper; and, in its luxurious refinements, too copiously detailed in manuals and directories published for the purpose, to require any enlargement here, were it even a topic that at all deserved consideration in a work of this nature.

COOLERS, in *Medicine*, those remedies which were supposed to produce an immediate sense of cold, being such as have their parts in less motion than those of the organs of feeling; as fruits and all acid liquors. Or they are such as were supposed, by a particular viscidity or grossness of parts, to give the animal fluids a greater consistency than they had before, and consequently retard their motion, having less of that intestine force on which their heat depends: this property was ascribed to cucumbers and similar substances.

COOM, a term applied to the soot that gathers over an oven's mouth; and also to the black, greasy substance, which works out of the wheels of carriages.

COOMB, or COMB, *of corn*, a dry measure containing four bushels, or half a quarter.

COOP, in *Husbandry*, a tumbrel or cart enclosed with boards, and used to carry dung, grains, &c.

COOP, is also the name of a pen, or enclosed place,

where

Anthony first earl of Shaftesbury, lord high chancellor of England. He was born in 1671, at Exeter-house in London, where his grandfather lived, who from the time of his birth conceived so great an affection for him, that he undertook the care of his education; and he made so good a progress in learning, that he could read with ease both the Latin and Greek languages when only 11 years old. In 1683, his father carried him to the school at Winchester, where he was often insulted on his grandfather's account, whose memory was odious to the zealots for despotic power: he therefore prevailed with his father to consent to his desire of going abroad. After three years stay abroad, he returned to England in 1689, and was offered a seat in parliament in some of those boroughs where his family had an interest. But this offer he did not now accept, that he might not be interrupted in the course of his studies, which he prosecuted five years more with great vigour and success; till, on Sir John Trenchard's death, he was elected burgess for Pool. Soon after his coming into parliament, he had an opportunity given him of expressing that spirit of liberty by which he uniformly directed his conduct on all occasions. It was the bringing in and promoting "the act for regulating trials in cases of high treason." But the fatigues of attending the house of commons in a few years so impaired his health, that he was obliged to decline coming again into parliament after the dissolution in 1698. He then went to Holland, where the conversation of Mr Bayle, M. le Clerc, and several other learned and ingenious men, induced him to reside a twelvemonth. During this time, there was printed at London, in 8vo, an imperfect edition of Lord Ashley's Inquiry concerning Virtue. It had been surreptitiously taken from a rough draught, sketched when he was no more than 20 years of age. His lordship, who was greatly chagrined at this event, immediately bought up the impression before many books were sold, and set about completing the treatise, as it afterwards appeared in the second volume of the Characteristics. Soon after Lord Ashley's return to England, he became, by the decease of his father, earl of Shaftesbury. But his own private affairs hindered him from attending the house of lords till the second year of his peerage, when he was very earnest to support King William's measures, who was at that time projecting the grand alliance. So much was he in favour with King William, that he had the offer of secretary of state; but his declining constitution would not allow him to accept of it. Though he was disabled from engaging in business, the king consulted him on matters of very high importance; and it is pretty well known that he had the greatest share in composing that celebrated last speech of King William, December 31. 1701. On Queen Anne's accession to the throne, he returned to his retired manner of life, being no longer advised with concerning the public; and was then removed from the vice-admiralty of Dorset, which had been in the family for three generations. In 1703, he made a second journey to Holland, and returned to England the year following. The French prophets, soon after this, having by their enthusiastic extravagancies made a great noise throughout the nation, and among different opinions, some advising a prosecution, the lord Shaftesbury apprehended that such measures tended rather to inflame than to cure the disease. This was the origin of his Letter concerning Enthusiasm, which he sent to Lord Somers then president of the council; and which being approved of by that nobleman and other gentlemen to whom it was shown, was published in 1708, though without the name of the author, or that of the person to whom it was addressed. His Moralist, a philosophical Rhapsody, being a recital of certain conversations on natural and moral subjects, appeared in January 1709; and in the May following his *Sensus Communis*, an essay upon the freedom of Wit and Humour, in a letter to a Friend. It was in the same year that he entered into the marriage state with Mrs Jane Ewer, the youngest daughter of Thomas Ewer, Esq. of Lee in Hertfordshire. By this lady, to whom his lordship was related, he had an only son, Anthony the late earl of Shaftesbury. In 1710, his Soliloquy, or Advice to an Author, was published at London in 8vo. While he was thus employing himself in literary composition, his health declined so fast, that it was recommended to him to seek assistance from a warmer climate. Accordingly, in July 1711, he set out for Naples, and pursuing his journey by way of France, was obliged to pass through the duke of Berwick's army which at that time lay encamped near the borders of Piedmont. Here he was entertained by that famous general in the most friendly manner, and every assistance was given him to conduct him in safety to the duke of Savoy's dominions. Our noble author's removal to Italy was of no service to the re-establishment of his health; for after having resided at Naples about a year and a half, he departed this life on the 4th of February, O. S. 1712-13, in the 42d year of his age. The only pieces which he finished after he came to this city, were the Judgment of Hercules, and the Letter concerning Design, which last was added to that impression of the Characteristics which appeared in 1732. It was in 1711 that the first edition was published of all the Characteristics together, and in the order in which they now stand. But this publication not being entirely to his lordship's satisfaction, he chiefly employed the latter part of his life in preparing his writings for a more elegant edition; which was given to the world in 1713, soon after his decease. The several prints that were then first interspersed through the volumes were all invented by himself, and designed under his immediate inspection; and for this purpose he was at the pains of drawing up a most accurate set of instructions, the manuscript of which is still preserved in the family. That no mistakes might be committed, the earl did not leave to any other hands so much as the drudgery of correcting the press. In the three volumes of the Characteristics of Men, Manners, Opinions, and Times, he completed the whole of his works which he intended for the public eye. Not long before his death he had formed a scheme of writing a discourse on painting, sculpture, and the other arts of design, which, if he had lived to have finished it, might have proved a very pleasing and useful work, as he had a fine taste in subjects of that kind: but his premature decease prevented his making any great progress in the undertaking. The earl of Shaftesbury had an esteem for the works of the best English divines; one remarkable instance of which was displayed in his writing a Preface to a volume of Dr nous juice, flowing from incisions made in the trunk of the copaifera balsamum. See MATERIA MEDICA *Index*.

COPAIFERA, in *Botany*, a genus of plants belonging to the decandria class. See BOTANY *Index*.

COPAL, improperly called *gum copal*, is a gum of the resinous kind brought from New Spain, being the concrete juice of the *Rhus Copallinum*. It is employed as a varnish. See VARNISHING and CHEMISTRY *Index*.

COPARCENARY, the share or quota of a coparcener.

COPARCENERS, (from *con*, and *particeps*, "partner"), or PARCENERS; such as have equal portions in the inheritance of their ancestor.

Coparceners are so either by law or custom. Coparceners by law, are the issue female; which, in default of a male or heir, come equally to the lands of their ancestors. Coparceners by custom, are those who, by some peculiar custom of the country, challenge equal parts in such lands; as in Kent, by the custom of gavelkind. The crown of England is not subject to coparcenary.

COPE, an ecclesiastical ornament, usually worn by chanters and subchanters, when they officiate in solemnity. It reaches from the shoulders to the feet. The ancients called it *Pluviale*.—The word is also used for the roof or covering of a house, &c.

COPE is also the name of an ancient custom or tribute due to the king or lord of the soil, out of the lead mines in some part of Derbyshire; of which Manlove saith thus:

Egress and regress to the king's highway,
The miners have; and *lot* and *cope* they pay;
The thirteenth dish of ore within their mine,
To the lord for *lot*, they pay at measuring time;
Sixpence a load for *cope* the lord demands,
And that is paid to the *burghmaster's* hands.

This word by Doomsday-book, as Mr Hagar hath interpreted it, signifies a hill: and cope is taken for the supreme cover, as the *cope of heaven*.

COPEL. See CUPEL.

COPENHAGEN, the capital of the kingdom of Denmark, situated on the eastern shore of the island of Zealand, upon a fine bay of the Baltic sea, not far from the strait called the Sound. E. Long. 12. 35. N. Lat. 55. 41.

The precise date of the foundation of this city is disputed; but the most probable account is, that it took its rise from a castle built on the spot in the year 1168, as a protection against the pirates which at that time swarmed in the Baltic. The conveniency of the situation, and the security afforded by the castle, soon induced a number of the inhabitants of Zealand to resort thither: but it was not distinguished by the royal residence until 1443, during the reign of Christopher of Bavaria; since which time it has been gradually enlarged and beautified, and is become the capital of Denmark.

Copenhagen is the best built city of the north; for although Petersburgh excels it in superb edifices, yet, as it contains no wooden houses, it does not display that striking contrast of meanness and magnificence; but in general exhibits a more equable and uniform appearance. The town is surrounded towards the land with regular ramparts and bastions, a broad ditch full of water, and a few outworks: its circumference measures between four and five miles. The streets are well paved, with a foot-way on each side, but too narrow and inconvenient for general use. The greatest part of the buildings are of brick; and a few are of free-stone brought from Germany. The houses of the nobility are in general splendid, and constructed in the Italian style of architecture: the palace, which was erected by Christian VI. is a large pile of building; the front is of stone, and the wings of brick stuccoed; the suit of apartments is princely; but the external appearance is more grand than elegant.

The busy spirit of commerce is visible in this city. The haven is always crowded with merchant ships: and the streets are intersected by broad canals, which bring the merchandise close to the warehouses that line the quays. This city owes its principal beauty to a dreadful fire in 1728, that destroyed five churches and 67 streets, which have been since rebuilt in the modern style. The new part of the town, raised by the late king Frederic V. is extremely beautiful, scarcely inferior to Bath. It consists of an octagon, containing four uniform and elegant buildings of hewn stone, and of four broad streets leading to it in opposite directions. In the middle of the area stands an equestrian statue of Frederic V. in bronze, as big as life, which cost 80,000l. The Royal Museum, or Cabinet of Rarities, merits the attention of travellers.

Copenhagen contained 90,000 inhabitants in 1801, and at present is supposed to contain 105,000. It suffered by a great fire in 1794; and in 1807, when the town was bombarded by the British, about 300 houses were destroyed, including the cathedral and part of the university, and double the number were damaged.

Part of Copenhagen, which is called *Christianshafen*, is built upon the isle of Amak, which generally attracts the curiosity of foreigners; (see AMAK). From this place, to which the main city is joined by a bridge, the markets are supplied with fowl, beef, mutton, venison, corn, and culinary vegetables.

COPERNICAN, in general, something belonging to COPERNICUS. Hence

COPERNICAN System or *Hypothesis*, that system of the world wherein the sun is supposed to rest in the centre, and the planets, with the earth, to move in ellipses round him. See COPERNICUS.

COPERNICUS, NICOLAUS, an eminent astronomer, was born at Thorn in Prussia, Jan. 10. 1472. He was taught the Latin and Greek languages at home; and afterwards sent to Cracovia, where he studied philosophy and physic. His genius in the mean time was naturally turned to mathematics, which he pursued through all its various branches. He set out for Italy when he was 23 years of age; but staid at Bononia some time, for the sake of being with the celebrated astronomer of that place, Dominicus Maria: whose conversation, however, and company, he affected, not so much as a learner, as an assistant to him in making his observations. From thence he passed to Rome, where he was no sooner arrived than he was considered as not inferior to the famous Regiomontanus; and acquired, in short, so great a reputation, that he was chosen professor of mathematics, which he taught for a long time with great applause. He also made

Copernicus. made some astronomical observations there about the year 1500. Returning to his own country some years after, he began to apply his vast knowledge in mathematics to correct the system of astronomy which then prevailed. He set himself to collect all the books which had been written by philosophers and astronomers, and to examine all the various hypotheses they had invented for the solution of the celestial phenomena, to try if a more symmetrical order and constitution of the parts of the world could not be discovered, and a more just and exquisite harmony in its motions established, than what the astronomers of those times so easily admitted. But of all their hypotheses none pleased him so well as the Pythagorean, which made the sun to be the centre of the system, and supposed the earth to move not only round the sun, but round its own axis also. He thought he discerned much beautiful order and proportion in this; and that all that embarrassment and perplexity from epicycles and excentrics which attended the Ptolemaic hypothesis, would here be entirely removed.

This system, then, he began to consider, and to write upon, when he was about 35 years of age. He employed himself in contemplating the phenomena carefully; in making mathematical calculations; in examining the observations of the ancients, and in making new ones of his own; and after more than 20 years chiefly spent in this manner, he brought his scheme to perfection, and established that system of the world which goes by his name, and is now universally received, (see ASTRONOMY *Index*). His system, however, was then looked upon as a most dangerous heresy; for which he was thrown into prison by Pope Urban VIII. and not suffered to come out till he had recanted his opinion; that is, till he had renounced the testimony of his senses. He died the 24th of May 1543, in the 70th year of his age.

This extraordinary man had been made canon of Worms by his mother's brother, Lucas Wazelrodius, who was bishop of that place. He was not only the greatest of astronomers, but a perfect master of the Greek and Latin tongues; to all which he joined the greatest piety and innocence of manners.

The following is the account of the discoveries of Copernicus, by Dr Smith, in his *Essays on Philosophical Subjects*.

"The confusion (says Dr Smith) in which the old hypothesis represented the heavenly bodies, was, as Copernicus himself tells us, what first suggested to him the design of forming a new system, that these, the noblest works of nature, might no longer appear devoid of that harmony and proportion which discover themselves in her meanest productions. What most of all dissatisfied him was, the notion of the equalizing circle, which, by representing the revolutions of the celestial spheres as equable only when surveyed from a point that was different from their centres, introduced a real inequality into their motions; contrary to that most natural, and indeed fundamental idea, with which all the authors of astronomical systems, Plato, Eudoxus, Aristotle, even Hipparchus and Ptolemy themselves, had hitherto set out, that the real motions of such beautiful and divine objects must necessarily be perfectly regular, and go on in a manner as agreeable to the imagination as the objects themselves are to the senses. He began to consider, therefore, whether, by supposing the heavenly bodies to be arranged in a different order from that in which Aristotle and Hipparchus had placed them, this so much sought for uniformity might not be bestowed upon their motions. To discover this arrangement, he examined all the obscure traditions delivered down to us, concerning every other hypothesis which the ancients had invented for the same purpose. He found, in Plutarch, that some Pythagoreans had represented the earth as revolving in the centre of the universe, like a wheel round its own axis; and that others, of the same sect had removed it from the centre, and represented it as revolving in the ecliptic like a star round the central fire. By this central fire he supposed they meant the sun; and though in this he was very widely mistaken, it was, it seems, upon this interpretation that he began to consider how such an hypothesis might be made to correspond to the appearances. The supposed authority of those old philosophers, if it did not originally suggest to him his system, seems at least to have confirmed him in an opinion which, it is not improbable, he had beforehand other reasons for embracing, notwithstanding what he himself would affirm to the contrary.

"It then occurred to him, that if the earth was supposed to revolve every day round its axis, from west to east, all the heavenly bodies would appear to revolve, in a contrary direction, from east to west. The diurnal revolution of the heavens, upon this hypothesis, might be only apparent; the firmament, which has no other sensible motion, might be perfectly at rest; while the sun, the moon, and the five planets, might have no other movement beside that eastward revolution which is peculiar to themselves. That, by supposing the earth to revolve with the planets round the sun, in an orbit, which comprehended within it the orbits of Venus and Mercury, but was comprehended within those of Mars, Jupiter, and Saturn, he could, without the embarrassment of epicycles, connect together the apparent annual revolutions of the sun, and the direct, retrograde, and stationary appearances of the planets; that while the earth really revolved round the sun on one side of the heavens, the sun would appear to revolve round the earth on the other; that while she really advanced in her annual course, he would appear to advance eastward in that movement which is peculiar to himself. That, by supposing the axis of the earth to be always parallel to itself, not to be quite perpendicular, but somewhat inclined to the plane of her orbit, and consequently to present to the sun the one pole when on the one side of him, and the other when on the other, he would account for the obliquity of the ecliptic; the sun's seemingly alternate progression from north to south, and from south to north; the consequent change of the seasons, and different lengths of days and nights in the different seasons.

"If this new hypothesis thus connected together all these appearances as happily as that of Ptolemy, there were others which it connected together much better. The three superior planets, when nearly in conjunction with the sun, appear always at the greatest distance from the earth; are smallest, and least sensible to the eye; and seem to revolve forward in their direct motion with the greatest rapidity. On the contrary, when, in opposition to the sun, that is, when in their meridian about midnight, Cophti.

was given these people by the Mahometans, by way of reproach, because of their practice of circumcising: but P. Sollier, another Jesuit, refutes this opinion. Scaliger afterwards changed his opinion, and derived the word from Αιγυπτος, the ancient name of Egypt, by retrenching the first syllable: but this opinion, too, P. Sollier disputes. John de Leo and others say, that the Egyptians anciently called their country *Elchibth*, or *Cibth*, from Cibth their first king, whence Cophtite, &c.; others say from Cobtim second king of Egypt. Vansleb derives the word Copht from Copt, son of Misraim, grandson of Noah. All these etymologies P. Sollier rejects, on this principle, that were they true, the Egyptians ought all equally to be called *Cophti;* whereas, in effect, none but the Christians, and among those none but the Jacobites, bear the name, the Melchites not being comprehended under it. Hence he chooses to derive the word from the name *Jacobite*, retrenching the first syllable; whence Cobite, Cobea, Copta, and Cophta.

The Cophts have a patriarch who resides at Cairo, but he takes his title from Alexandria: he has no archbishop under him, but 11 or 12 bishops. The rest of the clergy, whether secular or regular, is composed of the orders of St Anthony, St Paul, and St Macarius, who have each their monasteries. Besides the orders of priests, deacons, and subdeacons, the Cophts have likewise archimandrites, the dignity whereof they confer with all the prayers and ceremonies of a strict ordination. This makes a considerable difference among the priests; and besides the rank and authority it gives them with regard to the religious, it comprehends the degree and functions of archpriests. By a custom of 600 years standing, if a priest elected bishop be not already archimandrite, that dignity must be conferred on him before episcopal ordination. The second person among the clergy, after the patriarch, is the titular patriarch of Jerusalem, who also resides at Cairo, because of the few Cophts at Jerusalem; he is, in effect, little more than the bishop of Cairo: only he goes to Jerusalem every Easter, and visits some other places in Palestine near Egypt, which own his jurisdiction. To him belongs the government of the Cophtic church, during the vacancy of the patriarchal see.

To be elected patriarch, it is necessary the person have lived all his life in continence; it is he confers the bishoprics. To be elected bishop, the person must be in the celibate; or, if he has been married, it must not be above once. The priests and inferior ministers are allowed to be married before ordination; but are not obliged to it, as Ludolphus erroneously observes. They have a great number of deacons, and even confer the dignity frequently on children. None but the lowest rank among the people commence ecclesiastics; whence arises that excessive ignorance found among them; yet the respect of the laity towards the clergy is very extraordinary. Their office is longer than the Roman office, and never changes in any thing: they have three liturgies, which they vary occasionally.

The monastic life is in great esteem among the Cophts: to be admitted into it, there is always required the consent of the bishop. The religious Cophts make a vow of perpetual chastity; renounce the world, and live with great austerity in deserts; they are obliged to sleep in their clothes and their girdle, on a mat stretched on the ground; and to prostrate themselves every evening 150 times, with their face and breast on the ground. They are all, both men and women, of the lowest class of the people; and live on alms. The nunneries are properly hospitals; and few enter but widows reduced to beggary.

Cophti, Cophtic.

F. Roderic reduces the errors and opinions of the Cophts to the following heads: 1. That they put away their wives, and espouse others while the first are living. 2. That they have seven sacraments, viz. baptism, the eucharist, confirmation, ordination, faith, fasting, and prayer. 3. That they deny the Holy Spirit to proceed from the Son. 4. That they only allow of three œcumenical councils; those of Nice, Constantinople, and Ephesus. 5. That they only allow of one nature, will, and operation, in Jesus Christ, after the union of the humanity with the divinity. For their errors in discipline, they may be reduced, 1. To the practice of circumcising their children before baptism, which has obtained among them from the 12th century. 2. To their ordaining deacons at five years of age. 3. To their allowing of marriage in the second degree. 4. To their forbearing to eat blood; to which some add their belief of a baptism by fire, which they confer by applying a hot iron to their forehead or cheeks.—Others palliate these errors, and show that many of them are rather abuses of particular persons than doctrines of the sect. This seems to be the case with regard to their polygamy, eating of blood, marrying in the second degree, and the baptism of fire; for circumcision, it is not practised as a ceremony of religion, nor as of any divine appointment, but merely as a custom, which they derive from the Ishmaelites; and which, perhaps, may have had its origin from a view to health and decency in these hot countries.

The Cophts, at different times, have made several reunions with the Latins; but always in appearance only, and under some necessity of their affairs. In the time of Pope Paul IV. a Syrian was despatched to Rome from the patriarch of Alexandria, with letters to that pope; wherein he acknowledged his authority, and promised obedience; desiring a person might be dispatched to Alexandria, to treat about a reunion of his church to that of Rome; pursuant to which, Pius IV. successor to Paul, chose F. Roderic, a Jesuit, whom he dispatched in 1561, in quality of apostolical nuncio. But the Jesuit, upon a conference with two Cophts deputed for that purpose by the patriarch, was made to know, that the titles of father of fathers, pastor of pastors, and master of all churches, which the patriarch had bestowed on the pope in his letters, were no more than mere matters of civility and compliment; and that it was in this manner the patriarch used to write to his friends: they added, that since the council of Chalcedon, and the establishment of several patriarchs independent of one another, each was chief and master of his own church. This was the answer the patriarch gave the pope, after he had received a sum of money remitted to him from Rome, by the hands of the Venetian consul.

COPHTIC, or Coptic, the language of the Cophts, the ancient language of the Egyptians, mixed with a custom of the manor by copy of court-roll; but is generally where the tenant has such estate either in fee or for three lives.

Copy-Right, the right which an author may be supposed to have in his own original literary compositions; so that no other person, without his leave, may publish or make profit of the copies. When a man by the exertion of his rational powers has produced an original work, he has clearly a right to dispose of that identical work as he pleases; and any attempt to take it from him, or vary the disposition he has made of it, is an invasion of his right of property. Now the identity of a literary composition consists entirely in the sentiment and the language; the same conceptions clothed in the same words, must necessarily be the same composition: and whatever method be taken of conveying that composition to the ear, or to the eye of another, by recital, by writing, or by printing, in any number of copies, or at any period of time, it is always the identical work of the author which is so conveyed; and no other man (it hath been thought) can have a right to convey or transfer it without his consent, either tacitly or expressly given. This consent may perhaps be tacitly given when an author permits his work to be published without any reserve of right, and without stamping on it any marks of ownership; it is then a present to the public, like the building of a church, or the laying out a new highway; but in case of a bargain for a single impression, or a total sale or gift of the copy-right; in the one case the reversion hath been thought to continue in the original proprietor; in the other the whole property, with its exclusive rights, to be perpetually transferred to the grantee. On the other hand, it is urged, that though the exclusive right of the manuscript, and all which it contains, belongs undoubtedly to the owner before it is printed or published; yet from the instant of publication, the exclusive right of an author, or his assigns, to the sole communication of his ideas immediately vanishes and evaporates; as being a right of too subtile and unsubstantial a nature to become the subject of property at the common law, and only capable of being guarded by positive statute and special provisions of the magistrate.

The Roman law adjudged, that if one man wrote any thing, though ever so elegantly, on the paper or parchment of another, the writing should belong to the original owner of the materials on which it was written: meaning certainly nothing more thereby than the mere mechanical operation of writing, for which it directed the scribe to receive a satisfaction: especially as, in works of genius and invention, such as a picture painted on another man's canvas, the same law gave the canvas to the painter. We find no other mention in the law of any property in the works of the understanding, though the sale of literary copies, for the purposes of recital or multiplication, is certainly as ancient as the times of Terence, Martial, and Statius. Neither with us in Britain hath there been (till very lately) any final determination upon the right of authors at the common law. It was determined in the case of *Miller* v. *Taylor*, in *B. R. Pasch.* 9 Geo. III. 1769, that an exclusive copy-right in authors subsisted by the common law. But afterwards, in the case of *Donaldson* v. *Becket*, before the house of lords, which was finally determined 22d February 1774, it was held, that no copy-right subsists in authors, after the expiration of the several terms created by the stat. 8 Ann. c. 19. This statute declares, that the author and his assigns shall have the whole liberty of printing and reprinting his works for the term of 14 years, and no longer; and also protects that property by additional penalties and forfeitures; directing farther, that, if at the end of that term, the author himself be living, the right shall then return to him for another term of the same duration. By the act of 1814 this contingent right for the second term of 14 years was made certain in all cases. See *Copy-Right*, Supplement.

COQUES, Gonzalo, an esteemed painter of portraits and conversations, was born at Antwerp in 1618, and was a disciple of the old David Ryckaert; under whose direction he applied himself diligently to cultivate those promising talents which he possessed; not only by practising the best rules administered to him by his instructor, but also by studying nature with singular attention. He was a great admirer of Vandyck; and fixing on the manner of that great artist as his model, had the happiness of so far succeeding, that next to him he was esteemed equal to any other painter of his time. In the school of Ryckaert he had been accustomed to paint conversations, and he frequently composed subjects of fancy like Teniers, Ostade, and his master; and by that habit he introduced a very agreeable style of portrait painting. In that way he composed several fine pictures for King Charles I. and likewise several for the archduke Leopold, and the prince of Orange; which latter prince, as a mark of respect, presented Coques with a rich gold chain, and a gold medal, on which the bust of that prince was impressed. He died in 1684. He had an excellent pencil; his portraits were well designed, with easy natural attitudes; he disposed the figures in his composition so as to avoid confusion or embarrassment: he gave an extraordinary clearness of colour to his heads and hands; and his touch was free, firm, and broad, a circumstance very uncommon in works of a small size.

COQUIMBO, a port town of Chili, in South America, situated at the mouth of a river of the same name, which discharges itself into the Pacific ocean. W. Long. 72. 10. N. Lat. 30. 8.

COR caroli, in *Astronomy*, an extra-constellated star in the northern hemisphere, situated between the *Coma Berenicis* and *Ursa major*, so called by Dr Halley in honour of King Charles.

Cor-Hydræ, a fixed star of the first magnitude, in the constellation of Hydra.

Cor Leonis, in *Astronomy*, a fixed star of the first magnitude in the constellation Leo.

Cor-Meille, a noted plant, common in the highlands of Scotland. Its roots dried are the support of the highlanders in long journeys, amidst the barren hills destitute of the supports of life; and a small quantity, like the alimentary powders, will for a long time repel the attacks of hunger. Infused in liquor it is an agreeable beverage, and, like the nepenthe of the Greeks, exhilarates the mind. From the similitude of sound in the name, it seems to be the same with

chara,

chara, the root discovered by the soldiers of Cæsar, at Dyrrhachium, which steeped in milk was such a relief to the famished army. Or we may reasonably believe it to have been the Caledonian food described by Dio, of which the quantity of a bean would prevent both hunger and thirst; and this, says the historian, they have ready for all occasions.

CORACIAS, the ROLLER, a genus of birds of the order of picæ. See ORNITHOLOGY *Index*.

CORACO-BRACHIALIS, in *Anatomy*, the name of a muscle in the arm, serving to raise it upwards.

CORACOIDES, in *Anatomy*, a small short process of the scapula. See ANATOMY *Index*.

CORACOMANTES, in antiquity, persons who foretold events from their observations on crows.

CORALLINA, or CORAL, in *Zoology*, a genus belonging to the order of vermes zoophyta. See HELMINTHOLOGY *Index*, and CORRALLINIADÆ, SUPPLEMENT.

CORAL FISHERY. Red coral is found in the Mediterranean, on the shores of Provence, from Cape de la Couronne to that of St Tropez; about the isles of Majorca and Minorca; on the south of Sicily; on the coasts of Africa; and lastly, in the Ethiopic ocean, about Cape Negro.

CORAL-Stone, a name for a kind of red and white agate which breaks in veins, and is found in Italy and some parts of Saxony. That of Rochlitz in Saxony is the most celebrated, and is found in globules which have a kind of crust about them.

CORALLINES, a genus belonging to the vermes zoophyta. See HELMINTHOLOGY *Index*.

CORALLODENDRON. See ERYTHRINA, BOTANY *Index*.

CORALLOIDES (FRUTICES). See ESCHARA and KERATOPHYTA.

CORAM, CAPTAIN THOMAS, a gentleman remarkably distinguished by his humanity, was born about the year 1668, and spent the early part of his life in the station of master of a vessel trading to our colonies. Afterwards residing in the eastern part of the metropolis, among sea-faring people, where business often obliged him to come early into the city, and return late, he frequently saw young children exposed in the streets through the indigence or cruelty of their parents. This excited his compassion, and induced him to project the foundation of an hospital for foundlings. In this humane design he laboured with indefatigable diligence for seventeen years; and by his application procured a number of the nobility and gentry to patronize and carry the scheme into execution, and at length obtained the royal charter for it. He was also highly instrumental in promoting the trade of America, by procuring a bounty upon naval stores imported from our colonies. He was likewise eminently concerned in setting on foot the colonies of Georgia and Nova Scotia. His last charitable design, in which he lived to make some progress, was a scheme for uniting the North American Indians more closely to the British interest, by an establishment for the education of Indian girls. In short, he spent the greatest part of life in labouring for the public, and experienced a fate too common in those who devote their talents to such laudable purposes; being at last indebted for subsistence to the voluntary subscriptions of some public-spirited persons, at the head of whom was the late Frederic prince of Wales. Captain Coram died in 1751; and was interred, at his own desire, in a vault under the chapel of the Foundling Hospital.

CORAN, or ALCORAN. See ALCORAN.

CORAX, the trivial name of a species of CORVUS. See ORNITHOLOGY *Index*.

CORANICH, among the Scotch and Irish, the custom of singing at funerals, anciently prevalent in those countries, and still practised in several parts. Of this custom Mr Pennant gives the following account. "I had not the fortune to be present at any in North Britain; but formerly assisted at one in the south of Ireland, where it was performed in the fulness of horror. The cries are called by the Irish the *ulogohne* and *hullulu*; two words very expressive of the sound uttered on these occasions; and being of Celtic stock, etymologists would swear to be the origin of the ολολυγων of the Greeks and *ululatus* of the Latins. Virgil is very fond of using the last whenever any of his females are distressed; as are others of the Roman poets, and generally on occasions similar to this. It was my fortune to arrive at a certain town in Kerry at the time that a person of some distinction departed this life; my curiosity led me to the house, where the funeral seemed conducted in the purest classical form.

Quodcunque aspiceret luctus, gemitusque sonabant,
Formaque non taciti funeris intus erat.

In short, the *conclamatio* was set up by the friends in the same manner as Virgil describes that consequential of Dido's death;

Lamentis, gemituque, et fœmineo ululatu
Tecta fremunt.

Immediately after this followed another ceremony, fully described by Camden in his account of the manners of the ancient Irish; the earnest expostulations and reproaches given to the deceased for quitting this world, where she enjoyed so many blessings, so good a husband, and such fine children. This custom is also of great antiquity, for Euryalus's mother makes the same address to her dead son.

——*Tunc illa senectæ*
Sera meæ requies? potuisti relinquere solam,
Crudelis?

But when the time approached for carrying out the corpse, the cry was redoubled,

Tremulis ululatibus æthera complent;

a numerous band of females waiting in the outer court to attend the hearse, and to pay in chorus the last tribute of their voices. The habit of this sorrowing train, and the neglect of their persons, were admirably suited to the occasion; their robes were black and flowing, resembling the ancient palla; their feet naked, their hair long and dishevelled: I might truly say,

Ut qui conducti plorant in funera, dicunt
Et faciunt prope plura dolentibus examino.

The corpse was carried slowly along the verge of a most beautiful lake, the ululatus was continued, and named *Almanzor*, or "the defender," from his great victories and wise conduct. His descendants inherited from him the visirship, and a power as absolute as if they had been caliphs, until the weakness of the sovereigns encouraged, and the insolence of the ministers provoked, the grandees to disturb the state with their jealousies and dissensions. These broils occasioned such a series of civil war and anarchy, as overthrew the throne of Cordova, and destroyed the whole race of Abdoulrahman. Thus the glorious edifice, founded by the valour and prudence of that conqueror, and cemented by similar virtues in many of his successors, sunk into nothing as soon as the sceptre devolved upon weak enervated princes, whose indolence and incapacity transferred the management of every thing to a visir. Many petty kingdoms sprung up out of the ruins of this mighty empire; and the Christians soon found opportunities of destroying, by separate attacks, that tremendous power, which when united had proved an overmatch for their utmost force.

New CORDOUA, a considerable town of South America, in the province of Tucuman, with a bishop's see, 175 miles from St Jago. W. Long. 62. 5. S. Lat. 32. 10.

CORDOUAN, a famous pharos or light-house of France, in Guienne, at the mouth of the river Girond. The architecture is extremely fine; and it is placed there to hinder vessels from running on the sand-banks at the mouth of the river. W. Long. 1. 9. N. Lat. 45. 36.

CORDUS, VALERIUS, a learned botanist, was the son of Ericius Cordus, a physician and poet of Germany. Having learned the languages, he applied himself to the study of botany, in the prosecution of which he examined the mountains of Germany, and travelled into Italy; but being wounded in the leg by the kick of a horse, died at Rome in 1554. He wrote Remarks on Dioscorides, and other worke.

CORDWAINERS, or CORDINERS, the term whereby the statutes denominate *shoemakers*. The word is formed from the French *cordonnier*, which Menage derives from *corduan*, a kind of leather brought from Cordoua, whereof they formerly made the upper leathers of their shoes. Others derive it from *corde*, "rope," because anciently shoes were made of cords; as they still are in some parts of Spain, under the name of *alpargates*. But the former etymology is better warranted; for, in effect, the French workmen who prepare the corduas are still called *corduanniers*.

In Paris they have two pious societies under the title of *freres cordonniers*, "brothers shoemakers," established by authority towards the middle of the 17th century; the one under the protection of St Crispin *, the other of St Crispianus, two saints who had formerly honoured the profession. They live in community, and under fixed statutes and officers; by which they are directed both in their spiritual and secular concerns. The produce of their shoes goes into a common stock, to furnish necessaries for their support; the rest to be distributed among the poor.

* See Crispin.

COREA, a peninsula lying to the north-east of China, between 125 and 130 degrees of E. Long. and between 34 and 40 of N. Lat. The recent voyage of Captains Hall and Maxwell has proved its breadth to be less than was supposed, as a great part of what had been considered its western coast, is found to consist of an immense archipelago of islands, the number of which baffled all calculation. Its whole length may be taken at 400 miles, and its average breadth at 150. The interior, however, is little known, except by accounts received through China, and by those of Humel, a Dutchman, who was shipwrecked there in the middle of the 17th century. The capital of the whole is Han-ching, where the king resides. The Jesuits say, the people are well made, of a sweet and tractable disposition, and fond of learning, music, and dancing, and in general resemble the Chinese. This is confirmed by Captain Hall, who found the inhabitants extremely courteous, kind, and gentle; but the strictest precautions were taken to prevent the British from penetrating into the country, or making observations on its condition. The houses are mean, being covered with thatch; and they have no beds, but lie on the floor. They have little silk, and therefore make use of linen cloth in its room. Their trade consists in white paper, pencils, ginseng, gold, silver, iron, yellow varnish, fowls whose tails are three feet long, horses no more than three feet in height, sable skins, castor, and mineral salt. In general it is a fertile country, though abounding in mountains. It is tributary to China.

M. Grosier relates an observation concerning the natural history of Corea, which, in his opinion, furnishes a new proof of the revolutions which the surface of our globe has undergone. An ancient Chinese book asserts, that the city where Kipe, the king of Corea, established his court, was built in a place which forms at present a part of the territories of *Yong-ping-fou*, a city of the first class in the province of Petcheli. "If this (says he) be admitted as a fact, we may from thence conclude, that these territories formerly belonged to Corea; and that the gulf of Lea-tong, which at present separates this kingdom from the province of Petcheli, did not then exist, and that it has been formed since; for it is not probable that the sovereign would have fixed his residence without the boundaries of his kingdom, or in a place where he was separated from it by a wide and extensive sea. This conjecture is confirmed by certain facts admitted by the Chinese. Thus when *Ya*, surnamed the *Great*, undertook to drain and carry off the waters which had inundated the low grounds of several provinces, he began by the river Hoang-ho, the overflowing of which caused the greatest devastation. He went in search of its source to the bosom of Tartary, from whence he directed its course across the provinces of Chan-si, Chen-si, Honan, and Petcheli. Towards its mouth, in order to weaken the rapidity of its waters, he divided them into nine channels, through which he caused the river discharge itself into the eastern sea near the mountain of *Kie-che-chan*, which then formed a promontory. Since that time to the present, that is, about 3950 years, the river Hoang-ho has departed so much from its ancient course, that its mouth at present is about six degrees farther south. If the sea has been able to cover with its waters that extent of territory which at present forms part of the gulf of Leatong, may we not be allowed to suppose that like inundations may have formed successively the whole of that gulf, the ancient existence of which seems so ill to to agree with the residence of the kings of Corea in the territory of Yong-ping-fou?

Corea chiefly produces wheat, rice, and ginseng, with a kind of palm tree which yields a gum capable of producing a yellowish varnish little inferior to gilding. Hence also are exported castor and sable skins; also gold, silver, iron, and fossil salt: a kind of small brushes for painting, made of the hair of a wolf's tail, are likewise manufactured here, which are exported to China, and highly esteemed there. The sea coasts abound in fish, and great numbers of whales are found there every year towards the north-east. Several of these, it is said, have in their bodies the harpoons of the French and Dutch, from whom they have escaped in the northern extremities of Europe; which seems to indicate a passage from the European into the Asiatic seas round the continents of Europe and Asia.

A considerable quantity of the paper of Corea is annually imported into China; indeed the tribute due to the emperor is partly paid with it every year. It is made of cotton, and is as strong as cloth, being written upon with a small hair-brush or pencil; but must be done over with alum-water before it can be written upon in the European manner. It is not purchased by the Chinese for writing, but for filling up the squares of their sash windows; because, when oiled, it resists the wind and rain better than that of China. It is used likewise as wrapping paper; and is serviceable to the tailors, who rub it between their hands until it becomes as soft and flexible as the finest cotton cloth, instead of which it is often employed in lining clothes. It has also this singular property, that if it be too thick for the purpose intended, it may be easily split into two or three leaves, each of which is even stronger than the best paper of China.

The Coreans are well made, ingenious, brave, and tractable; are fond of dancing, and show great docility in acquiring the sciences, to which they apply with great ardour, and which they honour in a particular manner. The northern Coreans are larger sized and more robust than those of the south; have a taste for arms, and become excellent soldiers. Their arms are crossbows and long sabres. Men of learning are distinguished from other classes of people by two plumes of feathers in their caps; and when merchants present the Coreans with any books for sale, they dress themselves in the richest attire, and burn perfumes before they treat concerning the price.

The Coreans mourn three years, as in China, for a father or mother: but the time of mourning for a brother is confined to three months. Their dead are not interred until three years after their decease; and when the ceremony of interment is performed, they place around the tomb the clothes, chariot and horses of the deceased, with whatever else he showed the greatest fondness for while alive; all which they leave to be carried off by the assistants. Their houses, as in China, consist only of one story, and are very ill built; in the country being composed of earth, and in cities generally of brick, but all thatched with straw; the walls of their cities are constructed after the Chinese manner, with square turrets, battlements, and arched gates. Their writing, dress, religious ceremonies, and creed, as well as the greater part of their customs, are borrowed from the Chinese. Their women, however, are less confined, and have the liberty of appearing in public with the other sex, for which they are often ridiculed by their neighbours. They differ from the Chinese also in their ceremonies of marriage, and in the manner of contracting it; the parties in this country taking the liberty to choose for themselves, without consulting the inclinations of their parents, or suffering them to throw any obstacles in their way.

COREIA, in antiquity, a festival in honour of Proserpine, named *Core*, Κόρη, which, in the Molossian dialect signifies a beautiful woman.

CORELLI, ARCANGELO, the famous Italian musician and composer, a native of Fusignano, in the territory of Bologna, was born in 1653. He entertained an early propensity to the violin; and as he advanced in years, laboured incessantly in the practice of that instrument. About the year 1672, his curiosity led him to visit Paris, probably with a view to attend the improvements which were making in music under the influence of Cardinal Mazarin, and in consequence of the establishment of a royal academy; but notwithstanding the character which he brought with him, he was driven back to Rome by Lully, whose jealous temper could not brook so formidable a rival as this illustrious Italian. In the year 1680 he visited Germany, and met with a reception suitable to his merit from most of the German princes, particularly the elector of Bavaria; in whose service he was retained, and continued for some time. After about five years stay abroad, he returned again to Rome, and there pursued his studies with great assiduity.

The proficiency of Corelli on his favourite instrument the violin was so great, that the fame of it spread throughout Europe. The style of his performance was learned, elegant, and pathetic; and his tone firm and even. Mr Geminiani, who was well acquainted with, and had studied it, used to resemble it to a sweet trumpet. A person who had heard him perform says, that whilst he was playing on the violin, it was usual for his countenance to be disturbed, his eyes to become as red as fire, and his eye-balls to roll as in agony.

Corelli was highly favoured by that great patron of poetry and music, Cardinal Ottoboni. Crescembini says that he regulated the musical academy held at the palace of his eminence every Monday afternoon. Here it was that Mr Handel became acquainted with him; and in this academy a serenata of Mr Handel, entitled *Il Trionfo del Tempo*, was performed, the overture to which was in a style so new and singular, that Corelli was confounded in his first attempt to play it.

During the residence of Corelli at Rome, besides those of his own country, many persons were ambitious of becoming his disciples, and learning the practice of the violin from the greatest master on that instrument the world had then heard of. Of these it is said the late Lord Edgecumbe was one: and that the fine mezzotinto print of Corelli by Smith was scraped from a picture painted by Mr Hugh Howard at Rome for that nobleman.

Corelli died at Rome in 1713; and was buried in the church of the Rotunda, otherwise called the Pantheon, in the first chapel on the left hand of the entrance. Over the place of his interment is a sepulchral monument to his honour, with a marble bust thereon, erected at the expence of Philip William, count palatine of the Rhine, under the care and direction of Cardinal Ottoboni.

For many years after his decease, this excellent musician was commemorated by a solemn musical performance in the Pantheon, on the anniversary of his death. In the year 1730 an eminent master, now living, was present at that solemnity, who relates that at it the third and eighth of his concertos were performed by a numerous band, among whom were many who had been the pupils of the author. He adds, that these two pieces were performed in a slow, distinct, and firm manner, without graces, and just as they are wrote; and from hence concludes, that this was the manner in which they were played by the author himself.

He died possessed of about 6000l. sterling. He was a passionate admirer of pictures, and lived in an uninterrupted friendship with Carlo Cignani and Carlo Marat: these two eminent painters were rivals for his favour; and for a series of years presented him at times with pictures, as well of other masters as of their own painting. The consequence was, that Corelli became possessed of a large and valuable collection of original paintings; all which, together with the sum abovementioned, he bequeathed to his dear friend and patron Cardinal Ottoboni, who, reserving the pictures to himself, generously distributed the rest of his effects among the relations of the testator.

Corelli is said to have been remarkable for the mildness of his temper and the modesty of his deportment; nevertheless, he was not insensible of the respect due to his skill and exquisite performance. Cibber, in the Apology for his Life, p. 340. relates, that when he was playing a solo at Cardinal Ottoboni's, he discovered the cardinal and another person engaged in discourse, upon which he laid down his instrument; and being asked the reason, gave for answer, that he feared the music interrupted their conversation.

The compositions of Corelli are celebrated for the harmony resulting from the union of all the parts; but the fineness of the airs is another distinguishing characteristic of them: the allemand in the 10th solo is as remarkable for spirit and force, as that in the 11th is for its enchanting delicacy: his jigs are in a style peculiarly his own; and that in the 5th solo was never equalled. In the gavot movements in the 2d and 4th operas, the melody is distributed with great judgment among the several parts. In his minuets alone he seems to fail; Bononcini, Mr Handel, and Guiseppe Martini, have excelled him in this kind of airs.

It is said there is in every nation a style both in speaking and writing, which never becomes obsolete; a certain mode of phraseology, so consonant and congenial to the analogy and principles of its respective language, as to remain settled and unaltered. This, but with much greater latitude, may be said of music; and accordingly it may be observed of the compositions of Corelli, not only that they are equally intelligible to the learned and unlearned, but that the impressions made by them have been found to be as durable as general. His music is the language of nature; and, for a series of years, all that heard it became sensible of its effects: of this there cannot be a stronger proof than that amidst all the innovations which the love of change had introduced, it continued to be performed, and was heard with delight, in churches, in theatres, at public solemnities and festivities, in all the cities of Europe, for near 40 years. Men remembered, and would refer to passages in it as to a classic author; and even at this day, the masters of the science do not hesitate to pronounce of the compositions of Corelli, that of fine harmony and elegant modulation, they are the most perfect exemplars.

COREOPSIS, Tick-seeded Sunflower; a genus of plants belonging to the syngenesia class; and in the natural method ranking under the 49th order, *Compositæ*. See Botany *Index*.

CORFE castle, a borough-town in Dorsetshire in England, which takes its name from a strong castle, belonging to the crown, that stood there, but which is now in ruins. It sends two members to parliament. W. Long. 2. 8. N. Lat. 50. 33.

CORFU, an island in the Ionian sea, at the mouth of the gulf of Venice, formerly called *Corcyra* and *Phæacia*, famous for the gardens of Alcinous. It belonged formerly to the Venetians; but was transferred to France in 1797. It was reduced by the Turks and Russians jointly in 1799, was again given up to France in 1807, and in 1814 was given up to Great Britain, as protector of the Ionian islands. This island forms the seat of the government, and contained 60,000 inhabitants in 1807. See *Ionian Islands*, Supplement. The inhabitants are of the Greek church. The soil is very fruitful, and produces a great deal of wine, olives, and several other fruits, particularly figs, which are exceedingly good.

During the Venetian government this island was the residence of the governor general, whose jurisdiction extended over all the islands subject to the republic of Venice, in the Levant seas, and was considered as one of the greatest honours they could confer on a subject. He was always a nobleman of the first rank, and had his appointment for three years only, in which time he made a tolerable addition to his fortune, and on his return to Venice was generally advanced to the honours of the senate.

Corfu, the chief city of the island of that name. It is situated on the east side of the island, and is built in the form of an amphitheatre on the northern slope of a promontory, at the foot of which the port opens. It is neither large nor well built, but is extremely strong. It has two citadels; the one the residence of the governor, separated from the city by an esplanade, and the other, called the fort, situated a little to the west. The harbour is rather small, admitting only merchant vessels and sloops of war, but the road is capacious and secure. Part of the suburb Kastrados stands on the site of the ancient town. In front of Corfu, at the distance of a mile, is the island of Vido, anciently called Ptichia, where the lazaretto is kept. It is protected by a triple range of batteries, and forms a strong outwork to the fortifications of the harbour. The inhabitants of the town amount to 15,000, and carry on a considerable trade. In the war the Venetians had with the Turks in 1716, this town was attacked by an they kill and cure seldom fewer than 100,000 head of black cattle. The rest of their exports consist of butter, candles, hides raw and tanned, linen cloth, pork, calves, lambs, and rabbit skins, tallow, wool for England, linen and woollen yarn, and worsted. The merchants of Cork carry on a very extensive trade to almost all parts of the known world; so that their commerce is annually increasing. Its manufactures consist of sail cloth, sheeting, paper, glass, leather, coarse cloth, and other minor articles. The only thing that seemed to be wanting to the security of the port of Cork was supplied in the earl of Chesterfield's memorable administration, by building a fort on the great island, to command the entrance of the haven. The outlets of Cork are cheerful and pleasant. The country around the city, on both sides of the river, is hilly and picturesque; and the harbour, called the *Cove*, is one of the best in the world; the entrance is safe, and the whole navy of England might ride in it, secure from every wind that blows. Ships of burden, however, are obliged to unload at Passage, five miles and a half from Cork, the channel not admitting vessels of above 150 tons.

Cork Jacket or *Waistcoat*, is an invention of one Mr Dubourg, a gentleman very fond of swimming, but subject to the cramp, which led him to consider of some method by which he might enjoy his favourite diversion with safety. The waistcoat is composed of four pieces of cork, two for the breasts and two for the back; each pretty near in length and breadth to the quarters of a waistcoat without flaps; the whole is covered with coarse canvass, with two holes to put the arms through; there is a space left between the two back-pieces, and the same betwixt each back and breast-piece, that they may fit the easier to the body. Thus the waistcoat is only open before, and may be fastened on the wearer with strings; or, if it should be thought more secure, with buckles and leather straps. This waistcoat does not weigh above 12 ounces, and may be made up for about five or six shillings expence. Mr Dubourg tried his waistcoat in the Thames, and found that it not only supported him on the water, but that two men could not sink him, though they used their utmost efforts for that purpose. If those who use the sea occasionally, and especially those who are obliged to be almost constantly there, were to have those waistcoats, it would be next to impossible that they should be drowned. It would also be of vast service to those that, for the sake of health, bathe in the sea; and even the most delicate and timorous young lady might by the help of one of these jackets venture into a rough sea. See *Air-Jacket* and *Bamboo-Habit*.

CORMANDEL. See Coromandel.

COR-MASS, the name of a grand procession, said to have been established at Dunkirk during the dominion of Charles V. and renewed on St John's day, the 24th of June. After the celebration of high mass, the procession, consisting of the several tradesmen of the town, begins. Each person has a burning taper of wax in his hand: and after each company comes a pageant, followed by the patron-saint, usually of solid silver, richly wrought and adorned. The companies are followed by music; and after the musicians, the friars in the habits of their order, the secular priests, and then the abbot magnificently adorned, and preceded by the host. Machines likewise of various fantastical forms and devices, and as variously accoutred, form a part of the show on this occasion; which is described as one of the most superb and magnificent in the world, by an eye-witnesses, in 1755.

CORMORANT, a corruption of corvorant. See Pelicanus, Ornithology *Index*.

CORN, the grain or seeds of plants separated from the spica or ear, and used for making bread.

There are several species of corn, such as wheat, rye, and barley, millet and rice, oats, maize, and lentils, pease, and a number of other kinds: each of which has its usefulness and propriety.

Europe, in every part of it; Egypt, and some other cantons of Africa, particularly the coasts of Barbary; and some parts of America cultivated by the Europeans, particularly New England, New France, and Acadia, are the places which produce corn. Other countries have maize and rice in lieu of it; and some parts of America, both in the islands and continents, simple roots, such as potatoes and minioc.—Egypt was anciently the most fertile of all other countries in corn; as appears both from sacred and profane history. It furnished a good part of the people subject to the Roman empire, and was called the *dry nurse of Rome and Italy*. Britain, France, and Poland, seem now in the place of Egypt, and with their superfluities support a good part of Europe.

For the first discovery and culture of corn, authors are much divided; the common opinion is, that in the first ages men lived on the spontaneous fruits of the earth; as acorns, and the nut or mast produced by the beech; which, they say, took its name *fagus*, from the Greek φαγω, *I eat*. It is added that they had not either the use of corn, or the art of preparing or making it eatable.

Ceres has the credit of being the first that showed the use of corn, on which account she was placed among the gods; others gave the honour to Triptolemus; others share it between the two, making Ceres the first discoverer, and Triptolemus, the first planter and cultivator of corn. Diodorus Siculus ascribes the whole to Isis; on which Polydore Virgil observes, he does not differ from the rest; Isis and Ceres being in reality the same. The Athenians pretend it was among them the art began; and the Cretans or Candiots, Sicilians, and Egyptians, lay claim to the same. Some think the title of the Sicilians best supported, that being the country of Ceres: and authors add, she did not teach the secret to the Athenians, till she had first instructed her own countrymen. Others say, Ceres passed first into Attica, thence into Crete, and, last of all, into Sicily: many of the learned, however, maintain it was in Egypt the art of cultivating corn first began; and it is certain there was corn in Egypt and the East long before the time of Ceres.

Corn is very different from fruits, with respect to the manner of its preservation; and is capable of being preserved in public granaries, for pressing occasions, and of being kept for several centuries.—A little time after the siege of Metz, under Henry II. of France, in the year 1578, the duc d'Espernon laid up vast stores of corn in the citadel; which was preserved in good plight to the year 1707, when the French

French king and his retinue, passing that way, ate bread baked thereof.

The chief thing that contributes to the preservation of corn is a crust which forms on its surface, by the germination of the grain next underneath, to the thickness of an inch and a half. On that at Metz people walked, without its giving the least way. At Sedan was a granary cut in a rock, wherein a heap of corn was preserved a hundred and ten years: it was covered with a crust a foot thick.

For the preservation of corn, the first method is to let it remain in the spike; the only expedient for conveying it to the islands and provinces of America. The inhabitants of those countries save it in the ear, and raise it to maturity by that precaution: but this method of preserving it is attended with several inconveniences among us; corn is apt to rot or sprout, if any the least moisture is in the heap; the rats likewise infest it, and our want of straw also obliges us to separate the grain from the ear. The second is to turn out and winnow it frequently; or to pour it through a trough or mill-hopper, from one floor to another; being thus moved and aired every 15 days, for the first 6 months, it will require less labour for the future, if lodged in a dry place: but if, through neglect, mites should be allowed to slide into the heap, they will soon reduce the corn to a heap of dust: this must be avoided by moving the corn anew, and rubbing the places adjacent with oils and herbs, whose strong odour may chase them away; for which garlic and dwarf-elder are very effectual; they may likewise be exposed to the open sun, which immediately kills them. When the corn has been preserved from all impurities for the space of two years, and has exhaled all its fires, it may be kept for 50 or even 100 years, by lodging it in pits covered with strong planks closely joined together; but the safer way is to cover the heap with quicklime, which should be dissolved by sprinkling it over with a small quantity of water; this causes the grains to shoot to the depth of two or three fingers; and incloses them with an incrustation, as above mentioned, through which neither air nor insects can penetrate.

Indian Corn, or *Maize*. See ZEA, BOTANY *Index*.

CORN-Butterfly, method of destroying it. See AGRICULTURE *Index*.

CORN-Crake. See RALLUS, ORNITHOLOGY *Index*.

CORN-Laws, the laws regulating the importation and exportation of corn; for an account of which, and of the trade in corn, see CORN LAWS, SUPPLEMENT.

CORN-Mill, a water-engine for grinding corn. See MECHANICS.

CORN, in *Farriery*. See FARRIERY *Index*.

CORNS, in *Surgery*, hard excrescences, consisting of indurations of the skin arising on the toes, and sometimes on the sides of the feet, where they are much exposed to the pressure of the shoes. By degrees they press themselves farther down between the muscular fibres on these parts, and by their irritation occasion extreme pain. Many cures have been prescribed, but the total removal of them is always found to be attended with great difficulty. The best cure is to bathe them frequently in warm water, and pare away as much as possible of the indurated skin without drawing blood.

CORNAGE, an ancient tenure, the service whereof was to blow a horn when any invasion of the Scots was perceived. This tenure was very frequent in the northern counties near the Picts wall; but by stat. 12 Car. II. all tenures are converted into free and common soccage.—An old rental calls cornage, *newtgeldt*, q. d. *neat-geld*. Lord Coke says, in old books it is called *horngeld*.

CORNARISTS, in ecclesiastical history, the disciples of Theodore Cornhert, an enthusiastic secretary of the states of Holland. He wrote at the same time against the Catholics, Lutherans, and Calvinists. He maintained that every religious communion needed reformation; but he added, that no person had a right to engage in accomplishing it without a mission supported by miracles. He was also of opinion, that a person might be a good Christian without being a member of any visible church.

CORNARIUS, or HAGUENBOT, *John*, a celebrated German physician, born at Zwickow in Saxony. His preceptor made him change his name of Haguenbot to that of Cornarius, under which he is most known. At 20 years of age he taught grammar, and explained the Greek and Latin poets and orators to his scholars; and at 23 was licentiate in medicine. He found fault with most of the remedies provided by the apothecaries; and observing, that the greatest part of the physicians taught their pupils only what is to be found in Avicenna, Rhasis, and other Arabian physicians, he carefully sought for the writings of the best physicians of Greece, and employed about 15 years in translating them into Latin, especially the works of Hippocrates, Aetius, Eginetes, and a part of those of Galen. Meanwhile he practised physic with reputation at Zwickow, Frankfort, Marpurg, Nordhausen, and Jena, where he died of an apoplexy in 1558, aged 58. He also wrote some medicinal treatises; published editions of some poems of the ancients on medicine and botany; and translated some of the works of the fathers, particularly those of Basil, and a part of those of Epiphanius.

CORNARO, LEWIS, a Venetian of noble extraction, memorable for having lived healthful and active to above 100 years of age by a rigid course of temperance. By the ill conduct of some of his relations he was deprived of the dignity of a noble Venetian; and seeing himself excluded from all employments under the republic, he settled at Padua. In his youth he was of a weak constitution; and by irregular indulgence reduced himself at about 40 years of age to the brink of the grave, under a complication of disorders; at which extremity he was told that he had no other chance for his life but by becoming sober and temperate. Being wise enough to adopt this wholesome counsel, he reduced himself to a regimen of which there are very few examples. He allowed himself no more than 12 ounces of food and 14 ounces of liquor each day; which became so habitual to him, that when he was above 70 years of age, the experiment of adding two ounces to each by the advice of his friends, had like to have proved fatal to him. At 83 he wrote a treatise which has been translated into English, and often printed, entitled, "Sure and certain Methods of attaining a Long and Healthful Life;" in which he relates his own story, and extols temperance to a degree of enthusiasm. At length the yolk of an egg became sufficient

sufficient for a meal, and sometimes for two, until he died with much ease and composure in 1566. The writer of the Spectator, N° 195, confirms the fact from the authority of the Venetian ambassador at that time, who was a descendant of the Cornaro family.

CORNAVII, (Ptolemy), a people of Britain, beginning in the very heart of the island, and extending to Chester. Now *Warwick*, *Worcester*, *Salop*, *Stafford*, and *Cheshire* (Camden).

CORNEA TUNICA, in *Anatomy*, the second coat of the eye; so called from its substance resembling the horn of a lantern, in Latin *cornu*. See ANATOMY *Index*.

CORNEILLE, PETER, a celebrated French poet, was born at Rouen in the year 1606. He was brought up to the bar, which he attended for some little time; but formed with a genius too elevated for such a profession, and having no turn for business, he soon deserted it. An affair of gallantry occasioned his writing his first piece, entitled *Melite;* which had prodigious success. Encouraged by the applause of the public, he wrote the Cid, and the other tragedies that have immortalized his name. In his dramatic works he discovers a majesty, a strength and elevation of genius, scarce to be found in any other of the French poets; and, like our immortal Shakespeare, seems better acquainted with nature than with the rules of critics. Corneille was received into the French academy in 1647, and died dean of that academy in 1684, aged 78. Besides his dramatic pieces, he wrote a translation, in French verse, of the "Imitation of Jesus Christ," &c. The best edition of his works is that of 1682, in 4 vols 12mo.

CORNEILLE, *Thomas*, brother of the former, was a member of the French academy and of that of inscriptions. He discovered in his youth a great inclination to poetry; and at length published several dramatic pieces in 5 vols 12mo, some of which were applauded by the public, and acted with success. He also wrote, 1. A translation of Ovid's Metamorphoses, and some of Ovid's Epistles; 2. Remarks on Vauglas; 3. A Dictionary of Arts, 2 vols folio; and 4. An Universal Geographical and Historical Dictionary, in 3 vols folio.

CORNEILLE, *Michael*, a celebrated painter, was born at Paris in the year 1642; and was instructed by his father, who was himself a painter of great merit. Having gained a prize at the academy, young Corneille obtained a pension from Louis XIV.; and was sent to Rome, where that prince had founded a school for young artists of genius. Having studied there some time, he gave up his pension, and applied to the antique with great care. He is said to have equalled Carache in drawing, but in colouring he was deficient. Upon his return from Rome, he was chosen professor in the academy of Paris; and was employed by the above prince in all the great works he was carrying on at Versailles and Trianon, where are still to be seen some noble efforts of his genius.

CORNEL-TREE. See CORNUS, BOTANY *Index*.

CORNELIA, daughter of Scipio Africanus, was the mother of Tiberius and Caius Gracchus. She was courted by a king, but she preferred being the wife of a Roman citizen to that of a monarch. Her virtues have been deservedly commended, as well as the wholesome principles she inculcated in her two sons. When a Campanian lady made once a show of her jewels at Cornelia's house, and entreated her to favour her with a sight of her own, Cornelia produced her two sons, saying, "These are the only jewels of which I can boast."

CORNELIA LEX, *de civitate*, was enacted, in the year of Rome 670, by L. Corn. Sylla. It confirmed the Sulpician law, and required that the citizens of the eight newly elected tribes should be divided among the 35 ancient tribes.—Another, *de judiciis*, in 673, by the same. It ordained, that the prætor should always observe the same invariable method in judicial proceedings, and that the process should not depend upon his will.—Another *de sumptibus*, by the same. It limited the expences which generally attended funerals.—Another *de religione*, by the same, in 677. It restored to the college of priests the privilege of choosing the priests, which by the Domitian law had been lodged in the hands of the people.—Another, *de municipiis*, by the same; which revoked all the privileges which had been some time before granted to the several towns that had assisted Marius and Cinna in the civil wars.—Another *de magistratibus*, by the same; which gave the power of bearing honours, and being promoted before the legal age, to those who had followed the interest of Sylla; while the sons and partizans of his enemies, who had been proscribed, were deprived of the privilege of standing for any office in the state.—Another, *de magistratibus*, by the same, in 673. It ordained, that no person should exercise the same office within ten years distance, or be invested with two different magistracies in one year.—Another, *de magistratibus*, by the same, in 673. It divested the tribunes of the privilege of making laws, interfering, holding assemblies, and receiving appeals. All such as had been tribunes were incapable of holding any other office in the state by that law.—Another, *de majestate*, by the same, in 670. It made it treason to lead an army out of a province or engage in a war without orders, to influence the soldiers to spare or ransom a captive general of the enemy, to pardon the leaders of robbers or pirates, or for the absence of a Roman citizen to a foreign court without previous leave. The punishment was *aquæ et ignis interdictio.*—Another by the same. It gave the power to a man accused of murder, either by poison, weapons, or false accusations, and the setting fire to buildings, to choose whether the jury that tried him should give their verdict *clam* or *palam*, *viva voce*, or by ballot. Another by the same, which made it *aquæ et ignis interdictio* to such as were guilty of forgery, concealing and altering of wills, corruption, false accusations, and the debasing or counterfeiting of the public coin. All such as were accessory to this offence were deemed as guilty as the offender.—Another, *de pecuniis repetundis;* by which a man convicted of peculation or extortion in the provinces was condemned to suffer the *aquæ et ignis interdictio*.—Another, by the same; which gave the power to such as were sent into the provinces with any government, of retaining their command and appointment without any renewal of it by the senate, as was before observed.—Another by the same; which ordained, that the lands of proscribed persons should be common, especially those about Volaterræ and Fesulæ in Etruria, which Sylla divided among his soldiers.—Another by C. Cornelius, tribune of of the people, in 686. It ordained, that no person should be exempted from any law according to the general custom, unless 200 senators were present in the senate; and no person thus exempted could hinder the bill of his exemption from being carried to the people for their concurrence.—Another, by Nasica, in 582, to make war against Perseus, son of Philip king of Macedon, if he did not give proper satisfaction to the Roman people.

CORNELIAN. See CARNELIAN.

CORNER, in a general sense, the same with ANGLE.

CORNET, in the military art of the ancients, an instrument much in the nature of a trumpet; which when it only sounded, the ensigns were to march alone without the soldiers; whereas when the trumpet only sounded, the soldiers were to move without the ensigns. The cornets and buccinæ sounded the charge and retreat; and the cornets and trumpets sounded during the course of the battle. See Plate CLXIV.

CORNET, in modern military economy, denotes an officer in the cavalry who bears the ensign or colours of a troop.

The cornet is the third officer in the company, and commands in the absence of the captain and lieutenant. He takes his title from his ensign, which is square; and is supposed to be called by that name from *cornu*, because placed on the wings, which form a kind of points or horns of the army. Others derive the name from *coronet;* alleging, that it was the ancient custom for these officers to wear coronets or garlands on their heads.

CORNEUS, the name by which Linnæus calls a kind of tin ore, found in black columns, with irregular sides, and terminating in prisms.

CORNICHE, CORNISH, or CORNICE, in *Architecture*, the uppermost member of the entablature of a column, as that which crowns the order. See ARCHITECTURE, Chap. I. and the Plates.

CORNICHE, is also used, in general, for all little projectures in masonry or joinery, even where there are no columns, as the corniche of a chimney, beaufet, &c.

CORNICHE Ring, in a piece of ordnance, is that next from the muzzle-ring, backward.

CORNICULARIUS, in antiquity, an officer in the Roman army, whose business was to aid and assist the military tribune in quality of a lieutenant.

The *cornicularii* went the rounds in lieu of the tribune, visited the watch, and were nearly what the aids major are in the French army.

The denomination *cornicularius* was given them from a little horn, called *corniculum*, which they used in giving orders to the soldiers: though Salmasius derives it from *corniculum*, the crest of a head-piece; it being an observation of Pliny, that they wore iron or brass horns on their helmets; and that these were called *cornicula*.

In the *Notitia Imperii* we find a kind of secretary or register of the same name. His business was to attend the judge, and enter down his sentiments and decisions. The critics derive the word, in this sense, from *corniculum*, a little horn to put ink in.

CORNICULUM, in *Ancient Geography*, a town of the Sabines, to the east of Crustumenum, towards the Anio. It was burnt down by Tarquin; but restored again, after the expulsion of the kings, (Florus). Now in ruins, called *il Monte Genaro*, (Holstenius).

CORNISH DIAMOND, a name given by many people to the crystals found in digging the mines of tin in Cornwall. See CORNWALL.

CORNIX, the trivial name of a species of CORVUS. See CORVUS, ORNITHOLOGY *Index*.

CORNU. See HORN.

CORNU Ammonis, in *Natural History*, fossil shells, called also *serpent-stones* or *snake-stones*.

They are found of all sizes, from the breadth of a sixpence to more than two feet in diameter, and some even larger; some of them rounded, others greatly compressed, and lodged in different strata of stones and clays; some again are smooth, and others variously ridged, their striæ and ridges being either straight, irregularly crooked, or undulated. See *SNAKE-Stones*.

CORNU Cervi. See HARTSHORN.

CORNUCOPIA, among the ancient poets, a horn out of which proceeded plenty of all things; by a particular privilege which Jupiter granted his nurse, supposed to be the goat Amalthea. The fable is thus interpreted: That in Libya there is a little territory shaped not unlike a bullock's horn, exceedingly fertile, given by King Ammon to his daughter, Amalthea, whom the poets feign to have been Jupiter's nurse.

In *Architecture* and *Sculpture*, the cornucopia, or horn of plenty, is represented under the figure of a large horn, out of which issue fruits, flowers, &c. On medals, F. Joubert observes, the cornucopia is given to all deities.

CORNUCOPIÆ, in *Botany*, a genus of plants belonging to the triandria class; and in the natural method ranking under the 4th order, *Gramina*. See BOTANY *Index*.

CORNUS, CORNEL-TREE, CORNELIAN CHERRY, or DOG-WOOD; a genus of plants belonging to the tetrandria class; and in the natural method ranking under the 47th order, *Stellatæ*.

CORNUTIA, a genus of plants, belonging to the didynamia class, and in the natural method ranking under the 40th order, *Personatæ*. See BOTANY *Index*.

CORNWALL, the most westerly county of England, bounded by the British channel on the south, and the Bristol channel on the north, the two seas meeting near the Land's End on the west, and on the east by the river Tamar, which separates it from Devonshire. Its name is supposed by some to be compounded of *carn*, signifying "a rock" in the British language, and *Gauls* or *Wauls*, the name the Saxons gave to the Britons. Others, however, think it is derived from the Latin *cornu*, or the British *kern*, "a horn;" on account of its running out into the sea somewhat in the form of a horn. Hither the ancient Britons (as well as in Wales) retired on the intrusion of the Saxons, where they opposed their further conquests. In this part of the island they formed a kingdom that existed for many years after under different princes, amongst whom were Ambrosius Aurelius, and the justly celebrated Arthur; nor were they subdued till the middle of the 7th century, from which time Cornwall was considered as subject to the West Saxon kings, who began their sovereignty in 519, and continued it till 828, under 18 sovereigns, the last of whom was the great Egbert, who subdued

Cornwall. dued all the others; and by uniting them, formed the kingdom of England, when this country was included in the county of Devon, then the 9th division; and that accounts for Alfred's not mentioning Cornwall, which, on forming the circuits after the Norman conquest, is included in the western circuit. In 1337, Edward III. erected it into a dukedom, and invested with it *Edward the Black Prince*. But this, according to the express words of the grant, is limited to the first born son and heir, on which account Richard II. was created duke of Cornwall by charter. So was Henry V. by his father Henry IV. Henry VI. delivered the duchy to his son Prince Edward, and Edward IV. created his son Edward V. duke of Cornwall, as did Henry VII. his son, afterwards Henry VIII. upon the death of his elder brother Arthur. James I. created his son Henry duke of Cornwall, which title on his decease came to his brother Charles. The eldest sons of succeeding kings have enjoyed this title by inheritance. These not only appoint the sheriff, but all writs, deeds, &c. are in their name, and not in the king's; and they have also peculiar royalties and prerogatives distinct from the crown, for which they appoint the officers. This county is 80 miles long, 40 broad, and 250 in circumference; containing 1185 square miles or 758,484 acres. It is divided into 9 hundreds; has 27 market towns, viz. Launceston, Truro, Falmouth, Helston, Saltash, Bodmyn, St Ives, Tregony, Camelford, Fowey, St Germains, Penryn, Callington, St Austle, East Looe, Padstow, St Colomb, Pensance, Grampond, Leskard, Lestwithiel, St Mawes, St Michael, Newport, Market Jew, Stratton, and Redruth; 1230 villages, 191 parishes, 89 vicarages. The population in 1811 was 216,667, having increased 28,550 since 1801. Its chief rivers are the Tamar, Fale, Cober, Looe, Camel, Fowe, Haile, Lemara, Kense, and Aire. Its principal capes or headlands are the Land's end, the Lizard, Cape Cornwall, Deadman's-head, Rame-head, &c. and a cluster of islands, 144 in number, called the *Scilly isles*, supposed formerly to have been joined to the main land, though now 30 miles distant; abounding with antiquities, particularly druidical.

As Cornwall is surrounded by the sea on all sides except the east, its climate is somewhat different from that of the other parts of Britain. The reasons of this difference will be easily understood from what is observed concerning the climate of America. The summers in Cornwall are less hot, and the winters less cold, than in other parts of England, and the spring and harvest are observed to be more backward. High and sudden winds are also more common in this than in other counties of England. The county is rocky and mountainous; but the mountains are rich in metals, especially tin and copper. The valleys are very pleasant and fertile, yielding great plenty both of corn and pasture. The lands near the sea-coast are manured and fertilized with sea-weed, and a kind of sand formed by the particles of broken shells as they are dashed against each other by the sea. Cattle of all sorts are smaller here than in the other counties of England; and the wool of the sheep, which are mostly without horns, is very fine, and the flesh, both of them and the black cattle, extremely delicate. The county is well supplied with fish from the sea and the many rivers with which it is watered. The most noted of the sea-fish is the pilchard; of which prodigious quantities are caught from July to November, and exported to different parts, especially to Spain. It is said that a million have been sometimes taken at a single draught. The natives are remarkable for their strength and activity, as well as their dexterity in wrestling, in which exercise the Cornish hug is highly extolled.

This county has been long famous for its mines of different metals; but the principal produce is tin. The Phenicians early visited these coasts for this article, some think 400 or 450 years before Christ; and the mines continued to be wrought with various success at different periods. In the time of King John they appear to have yielded no great emolument; the right of working them being wholly in the king as earl of Cornwall, and the mines farmed by the Jews for 100 merks; and according to this proportion the 10th of it, 6l. 13s. 4d. is at this day paid by the crown to the bishop of Exeter. In the time of Richard king of the Romans and earl of Cornwall, the tin-mines were immensely rich; the Jews being farmed out to him by his brother Henry III. what interest they had was at his disposal. The Spanish tin-mines being stopped by the Moors, and none discovered in Germany, the Malabar coast, or the Spanish West Indies, Cornwall and its earls had all the trade of Europe for it. The Jews being banished the kingdom, 18 Edw. I. they were again neglected till the gentlemen of Blackmore, lords of seven tithings best stored at that time with tin, obtained of Edmund earl of Cornwall, son of Richard king of the Romans, a charter under his own seal, with more explicit grants of privileges, courts, pleas, parliaments, and the toll-tin or $\frac{1}{15}$th of all the tin raised. At this time too the right of bounding or dividing tin-grounds into separate partitions for the encouragement of searching for it, seems to have been first appointed, or at least adjusted. This charter was confirmed 33 Edward I. and the Cornish separated from the Devonshire tinners. Their laws, particularly recited in Plowden's Commentaries, p. 237, were further explained, 50 Edw. III. confirmed and enlarged by parliament, 8 Rich. II. 3 Ed. IV. 1 Ed. VI. 1 and 2 P. and M. and 2 Eliz. and the whole society divided into four parts under one general warden to do justice in law and equity, from whose sentence lies an appeal to the duke of Cornwall in council, or for want of a duke of Cornwall to the crown. The lord-warden appoints a vice-warden to determine all stannery disputes every month; he also constitutes four stewards, one for each of the precincts before mentioned, who hold their courts every three weeks, and decide by juries of six persons, with an appeal reserved to the vice-warden, lord warden, and lord of the prince's council. In difficult cases the lord warden, by commission, issues his precept to the four principal towns of the stannery districts, who each choose six members; and these twenty-four stannators constitute the parliament of tinners. Each stannator chooses an assistant, making a kind of standing council in a different apartment to give information to the prince. Whatever is enacted by the body of tinners must be signed by the stannators, the lord-warden, or his deputy, and by the duke or the king, and thenceforward has with regard to tin affairs all the authority of an act of the whole sides, has also two angles equal; this corollary will follow, that a triangle which has three sides equal, has also its three angles equal.

COROLISTÆ, a name by which Linnæus distinguishes those systematic botanists who have arranged vegetables from the regularity, figure, number, and other circumstances, of the petals, or beautiful coloured leaves of the flowers. The best systems of this kind are those of Rivinus and Tournefort. The former proceeds upon the regularity and number of the petals; the latter, with much more certainty, on their regularity and figure.

COROLLULA, a term used by botanists to express the little partial flowers which make up the compound ones.

COROMANDEL, the eastern coast of the peninsula on this side the Ganges in Asia. It is bounded on the north by Golconda, on the east by the bay of Bengal, on the south by Madura, and on the west by Bisnagar. This coast so much resembles that of Orixa, that the Abbé Raynal chooses to consider them as one, and gives to both the general name of *Coromandel.* Here an excessive heat reigns from the beginning of May to the end of October. It begins at nine in the morning, and continues till nine in the evening. During the night it is allayed by a sea-breeze from the south-east; and most commonly this refreshing gale begins at three in the afternoon. The air is less inflamed during the rest of the year, though in all seasons it is very hot. It rains almost continually during the months of November and December. This immense tract is covered with a parched sand for the extent of two miles, and sometimes only one mile along the coast.

This country was at first neglected by the Europeans for many reasons. It was separated by inaccessible mountains from Malabar, where these bold adventurers endeavoured to settle themselves. Spices and aromatics, which were the principal objects of their attention, were not to be found there. In short, civil dissensions had banished from it tranquillity, security, and industry. At that period the empire of Bisnager, to which this vast country was subject, was falling to ruin. The governors of Visapour, the Carnatic, Golconda, and Orixa, threw off their dependence, and assumed the title of kings. Those of Madura, Tanjore, Mysore, Gingi, and some others, likewise usurped the sovereign authority, though they retained their ancient title of *Naick.* This revolution had just happened when the Europeans appeared on the coast of Coromandel. The foreign trade was at that time inconsiderable; it consisted only of diamonds from Golconda, which were carried to Calicut and Surat, and from thence to Ormus or Suez, whence they were circulated through all Europe and Asia. Massulipatan, the richest and most populous city of these countries, was the only market that was known for linens; they were purchased at a great fair annually holden there by the Arabian and Malayan vessels that frequented that bay, and by caravans arrived from distant parts. The linens were exported to the same places with the diamonds. The fondness for the manufactures of Coromandel, which began to prevail here, inspired all the European nations trading to the Indian seas with the resolution of forming settlements there. They were not discouraged either by the difficulty of conveying goods from the inland parts of the country, where there was no navigable river; by the total want of harbours, where the sea at one season of the year is not navigable; by the barrenness of the coasts, for the most part uncultivated and uninhabited; nor by the tyranny and fluctuating state of the government. They thought that silver would be industriously sought after; that Pegu would furnish timber for building, and Bengal corn for subsistence; that a prosperous voyage of nine months would be more than sufficient to complete their ladings; and that by fortifying themselves they should be secure against the attacks of the weak tyrants that oppressed these countries.

The first European colonies were established near the shore. Some of them obtained a settlement by force; most of them were formed with the consent of the sovereigns; and all were confined to a very narrow tract of land. The boundaries of each were marked out by a hedge of thorny plants, which was their only defence. In process of time fortifications were raised; and the security derived from them, added to the lenity of the government, soon increased the number of colonists. The splendor and independence of these settlements several times raised the jealousy of the princes in whose dominions they were formed; but their attempts to demolish them proved abortive. Each colony increased in prosperity in proportion to the riches and the wisdom of the nation that founded it. None of the companies that exercised an exclusive privilege beyond the Cape of Good Hope had any concern in the trade of diamonds. This was always left to private merchants, and by degrees fell entirely into the hands of the English, or the Jews and Armenians that lived under their protection. At present this grand object of luxury and industry is much reduced. The revolutions that have happened in Indostan have prevented people from resorting to these rich mines; and the anarchy in which this unhappy country is plunged leaves no room to hope that they will be again attended to. The whole of the commercial operations on the coast of Coromandel is confined to the purchase of cottons. The manufacturing of the white cotton brought there differs so little from ours, that it would be neither interesting nor instructive to enter into a minute description of it. The process used in making their printed cottons, which was at first servilely followed in Europe, has since been rendered more simple and brought to greater perfection by our manufactures. The painted cottons which are brought thither we have not yet attempted to imitate. Those who imagine we have been prevented from undertaking this branch merely by the high price of labour among us, are mistaken. Nature has not given us the wild fruits and drugs necessary for the composition of those bright and indelible colours which constitute the principal merit of the Indian manufactures; nor has she furnished us with the waters that serve to fix them. The Indians do not universally observe the same method in painting their cottons; either because there are some niceties peculiar to certain provinces, or because different soils produce different drugs for different uses. We should tire the patience of our readers were we to trace the slow

Corona.

tion or refraction, produce the appearance in question, when nothing else can be found that will do it, we must acquiesce in the hypothesis, and suppose such bodies to exist, even though we cannot give a satisfactory account of their generation. Now, two such bodies are assumed by Mr Huygens; one of them a round ball, opaque in the centre, but covered with a transparent shell; and the other is a cylinder, of a similar composition. By the help of the former he endeavours to account for halos, and by the latter for those appearances which are called mock suns. Those bodies which Mr Huygens requires, in order to explain these phenomena, are not, however, a mere assumption; for some such, though of a larger size than his purpose requires, have been actually found, consisting of snow within and ice without. They are particularly mentioned by Descartes.

The balls with the opaque kernel, which he supposed to have been the cause of them, he imagines not to exceed the size of a turnip-seed; but, in order to illustrate this hypothesis, he gives a figure of one, of a

Fig. 3. larger size, in ABCDEF, (fig. 3.) representing the kernel of snow in the middle of it. If the rays of light, coming from GH, fall upon the side AD, it is manifest they will be so refracted at A and D, as to bend inwards; and many of them will strike upon the kernel EF. Others, however, as GA and HD, will only touch the sides of the kernel; and being again refracted at B and C, will emerge in the lines BK, CK, crossing each other in the point K, whose nearest distance from the globule is somewhat less than its apparent diameter. If, therefore, BK and CK be produced

Fig. 4. towards M and L (fig. 4.), it is evident that no light can reach the eye placed within the angle LKM, but may fall upon it when placed out of that angle, or rather the cone represented by it.

For the same reason, every other of these globules will have a shadow behind it, in which the light of the sun will not be perceived. If the eye be at N, and that be conceived to be the vertex of a cone, the sides of which, NR, NQ, are parallel to the sides of the former cone KL, KM, it is evident that none of the globules within the cone QNR can send any rays of the sun to the eye at N. But any other globule out of this cone, as X, may send those rays, which are more refracted than XZ, to the eye; so that this will appear enlightened, while those within the cone will appear obscure. It is evident from this, that a certain area, or space, quite round the sun, must appear dark; and that the space next to this area will appear luminous, and more so in those parts that are nearest to the obscure area; because, he says, it may easily be demonstrated, that those globules which are nearest to the cone QNR exhibit the largest image of the sun. It is plain, also, that a corona ought to be produced in the same manner, whatever be the sun's altitude, because of the spherical figure of the globules.

To verify this hypothesis, our philosopher advises us to expose to the sun a thin glass bubble, filled with water, and having some opaque substance in the centre of it; and he says we shall find, that we shall not be able to see the sun through it, unless at a certain distance from a place opposite to the centre of it; but as soon as we do perceive the light, the image of the sun will immediately appear the brightest, and coloured red, for the same reason as in the rainbow.

These coronas, he says, often appear about the moon; but the colours are so weak as to appear only white. Such white coronas he had also seen about the sun, when the space within them appeared scarce darker than that without. This he supposes to happen when there are but few of those globules in the atmosphere; for the more plentiful they are, the more lively the colours of the halo appear; at the same time also the area within the corona will be the darker. The apparent diameter of the corona, which is generally about 45 degrees, depends upon the size of the dark kernel; for the larger it is with respect to the whole globule, the larger will be the dark cone behind it.

The globules that form these halos, Mr Huygens supposes to have consisted of soft snow, and to have been rounded by continual agitation in the air, and thawed on their outsides by the heat of the sun.

To make the diameter of the halo 45 degrees, he demonstrates that the semidiameter of the globule must be to the semidiameter of the kernel of snow very nearly as 1000 to 480; and that to make a corona of 100 degrees, it must be as 1000 to 680.

Mr Weidler, in his Commentary on parhelia, published at Wirtemberg in 1733, observes, that it is very improbable that such globules as Mr Huygens's hypothesis requires, with nuclei of such a precise proportion, should exist; and if there were such bodies, he thinks they would be too small to produce the effects ascribed to them. Besides, he observes that appearances exactly similar to halos are not uncommon, where fluid vapours alone are concerned; as when a candle is placed behind the steam of boiling water in frosty weather, or in the midst of the vapour issuing copiously from a bath, or behind a receiver when the air is so much rarefied as to be incapable of supporting the water it contains. The rays of the sun twice reflected and twice refracted within small drops of water are sufficient, he says, without any opaque kernel, to produce all the appearances of the halos that have the red light towards the sun, as may be proved by experiment. That the diameter of the halos is generally half of that of the rainbow, he accounts for as Gassendi did before him.

M. Mariotte accounts for the formation of the small coronas by the transmission of light through aqueous vapours, where it suffers two refractions, without any intermediate reflection. He shows that light which comes to the eye, after being refracted in this manner, will be chiefly that which falls upon the drop nearly perpendicular; because more rays fall upon any given quantity of surface in that situation, fewer of them are reflected with small degrees of obliquity, and they are not so much scattered after refraction. The red will always be outermost in these coronas, as consisting of rays which suffer the least refraction. And whereas he had seen, when the clouds were driven briskly by the wind, halos round the moon, varying frequently in their diameter, being sometimes of two, sometimes of three, and sometimes of four degrees; sometimes also being coloured, sometimes only white, and sometimes disappearing entirely; he concluded that all these variations arose from the different stance of about 22° 35′ from the centre of the moon. It was elliptical; and its long diameter was perpendicular to the horizon, verging below farthest from the moon. He was told, that the moon has sometimes three or more concentric crowns of colours encompassing one another next about her body. The more equal the globules of water or ice are to one another, the more crowns of colours will appear, and the colours will be the more lively. The halo, at the distance of 22½ degrees from the moon, is of another sort. By its being oval, and more remote from the moon below than above, he concludes that it was made by refraction in some kind of hail or snow floating in the air in an horizontal posture, the refracting angle being about 50 or 60 degrees. Dr Smith, however, makes it sufficiently evident, that the reason why this halo appeared oval, and more remote from the moon towards the horizon, is a deception of sight, and the same with that which makes the moon appear larger in the horizon.

Dr Koteluihow having, like Dr Halley, made very accurate observations to determine the number of possible rainbows, considers the coloured halo which appears about a candle as the same thing with one of these bows which is formed near the body of the sun, but which is not visible on account of his excessive splendor.

Lastly, M. Muschenbroeck concludes his account of coronas with observing, that some density of vapour, or some thickness of the plates of ice, divides the light in its transmission through the small globules of water, or their interstices, into its separate colours: but what that density was, or what was the size of the particles which composed the vapour, he could not pretend to determine.

Corona, among botanists, the name given by some to the circumference or margin of a radiated compound flower. It corresponds to the radius of Linnæus; and is exemplified in the flat, tongue-shaped petals which occupy the margin of the daisy or sunflower.

Corona *Australis* or *Meridionalis*, Southern Crown, a constellation of the southern hemisphere, whose stars in Ptolemy's catalogue are 13, in the British catalogue 12.

Corona *Borealis*, the Northern Crown or Garland, in *Astronomy*, a constellation of the northern hemisphere, whose stars in Ptolemy's catalogue are eight, in Tycho's as many, and in Mr Flamstead's 21.

Corona *Imperialis*, in *Conchology*, a name given by some authors to a kind of voluta, differing from the other shells of that family, by having its head ornamented with a number of points, forming a sort of crown. See Voluta, Conchology *Index*.

CORONALE, in *Anatomy*, the first suture of the skull. See Anatomy *Index*.

CORONALE os, the same with os frontis. See Anatomy *Index*.

CORONARY vessels, in *Anatomy*, certain vessels which furnish the substance of the heart with blood.

Coronary *Arteries*, are two arteries springing out of the aorta, before it leaves the pericardium. See Anatomy *Index*.

Coronary *Vein*, a vein diffused over the exterior surface of the heart. See Anatomy *Index*.

Stomachic Coronary, a vein inserted into the trunk of the splenic vein, which, by uniting with the mesenteric, forms the vena porta. See Anatomy *Index*.

CORONARIÆ, in *Botany*, the 10th order of plants in Linnæus's Fragments of a Natural Method. Under this name, instead of the more obvious one *liliaceæ*, Linnæus collects a great number of genera, most of which furnish very beautiful garden flowers, viz. albuca, cyanella, fritillaria, helonias, hyacinthus, hypoxis, lilium, melanthium, ornithogalum, scilla, tulipa, agave, aletris, aloe, anthericum, asphodelus, bromelia, burmannia, hemerocallis, polyanthes, tillandsia, veratrum, yucca.

CORONATION, the ceremony of investing with a crown, particularly applied to the crowning of kings, upon their succeeding to the sovereignty. See King.

CORONÆ, in *Ancient Geography*, a town of Bœotia, near Mount Helicon, and the lake Copais, situated on an eminence: famous for the defeat of the Athenians and Bœotians by Agesilaus. Another Corona of Thessaly; having Narthacium to the east, and Lamia near the Sperchius to the north (Ptolemy).

CORONE, in *Ancient Geography*, a town of Messenia, situated on the sea, giving name to the Sinus Coronæus, (Pliny); now *Golfo di Coron*. Pausanias takes it to be the *Æpea* of Homer; but Strabo *Thuria*, and Pliny *Pedasus*: now *Coron*, in the territory of Belvidere, in the Morea. E. Long. 22. N. Lat. 36. 30.

CORONELLI, Vincent, a famous geographer, was born at Venice. His skill in the mathematics having brought him to the knowledge of the count d'Estrees, his eminence employed him in making globes for Louis XIV. With this view Coronelli spent some time at Paris, and left a great number of globes there, which are esteemed. In 1685, he was made cosmographer to the republic of Venice; and four years after public professor of geography. He founded an academy of cosmography at Venice; and died in that city in 1718. He published about 400 geographical charts, an abridgment of cosmography, several books on geography, and other works.

CORONER (*coronator*), an ancient officer in England, so called because he hath principally to do with pleas of the crown, or such wherein the king is more immediately concerned. And in this light the lord chief justice of the king's bench is the principal coroner in the kingdom; and may, if he pleases, exercise the jurisdiction of a coroner in any part of the realm. But there are also particular coroners for every county in England; usually four, but sometimes six, and sometimes fewer. This officer is of equal authority with the sheriff; and was ordained, together with him, to keep the peace, when the earls gave up the wardship of the county.

He is chosen by all the freeholders of the county court; and by the statute of Westminster 1. it was enacted, that none but lawful and discreet knights should be chosen; but it seems now sufficient if a man have land enough to be made a knight, whether he be really knighted or not; for the coroner ought to have an estate sufficient to maintain the dignity of his office, and answer any fines that may be made upon him for his

his misbehaviour; and, if he hath not enough to answer, his fine shall be levied on the county, as a punishment for electing an insufficient officer. Now, indeed, through the culpable neglect of gentlemen of property, this office has been suffered to fall into disrepute, and get into low and indigent hands; so that although formerly no coroners would be paid for serving their country, and they were by the aforesaid statute of Westminster 1. expressly forbidden to take a reward under pain of great forfeiture to the king, yet for many years past they have only desired to be chosen for the sake of their perquisites; being allowed fees for their attendance by the statute 3 Hen. VII. c. 1. which Sir Edward Coke complains of heavily, though since his time those fees have been much enlarged.

The coroner is chosen for life; but may be removed, either by being made sheriff or chosen verderor, which are offices incompatible with the other; and by the statute 25 Geo. II. c. 29. extortion, neglect, or misbehaviour, are also made causes of removal.

The office and power of a coroner are also, like those of the sheriff, either judicial or ministerial; but principally judicial. This is in a great measure ascertained by statute 4 Edw. I. *De officio coronatoris;* and consists, first, in inquiring, when any person is slain, or dies suddenly, or in prison, concerning the manner of his death. And this must be *super visum corporis;* for if the body is not found, the coroner cannot sit. He must also sit at the very place where the death happened. And his inquiry is made by a jury from four, five, or six, of the neighbouring towns, over whom he is to preside. If any be found guilty by this inquest of murder, he is to commit to prison for farther trial, and is also to inquire concerning their lands, goods, and chattels, which are forfeited thereby; but whether it be murder or not, he must inquire whether any deodand has accrued to the king, or the lord of the franchise, by this death; and must certify the whole of this inquisition to the court of king's bench, or the next assizes. Another branch of his office is to inquire concerning shipwrecks; and certify whether wreck or not, and who is in possession of the goods. Concerning treasure-trove, he is also to inquire concerning the finders, and where it is, and whether any one be suspected of having found and concealed a treasure; "and that may well be perceived (saith the old statute of Edw. I.) where one liveth riotously, haunting taverns, and hath done so of long time;" whereupon he might be attached and held to bail upon this suspicion only.

The ministerial office of the coroner is only as the sheriff's substitute. For when just exception can be taken to the sheriff, for suspicion of partiality (as that he is interested in the suit, or of kindred to either plaintiff or defendant), the process must then be awarded to the coroner, instead of the sheriff, for execution of the king's writs.

CORONET. See CROWN.

CORONET, or *Cornet*, of a horse, the lowest part of the pastern, which runs through the coffin, and is distinguished by the hair joining and covering the upper part of the hoof.

CORONILLA, *Jointed-podded* COLUTEA; a genus of plants belonging to the diadelphia class, and in the natural method ranking under the 32d order, *Papilionaceæ*. See BOTANY *Index*.

CORONOID, and CONDYLOID, processes. See ANATOMY *Index*.

CORPORA CAVERNOSA, in *Anatomy*, two spongious bodies, called also *corpora nervosa* and *corpus spongiosum*. See ANATOMY *Index*.

CORPORA *Pyramidalia*, are two protuberances of the under part of the *cerebellum*, about an inch long; so called from their resemblance to a pyramid. See ANATOMY *Index*.

CORPORA *Striata*. See ANATOMY *Index*.

CORPORAL, an inferior officer under a sergeant, in a company of foot, who has charge over one of the divisions, places and relieves sentinels, and keeps good order in the corps de garde; he also receives the word from the inferior rounds which pass by his corps de garde. This officer carries a fusee, and is commonly an old soldier; there are generally three corporals in each company.

CORPORAL *of a Ship of War*, an officer under the master at arms, employed to teach the officers the exercise of small arms, or of musketry; to attend at the gangway, on entering ports, and observe that no spirituous liquors are brought into the ship, unless by express leave from the officers. He is also to extinguish the fire and candles at eight o'clock in winter, and nine in summer, when the evening gun is fired; and to walk frequently down in the lower decks in his watch, to see that there are no lights but such as are under the charge of proper sentinels.

CORPORAL (*Corporale*), is also an ancient church-term, signifying the sacred linen spread under the chalice in the eucharist and mass, to receive the fragments of the bread, if any chance to fall. Some say it was Pope Eusebius who first enjoined the use of the corporal; others ascribe it to St Sylvester. It was the custom to carry corporals, with some solemnity, to fires, and to heave them against the flames, in order to extinguish them. Philip de Comines says, the pope made Louis XI. a present of the corporale whereon my lord St Peter sung mass.

CORPORATION, a body politic or incorporate, so called, because the persons or members are joined into one body, and are qualified to take, grant, &c.

Of corporations there is a great variety subsisting, for the advancement of religion, of learning, and of commerce; in order to preserve entire and for ever those rights and immunities, which, if they were granted only to those individuals of which the body corporate is composed, would upon their death be utterly lost and extinct. To show the advantages of these incorporations, let us consider the case of a college in either of our universities, founded *ad studendum et orandum*, for the encouragement and support of religion and learning. If this was a mere voluntary assembly, the individuals which compose it might indeed read, pray, study, and perform scholastic exercises together, so long as they could agree to do so; but they could neither frame nor receive any laws or rules of their conduct; none at least which would have any binding force, for want of a coercive power to create a sufficient obligation. Neither could they be capable of retaining any privileges or immunities: for,

for, if such privileges be attacked, which of all this unconnected assembly has the right or ability to defend them? And, when they are dispersed by death or otherwise, how shall they transfer these advantages to another set of students, equally unconnected as themselves? So also, with regard to holding estates or other property, if land be granted for the purposes of religion or learning to 20 individuals not incorporated, there is no legal way of continuing the property to any other persons for the same purposes, but by endless conveyances from one to the other, as often as the hands are changed. But when they are consolidated and united into a corporation, they and their successors are then considered as one person in law: as one person, they have one will, which is collected from the sense of the majority of the individuals: this one will may establish rules and orders for the regulation of the whole, which are a sort of municipal laws of this little republic; or rules and statutes may be prescribed to it at its creation, which are then in the place of natural laws: the privileges and immunities, the estates and possessions, of the corporation, when once vested in them, will be for ever vested, without any new conveyance to new successions; for all the individual members that have existed from the foundation to the present time, or that shall ever hereafter exist, are but one person in law, a person that never dies: in like manner as the river Thames is still the same river, though the parts which compose it are changing every instant.

The original invention of these political constitutions seems entirely to belong to the Romans. They were introduced, as Plutarch says, by Numa; who finding, upon his accession, the city torn to pieces by the two rival factions of Sabines and Romans, thought it a prudent and politic measure to subdivide these two into many smaller ones, by instituting separate societies of every manual trade and profession. They were afterwards much considered by the civil law, in which they were called *universitates*, as forming one whole out of many individuals; or *collegia*, from being gathered together: they were adopted also by the canon law, for the maintenance of ecclesiastical discipline; and from them our spiritual corporations are derived. But our laws have considerably refined and improved upon the invention, according to the usual genius of the English nation, particularly with regard to sole corporations, consisting of one person only, of which the Roman lawyers had no notion; their maxim being that *Tres faciunt collegium;* though they held, that if a corporation, originally consisting of three persons, be reduced to one, *Si universitas ad unum redit;* it may still subsist as a corporation, *Et stet nomen universitatis.*

As to the several sorts of corporations, the first division of them is into *aggregate* and *sole*. Corporations aggregate consist of many persons united together into one society, and are kept up by a perpetual succession of members, so as to continue for ever: of which kind are the mayor and commonalty of a city, the head and fellows of a college, the dean and chapter of a cathedral church. Corporations sole consist of one person only and his successors, in some particular station, who are incorporated by law, in order to give them some legal capacities and advantages, particularly that of perpetuity, which in their natural persons they could not have had. In this sense the king is a sole corporation; so is a bishop; so are some deacons and prebendaries, distinct from their several chapters; and so is every parson and vicar. And the necessity, or at least use, of this institution will be very apparent, if we consider the case of a parson of a church. At the original endowment of parish churches, the freehold of the church, the church-yard, the parsonage-house, the glebe, and the tithes of the parish, were vested in the then parson by the bounty of the donor, as a temporal recompense to him for his spiritual care of the inhabitants, and with intent that the same emoluments should ever afterwards continue as a recompense for the same care. But how was this to be effected? The freehold was vested in the parson; and if we suppose it vested in his natural capacity, on his death it might descend to his heir, and would be liable to his debts and incumbrances: or at best, the heir might be compellable, at some trouble and expence, to convey these rights to the succeeding incumbent. The law therefore has wisely ordained, that the parson, *quatenus* parson, shall never die, any more than the king; by making him and his successors a corporation. By which means all the original rights of the parsonage are preserved entire to the successor; for the present incumbent, and his predecessor who lived seven centuries ago, are in law one and the same person; and what was given to the one was given to the other also.

Another division of corporations, either sole or aggregate, is into *ecclesiastical* and *lay*. Ecclesiastical corporations are, where the members that compose it are entirely spiritual persons, such as bishops, certain deans and prebendaries, all archdeacons, parsons, and vicars, which are sole corporations; deans and chapters at present, and formerly prior and convent, abbot and monks, and the like, bodies aggregate. These are erected for the furtherance of religion, and perpetuating the rights of the church.—Lay corporations are of two sorts, *civil* and *eleemosynary*. The civil are such as are erected for a variety of temporal purposes. The king, for instance, is made a corporation, to prevent in general the possibility of an *interregnum* or vacancy of the throne, and to preserve the possessions of the crown entire; for immediately upon the demise of one king, his successor is in full possession of the regal rights and dignity. Other lay corporations are erected for the good government of a town or particular district, as a mayor and commonalty, bailiff and burgesses, or the like: some for the advancement and regulation of manufactures and commerce; as the trading companies of London and other towns: and some for the better carrying on of divers special purposes; as church wardens, for conservation of the goods of the parish; the college of physicians and company of surgeons in London, for the improvement of the medical science; the royal society for the advancement of natural knowledge; and the society of antiquarians for promoting the study of antiquities. The eleemosynary sort are such as are constituted for the perpetual distribution of the free alms or bounty of the founder of them to such persons as he has directed. Of this kind are all hospitals for the maintenance of the poor, sick, and impotent; and all colleges, both *in* our universities and *out* of them: which colleges are founded for two purposes:

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poses: 1. For the promotion of piety and learning by proper regulations and ordinances. 2. For imparting assistance to the members of those bodies, in order to enable them to prosecute their devotion and studies with greater ease and assiduity. And all these eleemosynary corporations are, strictly speaking, lay, and not ecclesiastical, even though composed of ecclesiastical persons, and although they in some things partake of the nature, privileges, and restrictions of ecclesiastical bodies.

Having thus marshalled the several species of corporations, let us next proceed to consider, 1. How corporations in general may be created. 2. What are their powers, capacities, and incapacities. And, 3. How they may be dissolved.

I. Corporations, by the civil law, seem to have been created by the mere act and voluntary association of their members; provided such convention was not contrary to law, for then it was *illicitum collegium*. It does not appear that the prince's consent was necessary to be actually given to the foundation of them; but merely that the original founders of these voluntary and friendly societies (for they were little more than such) should not establish any meetings in opposition to the laws of the state.

But in England the king's consent is absolutely necessary to the erection of any corporation, either implied or expressly given. The king's implied consent is to be found in corporations which exist by force of the common law, to which our former kings are supposed to have given their concurrence; common law being nothing else but custom, arising from the universal agreement of the whole community. Of this sort are the king himself, all bishops, parsons, vicars, church-wardens, and some others; who by common law have ever been held (as far as our books can show us) to have been corporations, *virtute officii;* and this incorporation is so inseparably annexed to their offices, that we cannot frame a complete legal idea of any of those persons, but we must also have an idea of a corporation, capable to transmit his rights to his successors, at the same time. Another method of implication, whereby the king's consent is presumed, is as to all corporations by prescription, such as the city of London, and many others, which have existed as corporations, time whereof the memory of man runneth out to the contrary; and therefore are looked upon in law to be well created. For though the members thereof can show no legal charter of incorporation, yet in cases of such high antiquity the law presumes there once was one; and that by the variety of accidents, which a length of time may produce, the charter is lost or destroyed. The methods by which the king's consent is expressly given, are either by act of parliament or charter. By act of parliament, of which the royal assent is a necessary ingredient, corporations may undoubtedly be created: but it is observable, that most of those statutes which are usually cited as having created incorporations, do either confirm such as have been before created by the king; as in the case of the college of physicians, erected by charter 10 Hen. VIII. which charter was afterwards confirmed in parliament: or, they permit the king to erect a corporation *in futuro* with such and such powers; as is the case of the bank of England, and the society of the British fishery. So that the immediate creative act is usually performed by the king alone, in virtue of his royal prerogative.

All the other methods therefore whereby corporations exist, by common law, by prescription, and by act of parliament, are for the most part reducible to this of the king's letters patent, or charter of incorporation. The king's creation may be performed by the words *creamus*, *erigimus*, *fundamus*, *incorporamus*, or the like. Nay it is held, that if the king grants to a set of men to have *gildam mercatorium*, "a mercantile meeting or assembly," this is alone sufficient to incorporate and establish them for ever.

The king (it is said) may grant to a subject the power of erecting corporations, though the contrary was formerly held; that is, he may permit the subject to name the persons and powers of the corporation at his pleasure; but it is really the king that erects, and the subject is but the instrument; for though none but the king can make a corporation, yet *qui facit per alium, facit per se*. In this manner the chancellor to the university of Oxford has power by charter to erect corporations; and has actually often exerted it in the erection of several matriculated companies, now subsisting, of tradesmen subservient to the students.

When a corporation is erected, a name must be given to it; and by that name alone it must sue and be sued, and do all legal acts.

II. After a corporation is so formed and named, it acquires may powers and rights, which we are next to consider. Some of these are necessarily and inseparably incident to every corporation; which incidents as soon as a corporation is duly erected, are tacitly annexed of course. As, 1. To have perpetual succession. This is the very end of its incorporation; for there cannot be a succession for ever without an incorporation; and therefore all aggregate corporations have a power necessarily implied of electing members in the room of such as go off. 2. To sue or be sued, implead or be impleaded, grant or receive, by its corporate name, and do all other acts as natural persons may. 3. To purchase lands and hold them, for the benefit of themselves and their successors: which two are consequential to the former. 4. To have a common seal. For a corporation being an invisible body, cannot manifest its intention by any personal act or oral discourse: it otherwise acts and speaks only by its common seal. For though the particular members may express their private consents to any act by words or signing their names, yet this does not bind the corporation; it is the fixing of the seal, and that only, which unites the several assents of the individuals who compose the community, and makes one joint assent of the whole. 5. To make bye-laws or private statutes for the better government of the corporation; which are binding upon themselves, unless contrary to the laws of the land, and then they are void. But no trading company is with us allowed to make bye-laws which may affect the king's prerogative or the common profit of the people, under penalty of 40l. unless they be approved by the chancellor, treasurer, and chief justices, or the judges of assize in their circuits; and even though they be so approved, still, if contrary to law, they are void. These five powers are inseparably incident to every corporation, at least to every corporation

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ration aggregate: for two of them, though they may be practised, yet are very unnecessary to a corporation sole; viz. to have a corporate seal to testify his sole assent, and to make statutes for the regulation of his own conduct.

Corporations have a capacity to purchase lands for themselves and successors; but they are excepted out of the statute of wills; so that no devise of lands to a corporation by will is good; except for charitable uses, by stat. 43 Eliz. c. 4. which exception is again greatly narrowed by the stat. 9 Geo. II. c. 36. And also, by a great variety of statutes, their privilege even of purchasing from any living granter is much abridged; so that now a corporation, either ecclesiastical or lay, must have a license from the king to purchase, before they can exert that capacity which is vested in them by the common law: nor is even this in all cases sufficient. These statutes are generally called the statutes of *mortmain*. See MORTMAIN.

Blackst. Comment.

The general duties of all bodies politic, considered in their corporate capacity, may, like those of natural persons, be reduced to this single one; that of acting up to the end or design, whatever it be, for which they were created by their founder.

III. How corporations may be dissolved. Any particular member may be disfranchised, or lose his place in the corporation, by acting contrary to the laws of the society, or the laws of the land: or he may resign it by its own voluntary act. But the body politic may also itself be dissolved in several ways; which dissolution is the civil death of the corporation; and in this case their lands and tenements shall revert to the person, or his heirs, who granted them to the corporation; for the law doth annex a condition to every such grant, that if the corporation be dissolved, the granter shall have the lands again, because the cause of the grant faileth. The grant is indeed only during the life of the corporation; which may endure for ever: but when that life is determined to be the dissolution of the body politic, the granter takes it back by reversion, as in the case of every other grant for life. The debts of a corporation, either to or from it, are totally extinguished by its dissolution; so that the members thereof cannot recover, or be charged with them, in their natural capacities: agreeable to that maxim of the civil law, *Si quid universitati debetur, singulis non debetur; nec, quod debet universitas, singuli debent.*

A corporation may be dissolved, 1. By act of parliament, which is boundless in its operations. 2. By the natural death of all its members, in cases of an aggregate corporation. 3. By surrender of its franchises into the hands of the king, which is a kind of suicide. 4. By forfeiture of its charter through negligence or abuse of its franchises, in which case the law judges that the body politic has broken the conditions upon which it was incorporated, and therefore the incorporation is void. And the regular course is to bring an information in nature of a writ of *quo warranto*, to inquire by what warrant the members now exercise their corporate power, having forfeited it by such and such proceedings. The exertion of this act of law, for the purposes of the state, in the reigns of King Charles and King James II. particularly by seizing the charter of the city of London, gave great and just offence; though perhaps, in strictness of law, the proceedings in most of them were sufficiently regular; but the judgment against that of London was reversed by act of parliament after the Revolution; and by the same statute it is enacted, that the franchises of the city of London shall never more be forfeited for any cause whatsoever. And because by the common law corporations were dissolved, in case the mayor or head officer was not duly elected on the day appointed in the charter or established by prescription, it is now provided, that for the future no corporation shall be dissolved upon that account, and ample directions are given for appointing a new officer, in case there be no election, or a void one, made upon the charter or prescriptive day.

Corporation || Corpulency.

CORPORATION Act, is that which prevents any person from being legally elected into any office relating to the government of any city or corporation, unless within a twelvemonth before he has received the sacrament of the Lord's Supper according to the rites of the church of England; and which enjoins him to take the oaths of allegiance and supremacy when he takes the oath of office; otherwise his election is void.

CORPOREAL, those qualities which denominate a body. See INCORPOREAL.

CORPOREITY, the quality of that which is corporeal, or has body; or that which constitutes or denominates it such. The corporeity of God was the capital error of the Anthropomorphites. Some authors reproach Tertullian with admitting a corporeity in the Deity; but it is manifest, by *body* he means no more than *substance*. The Mahometans reproach the Samaritans at this day, with a belief of the corporeity of God. Many of the ancients believed the corporeity of angels.

CORPSE, a dead body.

If any one, in taking up a dead body, steals the shroud, or other apparel, it will be felony. Stealing only the corpse itself is not felony; but it is punishable as a misdemeanor by indictment at common law.

CORPS, in *Architecture*, is a term borrowed from the French, signifying any part that projects or advances beyond the naked of a wall; and which serves as a ground for some decoration or the like.

CORPS de Battaille, is the main body of an army drawn up for battle.

CORPS de Garde, a post in an army, sometimes under covert, sometimes in the open air, to receive a body of soldiers, who are relieved from time to time, and are to watch in their turns, for the security of a quarter, a camp, station, &c. The word is also used for the men who watch therein. It is usual to have, beside the great, a little corps de garde, at a good distance before the lines; to be the more readily advertised of the approach of the enemy.

CORPULENCY, the state of a person too much loaded with flesh or fat.

Corpulency is the occasion of various diseases, and particularly the apoplexy. It was held infamous among the ancient Lacedæmonians.

Sennertus mentions a man that weighed 600 pounds, and a maid 36 years of age who weighed 450. Bright of Malden, who died at the age of 29 years in 1750, weighed 616 pounds. Chiapin Vitelli, marquis of Cerona, a noted Spanish general in his time, from an excessive corpulency, is said to have reduced himself by drinking of vinegar, to such a degree of leanness, that he could fold his skin several times round him.

Castile soap, in the form of a bolus, an electuary, pills, or dissolved in a gill or more of soft water, from one to four drachms taken at bed-time, is strongly recommended with a view of reducing corpulency, in a discourse on its nature, causes, and cure, by Malcolm Flemyng, M. D. Lond. 1760. See MEDICINE *Index*.

CORPUS, in *Anatomy*, is applied to several parts of the animal structure; as *corpus callosum*, *corpus cavernosum*, &c. See ANATOMY *Index*.

CORPUS is also used in matters of learning, for several works of the same nature collected and bound together.

Gratian made a collection of the canons of the church, called *corpus canonum*. The *corpus* of the civil law is composed of the digest, code, and institutes. We have also a *corpus* of the Greek poets; and another of the Latin poets.

Corpus Christi, a festival of the church of England, kept on the next Thursday after Trinity Sunday, instituted in honour of the eucharist; to which also one of the colleges of Oxford is dedicated.

CORPUSCLE, in *Physics*, a minute particle, or physical atom, being such as a natural body is made up of. By this word is not meant the elementary particles, nor hypostatical principles of chemists; but such particles, whether of a simple or compound nature, whose parts will not be dissolved nor dissipated by ordinary degrees of heat.

CORPUSCULAR PHILOSOPHY, is that way of philosophising which endeavours to explain things, and to account for the phenomena of nature, by the motion, figure, rest, position, &c. of the corpuscles, or the minute particles of matter.

Mr Boyle sums up the chief principles of the corpuscular hypothesis, which now flourishes under the mechanical philosophy, in these particulars:

1. They suppose that there is but one catholic or universal matter, which is an extended, impenetrable, and divisible substance, common to all bodies, and capable of all forms. 2. That this matter, in order to form the vast variety of natural bodies, must have motion in some or all its assignable parts; and that this motion was given to matter by God the Creator of all things, and has all manner of directions and tendencies. 3. Matter must also be actually divided into parts, and each of these primitive particles, fragments, or atoms of matter must have its proper magnitude or size, as also its peculiar figure or shape. 4. They suppose also, that these differently sized and shaded particles may have as different orders and positions, whereof great variety may arise in the composition of bodies.

CORRADINI DE SEZZA, *Peter Marcellinus*, a learned civilian and cardinal, born at Sezza, in 1658, acquired the esteem and confidence of Clement XI. and died at Rome in 1743. He was the author of a learned and curious work, entitled, "Verus Latium profanum et sacrum," 2 vols folio; and a history of Sezza, in 4to.

CORRADO, SEBASTIAN, an Italian grammarian of the 16th century, taught the Greek and Latin tongues at Reggio, where he formed an academy of polite literature; and at length removed to Bologna, in order to be professor of those languages. He wrote several works, the most esteemed of which are, "*Questura in qua Ciceronis vita refertur*," an excellent performance; and, "*de Lingua Latina*." He died at 1556.

CORRECTION, in *Printing*, the act of retrenching the faults in a work; or the reading which the corrector gives the first proofs, to point out and amend the faults to be rectified by the compositor.

The corrections are placed on the margin of each page, right against the line where the faults are found. There are different characters used to express different corrections, as D or ∂, *dele*, for any thing to be effaced or left out. When any thing is to be inserted, the place is marked in the line with a caret ∧, and the insertion added in the margin. When a word, syllable, &c. is to be altered, it is erased out of the proof, and that to be put in its room written in the margin; always observing, if there be several mistakes in the same line, that the corrections in the margin be separated by little bars or strokes, |. If a space be omitted, its place is marked with a caret, and the margin with ✱. If a space be wrong placed, as in the middle of a word, the two parts are connected with a cu rve, and the same character put in the margin. If a letter be inverted, it is expressed on the margin with 9. If any thing be transposed, it is marked thus: *The shortest* |*are the*| *follies* |*best;* for *the shortest follies are the best;* and the margin is added *tr.* in a circle. If Roman characters are to be changed for Italic, or *vice versa*, a line is drawn under them thus, and *Roman* or *Italic* added to the margin: if to capitals, a double line. If a word or sentence is entirely omitted, the place is marked with a caret, and in the margin is inserted the word *out*. If the letters of a word stand too far asunder, a line is drawn under them, and in the margin is put a crooked line or hook, thus

CORRECTION House, a place of confinement, where vagrants and persons guilty of crimes of an inferior degree, suffer punishment by being obliged to labour for a certain period of time, as for months or years, according to the nature of the crime. The benefits arising to society, and the reformation of offenders, from this mode of punishment, have been variously estimated by different writers, according to the views which they have taken of the effects and consequences which are supposed to follow the confinement and restraint to which the criminal is subjected. It has been regarded as one of the greatest defects of the laws of this country, that, excepting the punishment of death, there is no other which is accompanied with that degree of severity and terror to awe or restrain offenders from the commission of crimes. To this purpose are the following observations of Dr Paley. The laws of England, he says, "are not provided with any other punishment than that of death, sufficiently terrible to keep offenders in awe. Transportation, which is the punishment second in the order of severity, answers the purpose of example very imperfectly; not only because exile is in reality a slight punishment to those who have neither property, nor friends, nor regular means of binations, and a change of their form, without converting them to fluidity.

CORROSIVE SUBLIMATE MERCURY. See CHEMISTRY *Index*.

CORRUGATOR MUSCLE. See ANATOMY, *Table of the Muscles*.

CORROSIVES, in *Surgery*, are medicines which corrode whatever part of the body they are applied to. Such are burnt alum, white precipitate of mercury, white vitriol, red precipitate of mercury, butter of antimony, lapis infernalis, &c.

CORRUPTICOLÆ, a sect who rose out of the Monophysites in Egypt about the year 519, under their chief Severus, the pretended patriarch of Alexandria.

Their distinguishing doctrine, whence they derived their name, was, that the body of Jesus Christ was *corruptible;* that the fathers had owned it; and that to deny it was to deny the truth of our Saviour's passion.

On the other hand, Julian of Halicarnassus, another Eutychian, a refugee, as well as Severus, in Alexandria, maintained that the body of Jesus Christ had been always incorruptible; that to say it was corruptible, was to make a distinction between Jesus Christ and the Word, and by consequence to make two natures in Jesus Christ.

The people of Alexandria were divided between the two opinions; and the partisans of Severus were called *corrupticolæ*, q. d. worshippers of something *corruptible:* sometimes they were denominated *corruptibiles;* and the adherents of Julian *incorruptibiles* or *phantasiastæ*. The clergy and secular powers favoured the first; the monks and the people the latter.

CORRUPTION, the destruction, extinction, or at least cessation for a time, of the proper mode of existence of any natural body. See PUTREFACTION.

CORRUPTION of Blood, in *Law*, one of the consequences of an attainder; and is both upwards and downwards: so that an attainted person can neither inherit lands or other hereditaments from his ancestors, nor retain those he is already in possession of, nor transmit them by descent to any heir; but the same shall escheat to the lord of the fee, subject to the king's superior right of forfeiture; and the person attainted shall also obstruct all descents to his posterity, wherever they are obliged to derive a title through him to a remoter ancestor. See ATTAINDER.

Blackst. Comment. This is one of those notions which our laws have adopted from the feudal constitutions, at the time of the Norman conquest; as appears from its being unknown in those tenures which are indisputably Saxon, or gavel kind: wherein though by treason, according to the ancient Saxon laws, the land is forfeited to the king, yet no corruption of blood, no impediment of descents, ensues; and on judgment of mere felony, no escheat accrues to the lord. But by the law of England, derived as above, a man's blood is so universally corrupted by attainder, that his sons can neither inherit to him nor to any other ancestor, at least on the part of their attainted father.

This corruption of blood cannot be absolutely removed but by authority of parliament. The king may excuse the public punishment of an offender; but cannot abolish the private right which has accrued, or may accrue, to individuals as a consequence of the criminal's attainder. He may remit a forfeiture in which the interest of the crown is alone concerned; but he cannot wipe away the corruption of blood; for therein a third person hath an interest, the lord who claims by escheat. If therefore a man hath a son, and is attainted, and afterwards pardoned by the king: this son can never inherit to his father, or father's ancestors; because his paternal blood, being once thoroughly corrupted by his father's attainder, must continue so: but if the son had been born after the pardon, he might inherit; because, by the pardon, the father is made a new man, and may convey new inheritable blood to his after-born children.

This corruption of blood, thus arising from feudal principles, but perhaps extended farther than even these principles will warrant, has been long looked upon as a peculiar hardship: because the oppressive parts of the feudal tenures being now in general abolished, it seems unreasonable to reserve one of their most inequitable consequences; namely, that the children should not only be reduced to present poverty (which, however severe, is sufficiently justified upon reasons of public policy), but also be laid under future difficulties of inheritance, on account of the guilt of their ancestors. And therefore in most (if not all) of the new felonies treated by parliament since the reign of Henry VIII. it is declared that they shall not extend to any corruption of blood: and by the statute 7 Anne, c. 21. (the operation of which is postponed by the statute 17 Geo. II. c. 39.) it is enacted, that after the death of the late pretender and his sons, no attainder for treason shall extend to the disinheriting any heir, nor the prejudice of any person, other than the offender himself; which provisions have indeed carried the remedy farther than was required by the hardship above complained of; which is only the future obstruction of descents, where the pedigree happens to be deduced through the blood of an attainted ancestor.

CORSAIR, a pirate or person who scours the seas, especially the Mediterranean, with a vessel armed for war, without commission from any prince or power, to plunder merchant vessels. The word comes from the Italian *corsare*, of *corso*, or *à cursibus*, by reason of their courses or excursions.—The name is commonly given to the piratical cruisers of Barbary, who had their rise about the beginning of the 16th century.

A *corsair* is distinguished from a *privateer* in this, that the latter does it under a commission, and only attacks the vessels of those at war with the state whence his commission is derived. The punishment of a corsair is to be hanged, without remission; whereas privateers are to be treated as prisoners of war. All corsair vessels are good prizes.

CORSELET, a little cuirass: or, according to others, an armour or coat made to cover the whole body, anciently worn by the pikemen, usually placed in the front and flanks of the battle, for the better resisting the enemy's assaults, and guarding the soldiers placed behind them.

CORSICA, an island in the Mediterranean, between 8° and 10° E. Long. and 41° and 43° N. Lat. On the south it is separated from Sardinia, by the strait of Bonifacio; to the east it has the Tuscan sea; to the north the gulf of Genoa; and to the west it is opposite the coasts of France and Spain. It is 150 miles ving a part of the bark on, and others deeper, to the wood itself; these pieces being again put into their places, and bound on with pack-thread, will not indeed unite, but a fresh bark will grow in their places, and thrust them away; but if they be first carefully laid on in the exact direction in which they originally grew, and then the whole part beyond the wound on every side covered with a large plaster of diachylon, or the like, and this bound over with pack-thread to keep all firmly in their places, the pieces of bark, whether cut off shallow or deep down to the very wood of the tree, will firmly unite themselves to the places where they originally grew. This cure will be performed in about three weeks; but the outer rind of the separated pieces will not be plump, but somewhat shrivelled; the edges will also recede somewhat from their original place; so that there remains a sort of scar all round. These experiments are best made in the spring season; for in the autumn and winter, the sap arising but weakly, the parts that should unite wither before that is brought about. The success of these experiments has made some think that the whole branch of a tree separated and bound on again might unite with the rest. But the experiments that have been made in the most favourable manner for such a trial have all proved vain, the branch cut off withering always in a few days, however well united and carefully kept on.

CORTEX *Peruvianus*. See CINCHONA, BOTANY and MATERIA MEDICA *Index*.

CORTEX *Winteranus*. See WINTERA, BOTANY and MATERIA MEDICA *Index*.

CORTONA, PIETRO DA. See BERRETINI.

CORTONA, a very ancient town of Italy, mentioned by many of the Roman historians. It was originally called *Corton*, and lay to the northward of the lake Thrasymenus. It still retains the name of Cortona. E. Long. 13. 0. N. Lat. 43. 15.

CORTONESE, PIETRO PALO. See GOBBO.

CORTUSA, BEARS-EAR SANICLE; a genus of plants belonging to the pentandria class; and in the natural method ranking under the 21st order, *Preciæ*. See BOTANY *Index*.

CORUNNA, or GROYNE, a port-town of Gallicia in Spain, situated on a fine bay of the Atlantic ocean, about 32 miles north of Compostella, and 20 south-west of Ferrol. W. Long. 9. 0. N. Lat. 43. 0.

CORUS, OMER, HOMER, or CHOMER, in the Jewish antiquities, a measure containing 10 baths or 75 gallons and five pints, as a measure of things liquid, and 32 pecks and 1 pint as a measure for things dry. The *corus* or *omer* was most commonly a measure for things dry; and the greatest that was used among the Jews. It contained, according to the rabbins, 10 ephahs or 30 sata or seahs. *Corus* is the most usual term in the historical writers, and *omer* or *chomer* among the prophets.

CORUS is also used in some of our old writers for eight bushels or a quarter; *decem* coros *tritici*, *sive decem quarteria*.

CORUSCATION, a glittering or gleam of light issuing from any thing. It is chiefly used for a flash of lightning darting from the clouds in time of thunder.

There is a method of producing artificial coruscations, or sparkling fiery meteors, which will be visible not only in the dark but at noon-day, and that from two liquors actually cold. The method is this. Fifteen grains of solid phosphorus are to be melted in about a drachm of water; when this is cold, pour upon it about two ounces of oil of vitriol; let these be shaken together, and they will at first heat, and afterwards they will throw up fiery balls in great number, which will adhere like so many stars to the sides of the glass, and continue burning a considerable time; after this, if a small quantity of oil of turpentine is poured in, without shaking the phial, the mixture will of itself take fire, and burn very furiously. The vessel should be large, and open at the top.

Artificial coruscations may also be produced by means of oil of vitriol and iron, in the following manner: Take a glass body capable of holding three quarts; put into this three ounces of the oil of vitriol and twelve ounces of water; then warming the mixture a little, throw in, at several times, two ounces or more of clean iron filings; upon this an ebullition and white vapours will arise: then present a lighted candle to the mouth of the vessel, and the vapour will take fire, and afford a bright fulmination or flash like lightning. Applying the candle in this manner several times, the effect will always be the same; and sometimes the fire will fill the whole body of the glass, and even circulate to the bottom of the liquor; at others, it will only reach a little way down its neck. The great caution to be used in making this experiment is the making the vapour of a proper heat: for, if too cold, few vapours will arise; and, if made too hot, they will arise too fast, and will only take fire in the neck of the glass, without any remarkable coruscation.

CORVORANT, formerly written CORMORANT. See PELICANUS, ORNITHOLOGY *Index*.

CORVUS, the RAVEN or CROW kind, a genus of birds of the order of picæ. See ORNITHOLOGY *Index*.

CORVUS (*Raven*,) in *Astronomy*, a constellation of the southern hemisphere; whose stars in Ptolemy's catalogue are 7; in Tycho's as many; in the Britannic catalogue 9.

CORVUS, in Roman antiquity, a military engine, or rather gallery, moveable at pleasure by means of pulleys; chiefly used in boarding the enemy's ships to cover the men. The construction of the corvus was as follows: They erected on the prow of their vessels a round piece of timber, of about a foot and a half diameter, and about 12 feet long; on the top of which they had a block or pulley. Round this piece of timber they laid a stage or platform of boards, four feet broad, and about 18 feet long, which was well framed and fastened with iron. The entrance was long-ways, and it moved about on the above-mentioned upright piece of timber as on a spindle, and could be hoisted up within six feet of the top: about this was a sort of parapet knee-high, which was defended with upright bars of iron sharpened at the end, and towards the top there was a ring, by the help of which and a pulley or tackle, they raised or lowered the engine at pleasure. With this moveable gallery they boarded the enemy's vessels (when they did not oppose side to side),

side), sometimes on their bow and sometimes on their stern, as occasion best served. When they had grappled the enemy with these iron spikes, if they happened to swing broadside to broadside, then they entered from all parts; but in case they attacked them on the bow, they entered two and two by the help of this machine, the foremost defending the foreparts, and those that followed the flanks, keeping the boss of their bucklers level with the top of the parapet.

CORYATE, THOMAS, a very extraordinary personage, who seems to have made himself famous by his whimsical extravagancies, was the son of a clergyman, and born at Oldcombe in Somersetshire in 1577. He acquired Greek and Latin at Oxford; and coming to London, was received into the household of Henry prince of Wales. If Coryate was not over witty himself, he got acquainted with the wits of that time, and served to exercise their abilities, having more learning than judgment. He was a great peripatetic; for, in 1608, he took a long journey on foot; and after he returned, published his travels under the following strange title: *Crudities hastily gobbled up in five months Travels in France, Savoy, Italy, Rhetia, Helvetia, some parts of High Germany, and the Netherlands*, Lond. 1611, 4to. In 1612 he set out again with a resolution to spend ten years in travelling; he went first to Constantinople; and after travelling over a great part of the East, died of a flux at Surat in the East Indies. Some of the accounts of his peregrinations are to be found in Purchas's Pilgrimages.

CORYBANTES, in antiquity, priests of Cybele, who danced and capered to the sound of flutes and drums. See CROTALUM.

Catullus, in his poem called *Atys*, gives a beautiful description of them, representing them as madmen. Accordingly Maximus Tyrius says, that those possessed with the spirit of Corybantes, as soon as they heard the sound of a flute, were seized with an enthusiasm, and lost the use of their reason. And hence the Greeks use the word κορυβαντιᾶν, *to corybantize*, to signify a person's being transported or possessed with a devil. See ENTHUSIASM.

Some say that the Corybantes were all eunuchs; and that it is on this account Catullus, in his Atys, always uses feminine epithets and relatives in speaking of them.

Diodorus Siculus remarks, that Corybas, son of Jason and Cybele, passing in Phrygia with his uncle Dardanus, there instituted the worship of the mother of the gods, and gave his own name to the priests. Strabo relates it as the opinion of some, that the Corybantes were children of Jupiter and Calliope, and the same with the *Cabiri*. Others say the word had its origin from this, that the Corybantes always walked dancing (if the expression may be allowed) or tossing the head, κορυπτοντες βαινειν.

CORYBANTICA, a festival held in Crete, in memory of the Corybantes, who educated Jupiter when he was concealed in that island from his father Saturn, who would have devoured him.

CORYCEUM, in antiquity, that part of the gymnasium where people undressed. It was otherwise called *apodyterion*.

CORYCOMACHIA, among the ancients, was a sort of exercise in which they pushed forwards a ball, suspended from the ceiling, and at its return either caught it with their hands, or suffered it to meet their body. Oribasius informs us it was recommended for extenuating too gross bodies.

CORYDALES, in *Botany*, an order of plants in the *Fragmenta Methodi Naturalis* of Linnæus, containing the following genera, viz. epimedium, hypecoum, leontice, melianthus, pinguicula, and utricularia.

CORYDALIS, in *Botany*. See FUMARIA, BOTANY *Index*.

CORYLUS, the HAZEL; a genus of plants belonging to the monœcia class; and in the natural method ranking under the 50th order, *Amentaceæ*. See BOTANY *Index*.

CORYMBIFERÆ, in *Botany*, the name of an order or division of the compound flowers adopted by Linnæus after Ray and Vaillant, in the former editions of his Fragments of a Natural Method. This title in the later editions is changed for *Discoideæ*, another name borrowed from Ray's Method, but used in a somewhat different sense.

CORYMBIUM, in antiquity, an ornament of hair worn by the women. Its form was that of a corymbus.

CORYMBIUM; a genus of plants belonging to the syngenesia class; and in the natural method ranking under the 49th order, *Compositæ*. See BOTANY *Index*. —The calyx is diphyllous, uniflorous, and prismatical; the corolla monopetalous and regular; there is one woolly seed below each floret.

CORYMBUS, properly signifies a cluster of ivy berries. Among botanists it is a mode of flowering, in which the lesser or partial flowerstalks are produced along the common stalk on both sides; and though of unequal lengths, rise to the same height, so as to form a flat and even surface at the top. See BOTANY *Index*.

CORYNOCARPUS, in *Botany*, a genus of plants belonging to the pentandria class. See BOTANY *Index*.

CORYPHA, MOUNTAIN PALM, or *Umbrella Tree*; a genus of plants of the order of *Palmæ*, belonging to the monœcia class. See BOTANY *Index*.

CORYPHÆNA, a genus of fishes belonging to the order of thoracici. See ICHTHYOLOGY *Index*.

CORYPHÆUS, in the ancient tragedy, was the chief or leader of the company that composed the chorus: (See CHORUS).—The word is formed from the Greek κορυφη, "tip of the head." The coryphæus spoke for all the rest, whenever the chorus took part in the action, in quality of a person of the drama, during the course of the acts. Hence coryphæus had passed into a general name for the chief or principal of any company, corporation, sect, opinion, &c. Thus Eustatius of Antioch is called the *coryphæus* of the council of Nice; and Cicero calls Zeno the *coryphæus* of the Stoics.

CORYVREKAN, a dangerous whirlpool on the west coast of Scotland, between the isle of Scarba and the north point of Jura. It is so named from a young Danish prince, who perished in this place. Its dreadful vortex extends above a mile in circuit. Many smaller whirlpools and rapid currents are found in this neighbourhood; dangerous to those who are strangers to the coast.

CORYZA, in *Medicine*, a catarrh of the nose. See MEDICINE *Index*.

CORZOLA, or CURSCOLA, an island in the gulf of Venice, divided from Ragusa in Dalmatia by a narrow strait. E. Long. 18. 0. N. Lat. 42. 35.

COS, or Coos, in *Ancient Geography*, a noble island on the coast of Caria, in the Hither Asia, 15 miles to the west of Halicarnassus, 100 in compass, called *Meropis;* and hence Thucydides joins both names together, *Cos Meropis;* it had a cognominal town *Cos*, but originally called *Astypalæa*, mentioned by Homer; with a port locked or walled round. (Scylax, Mela). The island was fruitful, and yielded a generous wine, (Strabo). It boasted of Hippocrates and Apelles; each at the head of his several profession. It was the country of Philetas, an excellent elegiac poet, who flourished in the time of Philip and Alexander: the preceptor of Ptolemy Philadelphus: so thin and light that he was obliged to wear lead to prevent the being blown away by a puff of wind (Ælian, Athenæus); much commended by Propertius. The *vestes Coæ*, made of silk, were famous for their fineness and colour, (Horace, Propertius, Tibullus). In the suburbs of Cos stood the temple of Æsculapius, a noble structure, and extremely rich.

Cos, the *Whetstone*, in *Natural History*, a genus of vitrescent stones, consisting of fragments of an indeterminate figure, sub-opaque, and granulated.

Of this genus there are several species, some consisting of rougher, and others of smoother, or even of altogether impalpable particles; and used not only for whetstones, but also for mill-stones, and other the like purposes.

COS TURCICA, *Turkey-stone*, a species of stones which is arranged in the siliceous class. It is of a dull white, and often of an unequal colour; some parts appearing more compact than others. Its specific gravity is 2.598: it strikes fire with steel, and effervesces with acids. Mr Kirwan found that 100 parts of it contain 25 of carbonate of lime, and no iron. Cronstedt is of opinion that there are probably two sorts of stones known by this name, as that described by Wallerius neither gives fire with steel nor effervesces with acids. It is used as a whetstone; and those of the finest grains are the best hones for the most delicate cutting tools, and even for razors, lancets, &c.

COSCINOMANCY, the art of divination by means of a sieve. The word comes from κοσκινον, *cribrum*, "a sieve," and μαντεια, *divination*. The sieve being suspended, after rehearsing a formula of words, it is taken between two fingers only; and the names of the parties suspected repeated: he at whose name the sieve turns, trembles, or shakes, is reputed guilty of the evil in question.

This must be a very ancient practice: Theocritus, in his third Idyllion, mentions a woman very skilful in it. It was sometimes also practised by suspending the sieve by a thread, or fixing it to the points of a pair of sheers, giving it room to turn, and naming, as before, the parties suspected; in which last manner *coscinomancy* is still practised in some parts of England. It appears from Theocritus, that it was not only used to find out persons unknown, but also to discover the secrets of those that were known.

CO-SECANT, in *Geometry*, the secant of an arch which is the complement of another to 90°. See GEOMETRY.

COSENAGE, in *Law*, a writ that lies where the tresail, that is, the tritavus, the father of the besail, or great grandfather, being seized in fee at his death of certain lands or tenements, dies; a stranger enters, and abates; then shall his heir have this writ of cosenage; the form of which see in Fitz. Nat. Br. fol. 221.

COSENING, in *Law*, an offence whereby any thing is done deceitfully, in or out of contracts, which cannot be fitly termed by any especial name. In the civil law it is called *stellionatus*. See STELLIONATE.

COSENZA, the capital of the Hither Calabria, in the kingdom of Naples. E. Long. 16. 35. N. Lat. 39. 15. It is an archbishop's see.

COSHERING, in the feudal customs, a kind of right of the lords to lie and feast themselves and their followers at their tenants houses. The word *coshering* may perhaps be derived from the old English word *coshe*, a cot or cottage.

CO-SINE, in *Trigonometry*, the sine of an arch which is the complement of another to 90°. See GEOMETRY.

COSMETIC, in *Physic*, any medicine or preparation which renders the skin soft and white, or helps to beautify and improve the complexion; as lip salves, cold creams, ceruse, &c.

COSMICAL, a term in *Astronomy*, expressing one of the poetical risings of a star: thus a star is said to rise cosmically when it rises with the sun, or with that point of the ecliptic in which the sun is at that time; and the cosmical setting is when a star sets in the west at the same time that the sun rises in the east.

COSMOGONY, in *Physics*, signifies the science of the formation of the universe. It is formed of κοσμος, *the world*, and γινομαι, *I am born*.

In our conjectures about the formation of the world there are two principles which we ought never to lose sight of: 1. That of *creation;* for certainly matter could not give itself existence, it must have received it. 2. That of a *Supreme Intelligence* directing this creation, and the arrangement of the parts of matter, in consequence of which this world was formed. See CREATION and GEOLOGY.

COSMOGRAPHY, the description of the world; or the art which teaches the construction, figure, disposition, and relation of all the parts of the world, with the manner of representing them on a plane. The word comes from κοσμος, *world*, and γραφω, *I describe*.

Cosmography consists chiefly of two parts: *Astronomy*, which shows the structure of the heavens, and the disposition of the stars; and *Geography*, which shows those of the earth.

COSMOLABE (from κοσμος, *world*, and λαμβανω, *I take*), an ancient mathematical instrument, serving to measure distances both in the heavens and on earth. The *Cosmolabe* is in a great measure the same with the astrolabe. It is also called *pantacosm*, or the *universal instrument*, by L. Morgard, in a treatise written expressly upon it, printed in 1612.

COSMOLOGY (from κοσμος, *world*, and λογος, *discourse*), the science of the world in general. This Wolfius calls *general*, or *transcendental cosmology*, and has honey and wax, as to supply a great part of the Russian empire with those commodities. Its pastures are exceeding rich, and its cattle very large; but the inhabitants are greatly plagued by locusts, which infest this fine country. The houses in the Ukraine are, like those of the Russians, mostly built with timber.

The Cossacks are tall and well made, generally hawknosed, and of a good mien. They are hardy, vigorous, brave, and extremely jealous of what is most valuable in life, their liberty; fickle and wavering, but sociable, cheerful, and sprightly. They are a very powerful people, and their forces consist wholly of cavalry.—Their dialect is a compound of the Polish and Russian languages; but the latter is the most predominant. They were formerly Pagans or Mahometans; but upon their entering into the Polish service, they were baptized Christians of the Romish communion; and now that they belong to Russia, they profess themselves members of the Greek church.

Each of their towns, with the district belonging to it, is governed by an officer called *ottomann* or *attamann*.

The Don Cossacks, so called from their residence upon the bank of the river Don, greatly resemble those already described. In the year 1559, when the Czar Iwan Basilowitz was emperor of Russia, they voluntarily put themselves under his protection, and are at this time on a pretty equal footing with the other Russian subjects. They have several towns and villages upon the banks of the Don; but are prevented from extending themselves farther up the country, by the scarcity of fresh water and wood in many places. Their chief support is grazing and agriculture, and occasionally robbing and plundering, for which they want neither capacity nor inclination. Every town is governed by a magistrate called *tamann;* and the tamanns, with their towns, are under the jurisdiction of two ottomanns, who reside at Tsherkasky. The troops of these Cossacks likewise consist entirely of cavalry. In this country all the towns and villages are fortified, and encompassed with pallisades, to defend them against the incursions of the Calmucks and Cuban Tartars, with whom they are continually at war. The Cossacks, in general, are of great service to garrison towns by way of defence, or to pursue an enemy; but are not so good at regular attacks.

The Sietsh Cossacks, who are also called *Haidamacks*, have their particular hettman. They inhabit the Russian, Polish, and Turkish dominions, along the banks of the Dnieper.

The Yaik Cossacks dwell on the south side of the river Yaik; and upon the success of the Russian arms in the kingdom of Astracan, voluntarily submitted to them. In stature they greatly resemble the other Cossacks; though by their boorish manner of living, and intermarriages with the Tartars they have not the shape and air peculiar to the rest of their countrymen. Their natural dispositions and customs are, however, nearly the same. Husbandry, fishing, and feeding of cattle, are their principal employments; and, like the other tribes, they let slip no opportunity of making depredations on their neighbours. The continual wars with the Kara Kalpacs and the Kasatshaia-Horda oblige them to keep their towns and villages in a state of defence. They are indeed subject to Russian waiwodes, to whom they pay an annual tribute in corn, wax, honey, and cattle; but they have also their particular chiefs, who govern them according to their ancient customs. Though the generality of the Yaik Cossacks profess the Greek religion, yet a great many relics of Mahometanism and Paganism are still found among them. Being naturally bold and hardy, they make excellent soldiers; and they are not so turbulent as the other Cossacks. They live entirely at peace with the Calmucks and their other neighbours, and even maintain a commercial intercourse with them.

COSSE DE GENISTE, an order of knighthood instituted in 1234, by Louis IX. at his marriage with Margaret of Provence. The motto on the collar of this order was *Exaltat humiles*.

COSSET, among farmers, a colt, calf, or lamb, brought up by hand without the dam.

COSTA, CHRISTOPHER, a celebrated botanist of the 16th century, was born in Africa, of a Portuguese father, and went into Asia, to perfect himself in the knowledge of simples, where he was taken prisoner, but found means to make his escape, and after several voyages, practised physic at Burgos. He wrote, 1. A treatise on Indian drugs and medicines. 2. His Voyages to the Indies. 3. A book in praise of Women; and other works.

COSTAL, an appellation given by anatomists to several parts belonging to the sides; thus we meet with costal muscles, vertebræ, &c.

COSTANZO, ANGELO DI, an Italian historian and poet, lord of Catulopa, was born in 1507, of a noble and ancient family of Naples, and died about 1591. He wrote, 1. A History of Naples, from 1250 to 1489; the best edition of which is that of Aquila, in 1582, in folio, very scarce. 2. Italian poems, which are esteemed, and have had several editions.

COSTA-RICCA, a province of North America in New Spain, and in the audience of Guatimala, bounded on the north-east by the Northern ocean, on the south west by the South sea, on the north-west by Nicaragua, and on the south-east by Veragua. The soil is not very fertile, though there is plenty of cattle. Carthagena is the capital town.

COSTARD, GEORGE, a clergyman of the church of England, and author of several learned works, was born about the year 1710. He was educated at Wadham college, Oxford; and took the degree of M. A. in 1773. The first ecclesiastical situation in which he was placed was that of curate of Islip in Oxfordshire. In 1747 he published, in 8vo, Some Observations tending to illustrate the Book of Job. In 1750 he published Two Dissertations: I. On the meaning of the word *Kesita*, mentioned in Job, chap. xlii. ver. 11. II. On the Signification of the word *Hermes*. In 1752 he published in 8vo, at Oxford, *Dissertationes II. Critico-sacræ, quarum prima explicatur Ezek.* xiii. 18. *altera vero*, 2 *Reg*. x. 22. In 1775 he wrote a letter to Dr Birch, which is preserved in the British Museum, respecting the meaning of the phrase *sphæra barbarica*. Some time after this he undertook to publish a second edition of Dr Hyde's *Historia Religionis veterum Persarum, eorumque Magorum;* and which was accordingly printed under his inspection and with his corrections, at the Clarendon quota of pleasantry. Here they coin new words not understood elsewhere, but which it becomes fashionable for others to use; and they are thought ridiculous who are ignorant of them. It has been sometimes used to signify a club of ladies.

COTES, Roger, an excellent mathematician of the 18th century. He early discovered an inclination to the mathematics; and at 17 years of age, was admitted a pensioner of Trinity college, Cambridge. In 1706, he was appointed professor of astronomy in the professorship founded by Dr Plume archdeacon of Rochester, being chosen the first in that chair for his great merit and learning. In the year 1713, at the request of Dr Richard Bentley, he published at Cambridge, in 4to, a second edition of Sir Isaac Newton's *Principia*, with all the improvements which the author had annexed thereto: to which he prefixed an excellent preface. He prepared several useful books for the public; and wrote A Description of the great Meteor which appeared on the 6th of March 1716, published in the Philosophical Transactions. He lived but a little while to carry on the discourses for which he was eminently qualified; dying in the prime of his age in 1716, to the great regret of all the lovers of the sciences.

COTESWOLD, several sheep-cotes, and sheep feeding on hills. It comes from the Saxon *cote*, i. e. *casa*, "a cottage," and *wold*, "a place where there is no wood."

COTHURNUS, Buskin, a very high shoe or patten raised on soles of cork, worn by the ancient actors in tragedy, to make them appear taller and more like the heroes they represented, most of whom were supposed to be giants. It covered the greatest part of the leg, and was tied beneath the knee. Æschylus is said to have invented the cothurnus. See Buskin.

COTICE, or Cotise', in *Heraldry*, is the fourth part of the bend; which with us is seldom or ever borne but in couples, with a bend between them; whence probably the name; from the French *cote*, "side;" they being borne, as it were, aside of the bend. A bend thus bordered is said to be *cotised*, *coticé*. He bears sable on a bend cotised argent three cinquefoils.

COTILLON, the name of a well-known brisk dance, in which eight persons are employed. The term is French, and signifies an under-petticoat.

COTRONE, a town in the Hither Calabria standing on the site of the ancient Croton, though not occupying the same extent of ground: (See Croton). It is fortified with single walls, and a castle erected by Charles V. Its private buildings are poor and sordid, the streets dismal and narrow. Cheese and corn are the principal commodities. For the stowage of corn, there are ranges of granaries in the suburbs; and the annual export is about 20,000 tomoti. The cheese is tolerably good; but has a great deal of that hot acrid taste so common to all cheese made with goat's milk. The wine is not unpleasant, and appears susceptible of improvement by better management in the making and keeping.

COTT, a particular sort of bed-frame, suspended from the beam of a ship for the officers to sleep in between the decks. This contrivance is much more convenient at sea than either the hammocks or fixed cabins: being a large piece of canvas sewed into the form of a chest, about six feet long, and one foot deep, and from two to three feet wide. It is extended by a square wooden frame with a canvas bottom.

COTTAGE, Cottagium, is properly a little house for habitation without lands belonging to it: stat. 4. Edw. 1. But by a later statute, 31 Eliz. c. 7. no man may build a cottage unless he lay four acres of land thereto; except it be in market-towns or cities, or within a mile of the sea, or for the habitation of labourers in mines, sailors, foresters, shepherds, &c. and cottages erected by order of justices of the peace for poor impotent people are excepted out of the statute. The four acres of land to make it a cottage within the law are to be freehold, and land of inheritance; and four acres holden by copy, or for life or lives, or for any number of years, will not be sufficient to make a lawful cottage.

Cottage System, a system of domestic economy, founded on the plan of giving small portions of land to the poorer classes. See Supplement.

COTTON, in *Commerce*, a soft downy substance found on the gossypium, or cotton-tree. See Gossypium, Botany *Index*.

Cotton is separated from the seeds of the plant by a mill, and then spun and prepared for all sorts of fine work, as stockings, waistcoats, quilts, tapestry, curtains, &c. With it they likewise make muslin; and sometimes it is mixed with wool, sometimes with silk, and even with gold itself.

The finest sort comes from Bengal and the coast of Coromandel.

Cotton makes a very considerable article in commerce, and is distinguished into cotton-wool and cotton-thread. The first is brought mostly from Cyprus, St John d'Acre, Smyrna, and the East and West Indies; the most esteemed is white. Those who buy it in bales should see that it has not been wet: moisture being very prejudicial to it.

Of cotton-thread, that of Damas, called *cotton d'ounce*, and that of Jerusalem, called *bazas*, are the most esteemed; as also that of the West India islands. It is to be chosen white, fine, very dry, and evenly spun. The other cotton threads are the half bazas, the rames, the beledin, and gondezel; the payas and mountasiri, the geneguins, the baquins, the josselassars, of which there are two sorts. Those of India, known by the name of Tutucorin, Java, Bengal, and Surat, are of four or five sorts, distinguished by the letters A, B, C, &c. They are sold in bags, with a deduction of one pound and a half on each of those of Tutucorin, which are the dearest, and two pounds on each bag of the other sorts. For those of Fielebas, Smyrna, Aleppo, and Jerusalem, the deduction at Amsterdam is eight in the hundred for the tare, and two in the hundred for weight, and on the value one per cent. for prompt payment.

Cotton of Siam, is a kind of silky cotton in the Antilles, so called because the grain was brought from Siam. It is of an extraordinary fineness, even surpassing silk in softness. They make hose of it there preferable to silk ones for their lustre and beauty. They sell from 10 to 12 and 15 crowns a pair, but there are very few made unless for curiosity.

The manner of packing Cotton *as practised in the Antilles.* The bags are made of coarse cloth, of which they

Cove, Covenant.

COVE, a small creek or bay, where boats and small vessels may ride at anchor, sheltered from the wind and sea.

COVENANT, in *Law*, is the consent and agreement of two or more persons to do, or not to do, some act, or thing, contracted between them. Also it is the declaration the parties make, that they will stand to such agreement, relating to lands or other things; and is created by deed in writing, sealed and executed by the parties, or otherwise it may be implied in the contract as incident thereto. And if the persons do not perform their covenants, a writ or action of covenant is the remedy to recover damages for the breach of them.

COVENANT, in ecclesiastical history, denotes a contract or convention agreed to by the Scotch in the year 1638, for maintaining their religion free from innovation. In 1581, the general assembly of Scotland drew up a confession of faith, or national covenant, condemning episcopal government, under the name of *hierarchy*, which was signed by James I. and which he enjoined on all his subjects. It was again subscribed in 1590 and 1596. The subscription was renewed in 1638, and the subscribers engaged by oath to maintain religion in the same state as it was in 1580, and to reject all innovations introduced since that time. This oath annexed to the confession of faith received the name of the *covenant:* as those who subscribed it were called *covenanters.*

COVENANT, in *Theology*, is much used in connection with other terms; as, 1. *The Covenant of Grace* is that which is made between God and those who believe the gospel, whereby they declare their subjection to him, and he declares his acceptance of them and favour to them. The gospel is sometimes denominated a *covenant of grace*, in opposition to the Mosaic law. 2. *Covenant of Redemption* denotes a mutual stipulation, tacit or express, between Christ and the Father, relating to the redemption of sinners by him, previous to any act on Christ's part under the character of Mediator. 3. *Covenant of Works* signifies, in the language of some divines, any covenant whereby God requires perfect obedience from his creatures, in such a manner as to make no express provision for the pardon of offences to be committed against the precepts of it, on the repentance of such supposed offenders, but pronounces a sentence of death upon them: such, they say, was the covenant made with Adam in a state of innocence, and that made with Israel at Mount Sinai.

Solemn League and COVENANT, was established in the year 1643, and formed a bond of union between Scotland and England. It was sworn and subscribed by many in both nations; who hereby solemnly abjured popery and prelacy, and combined together for their mutual defence. It was approved by the parliament and assembly at Westminster, and ratified by the general assembly of Scotland in 1645. King Charles I. disapproved of it when he surrendered himself to the Scots army in 1646: but in 1650 Charles II. declared his approbation both of this and the national covenant by a solemn oath; and in August of the same year, made a farther declaration at Dunfermline to the same purpose, which was also renewed on occasion of his coronation at Scone in 1651. The covenant was ratified by parliament in this year; and the subscription of it required by every member, without which the constitution of the parliament was declared null and void. It produced a series of distractions in the subsequent history of that country, and was voted illegal by parliament, and provision made against it. Stat. 14. Car. II. c. 4.

Covenant, Coventry.

Ark of the COVENANT, in Jewish antiquity. See ARK.

COVENTRY, a town of Warwickshire, in England, situated in W. Long. 1. 26. N. Lat. 52. 25. It is an ancient place, and is supposed to derive its name from a convent formerly situated here. Leofric, earl of Mercia, who rebuilt the religious house after it had been destroyed by the Danes, and was lord of the place about the year 1040, is said, upon some provocation, to have loaded them with heavy taxes. Being importuned by his lady, Godina, to remit them, he consented, upon condition that she should ride naked through the town, which he little imagined she would ever comply with. But he found himself mistaken: for she accepted the offer, and rode through the town with her long hair scattered all over her body; having first enjoined the citizens not to venture, on pain of death, to look out as she passed. It is said, however, that a certain taylor could not help peeping: and to this day there is an effigy of him at the window whence he looked. To commemorate this extraordinary transaction, and out of respect to the memory of their patroness, the citizens make a procession every year, with the figure of a naked woman on horseback. After Leofric's death, the earls of Chester became lords of the city, and granted it many privileges. At length it was annexed to the earldom of Cornwall; and growing considerable, had divers immunities and privileges conferred upon it by several kings; particularly that of a mayor and two bailiffs by Edward III.; and Henry VI. made it, in conjunction with some other towns and villages, a distinct county, independent of the county of Warwick. But afterwards Edward VI. for their disloyalty, deprived them of their liberties, which were not restored till they had paid a fine of 500 merks. By a charter from James I. an alderman is allotted to each ward, with the powers of the justices of the peace within the city and its liberties. The walls were ordered to be demolished at the Restoration; and now nothing remains of them but the gates, which are very lofty. Coventry is noted for the two parliaments which were held in it; the one called the parliament of *Dunces*, and the other of *Devils*. The former was so called on account of the exclusion of the lawyers; and the attainders of the duke of York, the earls of Salisbury, Warwick, and March, procured the other the epithet of *Devils*. The town-house of Coventry is much admired for its painted windows, representing several kings and others that have been benefactors to the city. The chief manufactures carried on here are temmies and ribbands.

Coventry had 17,923 inhabitants in 1811. It sends two members to parliament, and gives title of earl to an ancient family of the same name.—It is a bishop's see. The bishoprick is said to have been founded by Oswy king of Mercia, in the year 656 or 657; and although it has a double name, yet, like Bath and Wells, it is a single diocese. It was so wealthy, that King Offa, by the favour of Pope Adrian, constituted it an archiepiscopal see; but this

The Franks, Germans, &c. passing into Gaul and Germany, did not abolish the form of the Roman government: and as the governors of cities and provinces were called *counts*, *comites*, and *dukes*, *duces*, they continued to be called so. They commanded in time of war; and in time of peace they administered justice. Thus, in the time of Charlemagne, counts were the ordinary judges and governors of the cities.

These counts of cities were beneath the dukes and counts who presided over provinces; the first being constituted in the particular cities, under the jurisdiction of the latter. The counts of provinces were in nothing inferior to dukes, who themselves were only governors of provinces. Under the last of the second race of French kings, they got their dignity rendered hereditary, and even usurped the sovereignty when Hugh Capet came to the crown; his authority was not sufficient to oppose their encroachments; and hence it is they date the privilege of wearing coronets in their arms; they assumed it then, as enjoying the rights of sovereigns in their particular districts or counties. But, by degrees, most of the counties became reunited to the crown.

The quality of count is now become very different from what it was anciently; being now no more than a title, which a king grants upon erecting a territory into a county, with a reserve of jurisdiction and sovereignty to himself. At first there was no clause in the patent of erection intimating the reversion of the county to the crown in default of heirs male; but Charles IX. to prevent their being too numerous, ordained that duchies and counties, in default of heirs male, should return to the crown.

The point of precedence between counts and marquises was formerly much controverted: the reason was, that there were counts who were peers of France, but no marquises; but the point was given up, and marquises took place; though anciently, when counts were governors of provinces, they were on a level even with dukes.

William the Conqueror, as is observed by Camden, gave the dignity of counts in fee to his nobles; annexing it to this or that county or province, and allotting for their maintenance a certain proportion of money, arising from the prince's profits in the pleadings and forfeitures of the provinces. To this purpose he quotes an ancient record, thus: Hen. II. *Rex Angliæ his verbis comitem creavit; sciatis nos fecisse Hugonem Bigot comitem de Norf, &c. de tertio denarii de Norwich et Norfolk, sicut aliquis comes Angliæ, &c.*

The Germans call a count, *grauf* or *graff;* which, according to a modern critic, properly signifies *judge;* and is derived from *gravio* or *graffio*, of γραφω, *I write.* They have several kinds of these counts or graffs; as landgraves, marchgraves, burg-graves, and pals-graves or counts palatine. These last are of two kinds: the former are of the number of princes, and have the investiture of a palatinate; the others have only the title of *count palatine* without the investiture of any palatinate. Some assert, that by publicly professing the imperial laws for twenty years, the person acquires the dignity of a count palatine; and there are instances of professors in law who have assumed the title accordingly; but there are others who question this right.

COUNT, in *Law*, denotes the original declaration in a real action; as the declaration is in a personal one; the libellus of the civilians answers to both. Yet, count and declaration are sometimes confounded, and used for each other; as, count in debt, count in appeal, &c.

COUNT-*Wheel*, in the striking part of a clock, a wheel which moves round once in 12 or 24 hours. It is sometimes called the *locking-wheel*. See CLOCK-*Making*.

COUNTER, a term which enters into the composition of divers words of our language, and generally implies opposition; but when applied to deeds, means an exact copy kept of the contrary party, and sometimes signed by both parties.

COUNTER-*Changed*, in *Heraldry*, the intermixture or opposition of any metal with a colour.

COUNTER-*Flory*, in *Heraldry*, is said of a tressure whose flowers-de-luce are opposite to others. See HERALDRY.

COUNTER-*Drawing*, in *Painting*, is the copying a design or painting, by means of a fine linen-cloth, an oiled paper, or other transparent matter, where the strokes appearing through are followed with a pencil, with or without colour. Sometimes it is done on glass, and with frames or nets divided into squares with silk or with thread, and also by means of instruments invented for the purpose, as the parallelogram.

COUNTER-*Ermine*, in *Heraldry*, is the contrary of ermine, being a black field with white spots.

COUNTERFEITS, in *Law*, are persons that obtain any money or goods by counterfeit letters or false tokens, who being convicted before justices of assize or of peace, &c. are to suffer such punishment as shall be thought fit to be inflicted under death, as imprisonment, pillory, &c.

COUNTER-FOIL, or COUNTER-*stock*, in the exchequer, that part of a tally which is kept by an officer of the court.

COUNTER-*Guard*, in *Fortification*, is a work raised before the point of a bastion, consisting of two long faces parallel to the faces of the bastion, making a salient angle; they are sometimes of other shapes, or otherwise situated.

COUNTER-*Light*, or *Counter-jour*, a light opposite to any thing, which makes it appear to disadvantage. A single counter-light is sufficient to take away all the beauty of a fine painting.

COUNTER-*March*, in military affairs, a change of the face or wings of a battalion, by which means those that were in the front come to be in the rear. It also signifies returning, or marching back again.

COUNTER-*Mine*, in *War*, a well and gallery drove and sunk till it meet the enemy's mine, to prevent its effect.

COUNTER-*Paled*, in *Heraldry*, is when the escutcheon is divided into twelve pales parted per fesse, the two colours being counter-changed; so that the upper are of one colour and the lower of another.

COUNTER-*Part*, in *Music*, denotes one part to be applied to another. Thus the bass is said to be a counterpart to the treble.

COUNTER-*Passant*, in *Heraldry*, is when two lions are in a coat of arms, and the one seems to go quite the contrary way from the other.

wherein an equal number, or equal measure, of verses, is found in each part; which divisions, in odes, are called *strophes*. Couplet, by an abuse of the word, is frequently made to signify a couple of verses.

COURAGE, in *Ethics*, is that quality of the mind, derived either from constitution or principle, or both, that enables men to encounter difficulties and dangers. See FORTITUDE.

COURANT, a French term synonymous with *current*, and properly signifies running. See CURRENT.

COURANT, is also a term in music and dancing; being used to express both the tune or air and the dance. With regard to the first, *courant* or *currant* is a piece of music in triple time: the air of the courant is ordinarily noted in triples of minims; the parts to be repeated twice. It begins and ends when he who beats the measure falls his hands; in contradistinction from the saraband, which ordinarily ends when the hand is raised. With regard to dancing, the courant was long the most common of all the dances practised in England: it consists, essentially, of a time, a step, a balance, and a coupee; though it also admits of other motions. Formerly they leaped their steps; in which point the courant differed from the low dance and pavades. There are simple courants and figured courants, all danced by two persons.

COURAP, the modern name for a distemper very common in Java and other parts of the East Indies. It is a sort of herpes or itch on the arm-pits, groins, breast, and face; the itching is almost perpetual; and the scratching is followed by great pain and a discharge of matter, which makes the linen stick so to the skin as not easily to be separated without tearing off the crust. *Courap* is a general name for any sort of itch; but this distemper is thus called by way of eminence. It is so contagious that few escape it. For the cure, gentle and repeated purging is used, and externally the sublimate in a small quantity is a good topic.

COURAYER, PETER FRANCIS, a Roman Catholic clergyman, distinguished by great moderation, charity, and temper, concerning religious affairs, as well as by learning, was born at Vernon in Normandy, 1681. While canon regular and librarian of the abbey of St Genevieve at Paris, he applied to our archbishop Wake for the resolution of some doubts, concerning the episcopal succession in England, and the validity of our ordinations: he was encouraged to this by the friendly correspondence which had passed between the archbishop and M. du Pin of the Sorbonne. The archbishop sent him exact copies of the proper records; and on these he built his "Defence of English Ordinations," which was published in Holland, in 1727. This exposed him to a prosecution in his own country; he therefore took refuge in England; where he was well received, and presented the same year by the university of Oxford with a doctor's degree. As it is somewhat uncommon for a Roman Catholic clergymen to be admitted to degrees in divinity by Protestant universities, the curious may be gratified with a sight of the diploma, and the doctor's letter of thanks, in "The present State of the Republic of Letters, for June 1728." In 1736, he translated into French, and published, "Father Paul's History of the Council of Trent," in 2 vols. folio, and dedicated it to Queen Caroline; who augmented to 200l. a pension of 100l. a year, which he had obtained before from the court. The learned Jer. Markland, in a letter to his friend Bowyer, September 1756, says, "Mr Clarke has given me F. Courayer's translation of the History of the Council of Trent; with whose preface I am so greatly pleased, that if he be no more a papist in other tenets than he is in those he mentions (which are many, and of the most distinguishing class), I dare say there are very few considerate Protestants who are not as good Catholics as he is." His works are many, and all in French: he translated Sleidan's "History of the Reformation." He died in 1776, after two days illness, at the age of 95; and was buried in the cloister of Westminster-abbey. In his will, dated Feb. 3. 1774 he declares, that he "dies a member of the Catholic church, but without approving of many of the opinions and superstitions which have been introduced into the Romish church, and taught in their schools and seminaries; and which they have insisted on as articles of faith, though to him they appear to be not only not founded in truth, but also to be highly improbable." And his practice, was conformable to this declaration; for at London he constantly went to mass, and at Ealling in the country, whither he often retired, as constantly attended the service of the parish church; declaring at all times, that he "had great satisfaction in the prayers of the church of England."

COURBARIL. See HYMENEA.

COURIER, or CURRIER, (from the French *courir*, "to run,") a messenger sent post, or express, to carry dispatches.

The ancients too, had their couriers. We meet with two kinds: 1. These who ran on foot, called by the Greeks *hemerodromi*, q. d. "couriers of a day." Pliny, Corn. Nepos, and Cæsar, mention some of those who would run 20, 30, 36, and in the circus even 40 leagues per day. 2. Riding couriers (*cursores equitantes*), who changed horses as the modern couriers do.

Xenophon attributes the first couriers to Cyrus. Herodotus says they were very ordinary among the Persians, and that there was nothing in the world more swift than these kind of messengers. "That prince (says Xenophon) examined how far a horse would go in a day; and built stables, at such distances from each other, where he lodged horses, and persons to take care of them; and at each place kept a person always ready to take the packet, mount a fresh horse, and forward it to the next stage; and thus quite through his empire."

But it does not appear that either the Greeks or Romans had any regular fixed couriers till the time of Augustus; under that prince they travelled in cars; though it would appear that they afterwards went on horseback. Under the western empire they were called *viatores;* and under that of Constantinople, *cursores:* whence the modern name. See POST.

COURLAND, a duchy situated between E. Long. 21. 26. and between N. Lat. 56. 30. and 57. 20. It is bounded by the river Dwina, which divides it from Livonia on the north; by Lithuania, on the east; by Samogitia, on the south, and by the Baltic sea on the west; being 120 miles long and 30 broad. This duchy shall then be judged *dead*. 10. If a dog take a fall in his course, and yet perform his part, he may challenge the advantage of a turn more than he gave. 11. If a dog turn the hare, serve himself, and give divers cotes, and yet in the end shall stand still in the field, the other dog, if he turns home to the covert, although he gives no other, shall be adjudged to win the wager. 12. If by misfortune a dog be rid over in the course, that course shall be adjudged void, and he that did the mischief is to make reparation to the owner. 13. If a dog gives the first and last turn, and there be no other advantage betwixt them, he that gives the odd turn wins. 14. A cote is when a grehound goes endways by the side of his fellow, and gives the hare a turn. 15. A cote serves for two turns, and two trippings or jerkings for a cote; and if the hare turns not quite about, she only *wrencheth*, in the sportsman's phrase. 16. If there be no cotes given by either of the grehounds, but one serves the other at turning, then he that gives the most turns wins the wager. 17. Sometimes a hare does not turn, but wrenches; for she does not turn, except she turns as it were round. In these cases, two wrenches stand for one turn. 18. He that comes in first at the death of the hare takes her up, and saves her from breaking; he cherishes the dogs, and cleanses their mouths from the wool; he is adjudged to have the hare for his pains. 19. Finally, those who are judges for the leash, must give their judgment before they depart out of the field, or else it is not to stand as valid.

COURT, an appendage to a house or habitation; consisting of a piece of ground inclosed with walls, but open upwards.

COURT is also used for the palace or place where a king or sovereign prince resides.

COURT, in a law sense, is defined to be a place wherein justice is judicially administered. And, as, by our excellent constitution, the sole executive power of the laws is vested in the person of the king, it will follow that all courts of justice, which are the medium by which he administers the laws, are derived from the power of the crown. For whether created by act of parliament or letters patent, or subsisting by prescription (the only methods by which any court of judicature can exist), the king's consent in the two former is expressly, and in the latter impliedly, given. In all these courts, the king is supposed in contemplation of law to be always present; but as that is in fact impossible, he is there represented by his judges, whose power is only an emanation of the royal prerogative.

Blackst. Comment.

For the more speedy, universal, and impartial administration of justice between subject and subject, the law hath appointed a prodigious variety of courts, some with a more limited, others with a more extensive jurisdiction; some constituted to inquire only, others to hear and determine; some to determine in the first instance, others upon appeal and by way of review. See LAW, N° xcviii. xcix. c. cxli. clvi. clvii. clviii. and the respective articles in the order of the alphabet. One distinction may be here mentioned, that runs throughout them all; viz. that some of them are courts *of record*, others *not of record*. A court of record is that where the acts and judicial proceedings are enrolled in parchment for a perpetual memorial and testimony: which rolls are called the *records of the court*, and are of such high and supereminent authority, that their truth is not to be called in question. For it is a settled rule and maxim, that nothing shall be averred against a record, nor shall any plea, or even proof, be admitted to the contrary. And if the existence of a record be denied, it shall be tried by nothing but itself; that is, upon bare inspection whether there be any such record or not: else there would be no end of disputes. But if there appears any mistake of the clerk in making up such record, the court will direct him to amend it. All courts of record are the king's courts in right of his crown and royal dignity, and therefore no other court hath authority to fine or imprison: so that the very erection of a new jurisdiction, with power of fine or imprisonment, makes it instantly a court of records. A court not of record is the court of a private man; whom the law will not intrust with any discretionary power over the fortune or liberty of his fellow subjects. Such are the courts-baron incident to every manor, and other inferior jurisdictions; where the proceedings are not enrolled or recorded; but as well their existence as the truth of the matters therein contained shall, if disputed, be tried and determined by a jury. These courts can hold no plea of matters cognizable by the common law, unless under the value of 40s.; nor of any forcible injury whatsoever, nor having any process to arrest the person of the defendant.

In every court there must be at least three constituent parts, the *actor*, *reus*, and *judex*: the *actor*, or plaintiff, who complains of an injury done; the *reus*, or defendant, who is called upon to make satisfaction for it; and the *judex*, or judicial power, which is to examine the truth of the fact, to determine the law arising upon that fact, and, if any injury appears to have been done, to ascertain, and by its officers to apply the remedy. It is also usual in the superior courts to have attorneys, and advocates or counsel, as assistants. See ATTORNEY and COUNSEL.

COURT-Baron, in *English Law*, a court incident to every manor in the kingdom, to be holden by the steward within the said manor. This court-baron is of two natures: the one is a customary court, appertaining entirely to the copyholders, in which their estates are transferred by surrender and admittance, and other matters transacted relative to their tenures only. The other is a court of common law, and it is the court of the *barons*, by which name the freeholders were sometimes anciently called: for that it is held before the freeholders who owe suit and service to the manor, the steward being rather the register than the judge. These courts, though in their nature distinct, are equally confounded together. The court we are now considering, viz. the freeholder's court, was composed of the lord's tenants, who were the *pares* of each other, and were bound by their feodal tenure to assist their lord in the dispensation of domestic justice. This was formerly held every three weeks; and its most important business is to determine, by writ of right, all controversies relating to the right of lands within the manor. It may also hold plea of any personal actions, of debt, trespass on the case, or the like, where the debt or damages do not amount to 40s. Which is the same sum, or three marks, that bounded the jurisdiction

risdiction of the ancient Gothic courts in their lowest instance, or *fierding courts*, so called because four were instituted within every superior district or hundred. But the proceedings on a writ of right may be removed into the county-court by a precept from the sheriff called a *tolt, quia tollit atque eximit causam è curia baronum.* And the proceedings in all other actions may be removed into the superior courts by the king's writs of *pone* or *accedas ad curiam*, according to the nature of the suit. After judgment given, a writ also of *false judgment* lies to the courts at Westminster to rehear and review the cause, and not a writ of *error;* for this is not a court of record; and therefore, in some of these writs of removal, the first direction given is to cause the plaint to be recorded, *recordari facias loquelam.*

Court-Martial, a court appointed for the punishing offences in officers, soldiers, and sailors, the powers of which are regulated by the mutiny-bill.

For other courts, see ADMIRALTY, ARCHES, BENCH, CHANCERY, CHIVALRY, *COMMON-Pleas*, COUNTY, DUCHY, ECCLESIASTICAL, FACULTY, FOREST, HUSTINGS, LEET, LEGATE, MAYOR, PIEPOUDRE, PREROGATIVE, REQUESTS, STANNARY, *STAR-Chamber*, UNIVERSITY, &c.

COURTESY, or CURTESY, *of England;* a certain tenure whereby a man marrying an heiress seized of lands of fee-simple, or fee-tail general, or seized as heir of the tail special, and getteth a child by her that cometh alive into the world, though both it and his wife die forthwith; yet, if she were in possession, he shall keep the land during his life, and is called *tenant per legem Angliæ*, "or tenant by the courtesy of England;" because this privilege is not allowed in any country except Scotland, where it is called *curialitas Scotiæ.*

COURTESAN, a woman who prostitutes herself for hire, especially to people of superior rank. Laïs the famous Theban courtesan, stands on record for requiring no less than 10,000 crowns for a single night. Of all places in the world, Venice is that where courtesans abound the most. It is now 300 years since the senate, which had expelled them, was obliged to recal them; in order to provide for the security of women of honour, and to keep the nobles employed, lest they should turn their heads to make innovations in the state.

COURTRAY, a town of the Netherlands, situated on the river Lys, about 23 miles south-west of Ghent, and 14 east of Ypres. E. Long. 3. 10. N. Lat. 50. 48.

COUSIN, a term of relation between the children of brothers and sisters, who in the first generation are called *cousins-german*, in the second generation, *second cousins*, &c. If sprung from the relations of the father's side, they are denominated *paternal* cousins; if on the mother's, *maternal.*

The word is ordinarily derived from *consanguineus;* though Menage brings it from *congenius*, or *congeneus*, q. d. *ex eodem genere.*

In the primitive times, it was allowed cousins-german to marry, to prevent their making alliances in heathen families: but Theodosius the Great prohibited it under pain of death; on pretence that they were, in some sort, brothers and sisters with regard to each other.

COUSIN, *John*, a celebrated French painter, who excelled in painting on glass. His picture of the Last Judgment, in the vestry of the Minims of the Wood of Vincennes, is much admired. He was also a good sculptor. He wrote several works on geometry and perspective; and died after the year 1689.

COUSU, in *Heraldry*, signifies a piece of another colour or metal placed in the ordinary, as if it were sewed on, as the word imports. This is generally of colour upon colour, or metal upon metal, contrary to the general rule of heraldry.

COUTANCES, a port town of Normandy, in the department of La Manche. W. Long. 1. 32. N. Lat. 49. 10. This town, anciently called *Constantia* or *Cosedia*, is pleasantly situated among meadows and rivulets about five miles distant from the sea. By the remains of a Roman aqueduct, and other ancient ruins, it appears to be a place of great antiquity. It is the see of a bishop, suffragan of Rome; and has a magnificent cathedral, esteemed one of the finest pieces of Gothic architecture in Europe. The trade of this town is very inconsiderable, and the fortifications are quite demolished. They have several religious houses, and two parochial churches. Population 11,000 in 1815.

COUTHUTLAUGH, from the Saxon *couth*, "knowing," and *utlaugh*, "outlaw;" he that wittingly receives a man outlawed, and cherishes or conceals him: for which offence he was in ancient times subject to the same punishment with the outlaw himself.

COVERT, in *Heraldry*, denotes something like a piece of hanging, or a pavilion falling over the top of a chief or other ordinary, so as not to hide, but only to be a covering to it.

COW. See BOS, MAMMALIA *Index.*

Cow-Burner. See BUPRESTIS, ENTOMOLOGY *Index.*

Sea-Cow. See TRICHECUS, MAMMALIA *Index.*

Cow-Itch, or *Couhage.* See COUHAGE and DOLICHOS, BOTANY *Index.*

Cow's-Lip. See PRIMULA, BOTANY *Index.*

COWARD, in *Heraldry*, a term given to a lion borne in an escutcheon, with his tail doubled, or turned in between his legs.

COWEL, DR JOHN, a learned and eminent civilian, born about the year 1554. In 1607 he compiled a Law Dictionary, which gave great offence to Sir Edward Coke and the common lawyers: so that they first accused him to James I. as asserting that the king's prerogative was in some cases limited; and when they failed in that attempt, they complained of him to the house of commons, as a betrayer of the rights of the people, by asserting that the king was not bound by the laws; for which he was committed to custody, and his book publicly burnt. He also published *Institutiones Juris Anglicani*, in the manner of Justinian's Institutes; and died in the operation for the stone, in 1611.

COWES, a town and harbour on the north-east coast of the isle of Wight in Hampshire. It has no market, but is the best place for trade in the whole island; but as it lies low, the air is accounted unhealthy.

It is eight miles south-east of Portsmouth. W. Long. 1. 25. N. Lat 50. 45.

COWL, or COUL, a sort of monkish habit worn by the Bernardines and Benedictines. The word is formed from *cucullus*, by confounding the two first syllables into one, as being the same twice repeated. There are two kinds of cowls: the one white, very large, worn in ceremony, and when they assist at the office; the other black, worn on ordinary occasions, in the streets, &c.

F. Mabillon maintains the coul to be the same thing in its origin with the scapular. The author of the apology of the emperor Henry IV. distinguishes two forms of couls; the one is a gown reaching to the feet, having sleeves, and a capuchin, used in ceremonies; the other a kind of hood to work in, called also a *scapular*, because it only covers the head and shoulders.

COWLEY, ABRAHAM, an eminent poet, was born at London in 1618. His father, who was a grocer, dying before he was born, his mother procured him to be admitted a king's scholar at Westminster. His first inclination to poetry arose on his lighting on Spenser's Fairy Queen, when he was but just able to read; and this inclination so far improved on him, that at 13 he began to write several poems; a collection of which was published in 1613, when he was but 15. He has been represented as possessed of so bad a memory that his teachers could never bring him to retain the ordinary rules of grammar. But the fact was, as Dr Johnson notices, not that he could not learn or retain the rules; but that being able to perform his exercises without them, he spared himself the trouble. In 1636 he was elected a scholar of Trinity college, Cambridge, and removed to that university. Here he went through all his exercises with a remarkable degree of reputation; and at the same time must have pursued his poetical turn with great eagerness, as it appears that the greatest part of his poems were written before he left that university. He had taken his degree of master of arts before 1643, when, in consequence of the turbulence of the times, he, among others, was ejected from the college; whereupon, retiring to Oxford, he entered himself of St John's college; and that very year, under the denomination of a *scholar of Oxford*, published a satire called the Puritan and the Papist. It is apparent, however, that he did not remain very long at Oxford; for his zeal to the royal cause engaging him in the service of the king, who was very sensible of his abilities, and by whom he was frequently employed, he attended his majesty in many of his journeys and expeditions, and gained not only that prince's esteem, but that of many other great personages, and in particular of Lord Falkland, one of the principal secretaries of state.

During the heat of the civil war, he was settled in the earl of St Alban's family; and when the queen-mother was obliged to retire into France, he accompanied her thither, laboured strenuously in the affairs of the royal family, undertook several very dangerous journeys on their account, and was the principal instrument in maintaining an epistolary correspondence between the king and queen, whose letters he ciphered and deciphered with his own hand. His poems, entitled The Mistress, were published at London in 1647; and his comedy called The Guardian, afterwards altered and published under the title of Cutter of Coleman-street, in 1650. In 1656 it was thought proper by those on whom Mr Cowley depended that he should come over into England, and, under pretence of privacy and retirement, should give notice of the posture of affairs in this nation. Upon his return he published a new edition of all his poems, consisting of four parts; viz. I. Miscellanies. II. The Mistress, or Several copies of Love-verses. III. Pindaric Odes, written in imitation of the style and manner of Pindar, IV. Davideis, a sacred poem of the troubles of David, in four books.

Soon after his arrival, however, he was seized, in the search after another gentleman of considerable note in the king's party; but although it was through mistake that he was taken, yet when the republicans found all their attempts of every kind to bring him over to their party proved ineffectual, he was committed to a severe confinement, and it was even with considerable difficulty that he obtained his liberty; when, venturing back to France, he remained there, in his former situation, till near the time of the king's return. During his stay in England he wrote his Two Books of Plants, published first in 1662; to which he afterwards added four books more; and all six, together with his other Latin poems, were printed at London in 1678. It appears by Mr Wood's *Fasti Oxonienses*, that our poet was created doctor of physic at Oxford, December 2. 1657.

Soon after the Restoration he became possessed of a very competent estate, through the favour of his principal friends the duke of Buckingham and the earl of St Alban's; and being now upwards of 40 years of age, he took up a resolution to pass the remainder of a life which had been a scene of tempest and tumult, in that situation which had ever been the object of his wishes, a studious retirement. His eagerness to get out of the bustle of a court and city made him less careful than he might have been in the choice of a healthful habitation in the country; by which means he found his solitude from the very beginning suit less with the constitution of his body than with his mind. His first rural residence was at Barn Elms, a place which, lying low, and being near a large river, was subject to a variety of breezes from land and water, and liable in the winter-time to great inconvenience from the dampness of the soil. The consequence of this Mr Cowley too soon experienced, by being seized with a dangerous and lingering fever. On his recovery from this he removed to Chertsey, a situation not much more healthy, where he had not been long before he was seized with another consuming disease. Having languished under this for some months, he at length got the better of it, and seemed pretty well recovered from the bad symptoms, when one day in the heat of summer 1667, staying too long in the fields to give some directions to his labourers, he caught a most violent cold, which was attended with a defluxion and stoppage in his breast; and for want of timely care, by treating it as a common cold, and refusing advice till it was past remedy, he departed this life on the 28th of July in that year, being the 49th of his age; and on the 3d of August following, he

Cowley, Cowper.

ply; that he was the first who imparted to English numbers the enthusiasm of the greater ode and the gaiety of the less; and he was qualified for sprightly sallies and for lofty flights; that he was among those who freed translation from servility, and, instead of following his author at a distance, walked by his side; and that though he had left versification yet improveable, he left likewise from time to time such specimens of excellence as enabled succeeding poets to improve it."

So many of Cowley's productions being now esteemed scarcely worthy of a perusal, while others of them are distinguished by their beauty, Dr Hurd (the present bishop of Worcester), thought proper to make a selection of them, which he published in 1772, under the title of Select Works of Mr Abraham Cowley, in two volumes; with a preface and notes by the Editor.

COWPER, William, a distinguished modern poet, was born at Berkhamstead in Hertfordshire, in the year 1732. His father, who was rector of the parish, was nephew to Lord Chancellor Cowper. Mr Cowper was educated at Westminster school; and in that celebrated seminary he acquired his classical knowledge. But it would appear from his poem, entitled "*Tirocinium*," that the impressions which he then received were not favourable to this system of education, and gave him a permanent dislike to public schools. Through family interest, the honourable and lucrative place of clerk to the house of lords had been provided for him; he was therefore entered at the Temple for the study of the law, in order to qualify him for it. In this situation his manners were amiable and decent; and though it is probable that he did not refuse to indulge in those pleasures which are usual among young men similarly situated, yet there seems no reason to suppose that he had any peculiar causes for self-accusation. His natural disposition was timid and diffident; his spirits were constitutionally weak, even to the borders of absolute unfitness for worldly concerns; so that when the time came for assuming that post to which he had been destined, he shrunk with such terror from the idea of making his appearance before the most august assembly in the nation, that, after a violent struggle with himself, he actually resigned the employment, and with it all his prospects in life. It appears to have been under the agitation of mind which this circumstance occasioned, and which threw him into a serious illness, that he was led to a deep consideration of his state in a religious view; and from the system he had adopted, this course of reflection excited in him the most alarming and distressful apprehensions. In vain did his theological friends set before him those encouraging views which the theory of Christian justification is calculated to present, and which to many is the source of a confidence perhaps as excessive as their former fears; the natural disposition of his mind fitted it to receive all the horrors, without the consolations of his faith. We are told, that "the terror of eternal judgment overpowered and wholly disordered his faculties; and he remained seven months in a continual expectation of being instantly plunged into final misery." In this shocking condition he became the subject of medical care, and he was placed in the receptacle for lunatics kept by Dr Cotton at St Alban's, an amiable and worthy physician, and the author of some well-known poems. At length he recovered a degree of serenity; but his mind had acquired that indelible tinge of melancholy by which it was ever after characterised, and which rendered his whole life little more than a succession of intervals of comfort between long paroxysms of settled despondency. It is unnecessary to follow him through all his scenes of retirement. Part of his time was spent at the house of his relation, Earl Cowper, at Cole-green; and part at Huntingdon, with his intimate friend the reverend Mr Unwin. After the death of the latter, he removed with his widow to Olney in Buckinghamshire, which was thenceforth the principal place of his residence. The affectionate intimacy he enjoyed with this lady is strongly expressed in the following lines, which have probably been understood by most readers as expressive of a conjugal union:

Cowper.

—Witness, dear companion of my walks,
Whose arm this twentieth winter I perceive
Fast lock'd in mine, with pleasure such as love
Confirm'd by long experience of thy worth
And well-tried virtues could alone inspire—
Witness a joy that thou has doubled long.
Task, Book I.

At Olney he contracted a close friendship with the reverend Mr Newton, then minister there, and since rector of St Mary Woolnoth, London, whose religious opinions were in unison with his own. When Mr Newton published his volume of Hymns, called "The Olney's Collection," it was enriched with some compositions from the pen of Cowper, distinguished by the letter C. They bear internal evidence of a cultivated understanding, and an original genius. His time was now wholly dedicated to that literary leisure, in which the mind, left to its own operations, follows up that line of pursuit which is the most congenial to its taste, and the most adapted to its powers. In his garden, in his library, and in his daily walks, he seems to have disciplined his muse to the picturesque and vivid habits of description, which will always distinguish Cowper among our national poets. No writer, with the exception of Thomson, seems to have studied nature with more diligence, and to have copied her with more fidelity. An advantage which he has gained over other men, by his disdaining to study her "through the spectacles of books," as Dryden calls it; and by his pursuing her through her haunts, and watching her in all her attitudes, with the eye of a philosopher as well as of a poet. As Mr Cowper had no relish for public concerns, it was not singular that he should have neglected the study of the law, on which he had entered. That knowledge of active life, which is so requisite for the legal profession, would hardly be acquired on the banks of the Ouse, and in silent contemplations on the beauties of nature. In this retreat, he exchanged for the society and converse of the muses, the ambition and tumult of a forensic occupation; dedicating his mind to the cultivation of poetry, and storing it with those images which he derived from the inexhaustible treasury of a rich and varied scenery, in a most beautiful and romantic country. The first volume of his poems, which was published by Mr Newton in 1787, consists of shire, 14 miles north of York. W. Long. 1. 10. N. Lat. 54. 16.

COYPEL, Anthony, an excellent French painter, born at Paris in 1661. Noyel Coypel, his father, being chosen by M. Colbert to be director of the academy at Rome, he took his son with him into Italy, where Anthony Coypel formed himself on the works of the greatest masters, and on his return to France was made first painter to the duke of Orleans. That prince employed him in painting the grand gallery of the royal palace, and allowed him a pension. In 1714, he was director of the Academy of Painting and Sculpture. In 1715, he was made the first painter to the French king, and was ennobled on account of his merit. He died in 1722. M. Coypel, his son, also excelled in the same art.

COZENING; tricking, or defrauding.—In law, it denotes an offence where any thing is done deceitfully, whether belonging to contracts or not, which cannot be properly termed by any special name.

COZUMEL, an island near the western coast of Jucatan, where Cortez landed and refreshed his troops before entering upon the conquest of Mexico. W. Long. 89. 0. and N. Lat. 13. 0.

CRAB. See Cancer, Entomology *Index*.

Crab's Claws, in the *Materia Medica*, are the tips of the claws of the common crab broken off at the verge of the black part, so much of the extremity of the claws only being allowed to be used in medicine as is tinged with this colour. The blackness, however, is only superficial; they are of a grayish white within, and when levigated furnish a white powder.

Crab's claws are of the number of the alkaline absorbents; but they are superior to the generality of them, in some degree, as they are found on a chemical analysis to contain a volatile urinous salt.

Crab's Eyes, in *Pharmacy*, are a strong concretion in the head of the cray-fish. They are rounded on one side, and depressed and sinuated on the other, considerably heavy, moderately hard, and without smell. We have them from Holland, Muscovy, Poland, Denmark, Sweden, and many other places. What are usually met with in the shops are prepared by art.

Crab's eyes are much used both in the shop medicines and extemporaneous prescription, being accounted absorbent.

Crab-Lice, a troublesome kind of vermine, which stick so fast with their claws to the skin as to render it difficult to dislodge them. They are called *plactulæ*, *morpiones*, *petolæ*, and *pessolatæ*: they usually infest the arm-pits and *pudenda*. Cleanliness is the best preventive. But these vermine may be easily removed with the application of a little mercurial ointment.

Crab, a sort of wooden pillar, whose lower end, being let down through a ship's deck, rests upon a socket like the capstern; and having in its upper end three or four holes, at different heights, through the middle of it, one above another, into which long bars are thrust, whose length is nearly equal to the breadth of the neck. It is employed to wind in the cable, or to purchase any other weighty body which requires a great mechanical power. This differs from a capstern, as not being furnished with a *drum-head*, and by having the bars to go entirely through it, reaching from one side of the deck to the other; whereas those of the capstern, which are superior in number, reach only about eight inches or a foot into the drum-head, according to its size. See Capstern.

Crab-Yaws, a name in Jamaica for a kind of ulcer on the soles of the feet, with hard callous lips, so hard that it is difficult to cut them. The *ungt. cærul. fort.* is their cure.

CRACATOA, the most southerly of a cluster of islands lying in the entrance of the straits of Sunda in the East Indies. Its whole circumference does not exceed nine miles; and off its north-eastern extremity is a small island forming a road, in which Captain Cook anchored when visiting this island on his last voyage. On the southern part of the small island is a reef of rocks, within which is a tolerable shelter against all northerly winds, there being 27 fathoms water in the mid channel, and 18 near the reef. Between the two islands there is a narrow passage for boats. The shore that constitutes the west side of the road runs in a north-westerly direction, having a bank of coral running into the sea for a little way, so that it is difficult for boats to land except at the time of high water; but the anchoring ground is very good and free from rocks. In the inland parts the ground is elevated, rising on all sides gradually from the sea, and is entirely covered with wood, excepting a few spots which are cleared by the inhabitants for sowing rice. The climate is reckoned very healthy in comparison with the neighbouring countries, but it is very thinly inhabited. There are abundance of turtle on the coral reefs; but other refreshments are scarce, and sold at an extravagant price. Water is not plentiful: Captain Cook was obliged to supply himself from a small spring opposite to the southern extremity of the small island above mentioned. To the southward is a hot spring, whose waters are used as a bath by the inhabitants. The road where the Resolution anchored lies in S. Lat. 8. 6.; and by observation, in 105. 36. E. Long. by the time-keeper in 104. 48. The variation of the compass one degree W. On the full and change days it is high water at seven o'clock in the morning, and the tide rises three feet four inches perdicular.

CRACKOW, or Cracow, a city of Poland, situated in a palatinate of the same name. E. Long. 20. 16. N. Lat. 50. 8. It was formerly the capital of Poland, where the kings were elected and crowned, and was once almost the centre of the Popish dominions; but since the peace in 1814 it was created a free town, governed by its own magistrates, under the protection of Austria and Russia.

Crackow stands in an extensive plain, watered by the Vistula, which is broad but shallow: the city and its suburbs occupy a vast tract of ground, but are so badly peopled, that they scarcely contain 16,000 inhabitants. The great square in the middle of the town is very spacious, and has several well built houses, once richly furnished and well inhabited, but most of them now either untenanted or in a state of melancholy decay. Many of the streets are broad and handsome; but almost every building bears the most striking marks of ruined grandeur: the churches alone seem to have preserved their original splendour. The devastation of this unfortunate town was begun by the Swedes at the commencement of the present century, the when it was besieged and taken by Charles XII. but the mischiefs it suffered from that ravager of the north were far less destructive than those it experienced during the late dreadful commotions, when it underwent repeated sieges, and was alternately in possession of the Russians and Confederates. The effects of cannon, grape, and musket shot, are still discernible on the walls and houses. In a word, Crackow exhibits the remains of ancient magnificence, and looks like a great capital in ruins: from the number of fallen and falling houses one would imagine it had lately been sacked, and that the enemy had left it only yesterday. The town is surrounded with high walls of brick, strengthened by round and square towers of whimsical shapes, in the ancient style of fortification: these walls were built by Venceslaus king of Bohemia during the short period in which he reigned over Poland.

The university of Crackow was formerly, and not unjustly, called the mother of Polish literature, as it principally supplied the other seminaries with professors and men of learning; but its lustre has been greatly obscured by the removal of the royal residence to Warsaw, and still more by the late intestine convulsions. In this city the art of printing was first introduced into Poland by Haller; and one of the earliest books was the Constitutions and Statutes compiled by Casimir the Great, and afterwards augmented by his successors. The characters are Gothic, the same which were universally used at the invention of printing: the great initial letters are wanting, which shows that they were probably painted and afterwards worn away. The year in which this compilation was printed is not positively known; but its publication was certainly anterior to 1496, as it does not contain the statutes passed by John Albert in that year. The most flourishing period of the university was under Sigismond Augustus in the 16th century, when several of the German reformers fled from the persecutions of the emperor Charles V. and found an asylum in this city. They gave to the world several versions of the sacred writings, and other theological publications, which diffused the reformed religion over great part of Poland. The protection which Sigismond Augustus afforded to men of learning of all denominations, and the universal toleration which he extended to every sect of Christians, created a suspicion that he was secretly inclined to the new church; and it was even reported that he intended to renounce the Catholic faith, and publicly profess the reformed religion.

Towards the southern part of the town, near the Vistula, rises a small eminence or rock, upon the top of which is built the palace, surrounded with brick walls and old towers, which form a kind of citadel to the town. This palace owes its origin to Ladislaus Jaghellon; but little of the ancient structure now appears, as the greatest part was demolished by Charles XII. in 1701, when he entered this town in triumph after the battle of Clissow. It has been since repaired. The remains of the old palace consist of a few apartments, which are left in their ancient state as they existed in the last century. This palace was formerly the residence of the kings of Poland, who, from the time of Ladislaus Locketec, have been crowned at Crackow. The Polish and German historians differ concerning the time when the title of king was first claimed by the sovereigns of this country; but the most probable account is, according to Mr Cox, that in 1295 Premislaus assumed the regal title, and was inaugurated at Gnesna by the archbishop of that diocese. He was succeeded by Ladislaus Locketec, who offending the Poles by his capricious and tyrannical conduct, was deposed before he was crowned; and Venceslaus king of Bohemia, who had married Richsa daughter of Premislaus, being elected in his stead, was in 1300 consecrated at Gnesna. Ladislaus, after flying from his country and undergoing a series of calamitous adventures, was at length brought to a sense of his misconduct. Having regained the affection of his subjects, he was restored, in the lifetime of Venceslaus, to part of his dominions; and he recovered them all upon the demise of that monarch in the year 1305: he governed, however, for some years without the title of king; but at length in 1320 was crowned at Crackow, to which place he transferred the ceremony of the coronation; and afterwards enacted, that for the future his successors should be inaugurated in the cathedral of this city.

Since that period all the sovereigns have been consecrated at Crackow, excepting the last king. Previous to his election a decree was issued by the diet of convocation, that the coronation should be solemnized for this turn at Warsaw, without prejudice in future to the ancient right of Crackow; a proviso calculated to satisfy the populace, but which will not probably prevent any future sovereign from being crowned at Warsaw, now become the capital of Poland and the residence of its kings. The diadem and other regalia used at the coronation are still kept in the palace of Crackow, under so many keys, and with such care, that it it is impossible to obtain a sight of them.

Adjoining to the palace stands the cathedral, also within the walls of the citadel. Here all the sovereigns, from the time of Ladislaus Locketec, have been interred, a few only excepted, viz. Louis and Ladislaus II. who were kings of Hungary as well as of Poland, and whose bodies were deposited in Hungary; Alexander, who died and was buried at Vilna; Henry of Valois, interred in France; and the late monarch Augustus III. The sepulchres of the kings of Poland are not distinguished by any peculiar magnificence; their figures are carved in marble of no extraordinary workmanship, and some are without inscriptions.

The bishop of Crackow was formerly the first in the kingdom, and very often a cardinal. His revenues were large. The town has three suburbs, and had 25,736 inhabitants in 1810.

CRADLE, a well known machine in which infants are rocked to sleep.

It denotes also that part of the stock of a cross bow where the bullet is put.

CRADLE, in *Surgery*, a case in which a broken leg is laid after being set.

CRADLE, in engraving, is the name of an instrument used in scraping mezzotintos, and preparing the plate. It is formed of steel, resembling a chissel with one sloping side, upon which are cut hollow lines very near each other, and at equal distances. The acting part of this tool is made circular, and the corners are rounded

rounded. After being properly tempered, it must be sharpened on the whetstone. There are various sizes of this instrument.

CRADLE, among shipwrights, a frame placed under the bottom of a ship, in order to conduct her smoothly and steadily into the water when she is going to be launched; at which time it supports her weight while she slides down the descent or sloping passage called *the ways*, which are for this purpose daubed with soap and tallow.

CRAFT, a general name for all sorts of vessels employed to load or discharge merchant ships, or to carry alongside or return the stores of men of war. Such are lighters, hoys, barges, prames, &c. See those articles.

CRAKE, or CORN-CRAKE. See RALLUS, ORNITHOLOGY *Index*.

CRAIL, or CAREIL, a borough town of Scotland, situated on the sea-coast of the county of Fife, about seven miles south-east of St Andrews. Population, 1600. W. Long. 2. 20. N. Lat. 56. 17.

CRAMBE, SEA-CABBAGE, SEA-BEACH KALE, or SEA COLEWORT, a genus of plants belonging to the tetradynamia class, and in the natural method ranking under the 39th order, *Siliquosæ*. See BOTANY *Index*.

CRAMERIA, a genus of plants belonging to the tetrandria class. See BOTANY *Index*.

CRAMOND, OVER and NETHER, two villages about four miles west of Edinburgh; of which only the last deserves notice, as having been once a famous naval station of the Romans. It is situated at the influx of the river Almond into the Forth. Three Roman roads meet at this place, which was called by them *Alaterva*, and whither they brought their grain for the support of their troops. The village contains about 300 inhabitants. Here are the remains of a bath and sudatory; and many altars, medals, &c. have been dug up.

CRAMP, a spasmodic affection of the muscles of different parts of the body, as those of the neck, arms, legs, &c. accompanied with a violent but transitory pain. See MEDICINE *Index*.

CRAMP-Fish, or *Torpedo*. See RAJA, ICHTHYOLOGY *Index*.

CRAMP-Iron, or *Cramps*, a piece of iron bent at each end, which serves to fasten together pieces of wood, stones, or other things.

CRAMPONEE, in *Heraldry*, an epithet given to a cross which has at each end a cramp or square piece coming from it; that from the arm in chief towards the sinister angle, that from the arm on that side downwards, that from the arm in base towards the dexter side, and that from the dexter arm upwards.

CRANAGE, the liberty of using a crane at a wharf, and also the money paid for drawing up wares out of a ship, &c. with a crane.

CRANE. See ARDEA, ORNITHOLOGY *Index*.

CRANE, in *Mechanics*, a machine used in building for raising large stones and other weights. See MECHANICS.

CRANE's Bill. See GERANIUM, BOTANY *Index*.

CRANE-Fly, a species of TIPULA. See ENTOMOLOGY *Index*.

CRANGANOR, a Dutch factory on the Malabar coast in the East Indies, seated in E. Long. 75. 5. N. Lat. 10. 0. See COCHIN.

CRANIOLARIA, a genus of plants belonging to the didynamia class; and in the natural method ranking under the 40th order, *Personatæ*.

CRANIOSCOPY, a science which traces the connexion between the form of the skull and the powers of the mind. See SUPPLEMENT.

CRANIUM, in *Anatomy*, an assemblage of several bones which cover and enclose the brain and cerebellum, popularly called the *skull*. See ANATOMY *Index*. —The word comes from the Greek κρανιον, of κρανος, *galea*, "helmet."

CRANK, a contrivance in machines, in manner of an elbow, only of a square form, projecting out from an axis or spindle; and serving, by its rotation, to raise and fall the pistons of engines for raising water.

CRANK, in sea language. A ship is said to be *crank-sided*, when for want of a sufficient quantity of ballast or cargo, she cannot bear her sails, or can bear but small sail for fear of oversetting. She is said to be *crank by the ground*, when her floor is so narrow that she cannot be brought on ground without danger.

CRANK is also an iron brace which supports the lanthorns on the poop-quarters, &c.

CRANMER, THOMAS, a celebrated archbishop, reformer, and martyr, was the son of Thomas Cranmer, Esq. of Aslacton in Nottinghamshire, where our author was born in 1489. At the age of 14, he was admitted a student of Jesus College, Cambridge, of which he afterwards became fellow; but marrying the relation of an innkeeper's wife, he lost his fellowship and quitted the college. On the death of his wife he was re-admitted fellow of Jesus College. In 1523 he took the degree of doctor of divinity, and was made theological lecturer and examiner. The plague being at Cambridge, he retired to the house of a relation at Waltham Abbey, where, meeting with Fox the king's almoner, and Gardiner the secretary, he gave his opinion concerning King Henry's marriage with Catharine much to the satisfaction of his majesty. This opinion was, that instead of disputing about the validity of the king's marriage with Catharine, they should reduce the matter to this simple question, "Whether a man may marry his brother's wife or not?" When the king was told of it, he said, "This fellow has got the right sow by the ear." He then sent for him to court, made him one of his chaplains, and ordered him to write in vindication of the divorce in agitation. This book having quieted the tender conscience of the king, he was desirous that all Europe should be convinced of the illegality of his marriage with Queen Catharine; and for that purpose sent Cranmer to France, Italy, and Germany, to dispute the matter with the divines of those countries. At Nuremberg Cranmer married a second wife. Being returned to England, in March 1533 he was consecrated archbishop of Canterbury; in May following he pronounced the sentence of divorce between the king and queen; and soon after married the amorous monarch to Ann Boleyn. Being now at the head of the church, he exerted himself in the business of the Reformation. The Bible was translated into English, and monasteries dissolved, principally by his means.

In 1536 the royal conscience again required the as-

Cranmer.

sistance of our archbishop: in this year he divorced the king from Ann Boleyn. In 1537 he visited his diocese, and endeavoured to abolish the superstitious observance of holidays. In 1539 he and some of the bishops fell under the king's displeasure, because they could not be brought to give their consent in parliament that the monasteries should be suppressed for the king's sole use. He also strenuously opposed the act for the six articles in the house of lords, speaking three days against it; and upon the passing of that statute sent away his wife into Germany. In 1540 he was one of the commissioners for inspecting into matters of religion and explaining some of its chief doctrines. The result of the commission was the book entitled A necessary Erudition of any Christian man. After Lord Cromwell's death (in whose behalf he had written to the king), he retired and lived in great privacy, meddling not at all with state affairs. In 1541 he gave orders, pursuant to the king's directions, for taking away superstitious shrines; and exchanging Bishopsbourn for Beckesbourn, united the latter to his diocese. In 1542 he procured the "Act for the advancement of true religion and the abolishment of the contrary," which moderated the rigour of the six articles. But the year following, some enemies preferring accusations against him, he had like to have been ruined, had not the king interposed in his behalf. His majesty continued afterwards to protect him from his enemies; and at his death appointed him one of the executors of his will, and one of the regents of the kingdom. In 1556 he crowned young Edward, during whose short reign he promoted the reformation to the utmost of his power; and was particularly instrumental in composing, correcting, and establishing the liturgy by act of parliament. He had also a share in compiling the thirty-nine articles of religion.

In 1553 he opposed the new settlement of the crown upon Lady Jane Gray, and would no way be concerned in that affair (though at last, through many importunities, he was prevailed upon to set his hand to it); neither would he join in any of Dudley's ambitious projects. Upon Queen Mary's accession to the throne, he was committed to the Tower; partly for setting his hand to the instrument of Lady Jane's succession, and partly for the public offer he had made a little before of justifying openly the religious proceedings of the late king. Some of his friends, foreseeing the storm that was likely to fall upon him, advised him to fly, but he absolutely refused. In the ensuing parliament, on November the 3d, he was attainted, and at Guildhall found guilty of high treason; whereupon the fruits of his archbishopric were sequestrated. In April 1554, he and Ridley and Latimer were removed to Oxford, in order for a public disputation with the Papists; which was accordingly held there towards the middle of the month, with great noise, triumph, and impudent confidence on the Papists side, and with as much gravity, learning, modesty, and convincing sufficiency on the side of the Protestant bishops. The 20th of April, two days after the end of these disputations, Cranmer and the two others were brought before the commissioners, and asked, Whether they would subscribe (to Popery)? which they unanimously refusing, were condemned as heretics. From this sentence the archbishop appealed to the last judgment of the Almighty; and wrote to the council, giving them an account of the disputation, and desiring the queen's pardon for his treason, which it seems was not yet remitted. By the convocation, which met this year, his Defence of the true and Catholic Doctrine of the Sacrament of the Body and Blood of our Saviour Christ was ordered to be burnt. Some of his friends petitioned the queen in his behalf; putting her in mind how he had once preserved her in her father's time by his earnest intercessions with him for her, so that she had reason to believe he loved her, and would speak the truth to her more than all the rest of the clergy. All endeavours in his behalf, however, were ineffectual; and the archbishop being degraded and most ignominiously treated, was at last flattered and terrified into an insincere recantation and renunciation of the Protestant faith. But this triumph was not sufficient to gratify the pious vengeance of the Romish Mary. On the 24th of Feb. 1556, a writ was signed for the burning of Cranmer; and on the 24th March, which was the fatal day, he was brought to St Mary's Church, Oxford, and placed on a kind of stage over against the pulpit, where Dr Cole, provost of Eton, was appointed to preach a sermon on the occasion. While Cole was haranguing, the unfortunate Cranmer expressed great inward confusion; often lifting up his hands and eyes to heaven, and frequently pouring out floods of tears. At the end of the sermon, when Cole desired him to make an open profession of his faith, as he had promised him he would, he first prayed in the most fervent manner; then made an exhortation to the people present, not to set their minds upon the world, to obey the king and queen, to love each other, and to be charitable. After this he made a confession of his faith, beginning with the creed, and concluding with these words: "And I believe every word and sentence taught by our Saviour Jesus Christ, his apostles, and prophets, in the Old and New Testament.—And now (added he) I come to the great thing that so much troubleth my conscience, more than any thing I ever said or did in my whole life; and that is, the setting abroad a writing contrary to the truth, which I here now renounce as things written with my hand contrary to the truth which I thought in my heart; and written for fear of death, and to save my life if it might be: that is, all such bills and papers which I have written or signed with my hand since my degradation, wherein I have written many things untrue. And forasmuch as my hand offended, writing contrary to my heart, my hand shall first be punished; for, may I come to the fire, it shall be first burned. As for the pope, I refuse him as Christ's enemy and antichrist, with all his false doctrine. And as for the sacrament, I believe as I have taught in my book against the bishop of Winchester." Thunderstruck as it were with this unexpected declaration, the enraged Popish crowd admonished him not to dissemble. "Ah! (replied he with tears) since I lived hitherto, I have been a hater of falsehood and a lover of simplicity, and never before this time have I dissembled." Whereupon they pulled him off the stage with the utmost fury, and hurried him to the place of his martyrdom over against Baliol college; where he put off his clothes in haste, and standing in his shirt, and without shoes, was fastened with a chain to the stake. Some pressing him to agree to his former recantation,

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he answered, showing his hand, "This is the hand that wrote it, and therefore it shall first suffer punishment." Fire being applied to him, he stretched out his right hand into the flame, and held it there unmoved (except that once with it he wiped his face) till it was consumed; crying with a loud voice, "This hand hath offended;" and often repeating, "This unworthy right hand." At last the fire getting up, he soon expired, never stirring or crying out all the while; only keeping his eyes fixed to heaven, and repeating more than once, "Lord Jesus receive my spirit." Such was the end of the renowned Thomas Cranmer, in the 67th year of his age.

It was noticed above, that after the passing of the act for the six articles, Archbishop Cranmer sent his wife into Germany. But she afterwards returned again to England; and Mr Strype informs us, that "in the time of King Edward, when the marriage of the clergy was allowed, he brought her forth, and lived openly with her." Mr Gilpin says, "he left behind him a widow and children; but as he always kept his family in obscurity for prudential reasons, we know little about them. They had been kindly provided for by Henry VIII.; who, without any solicitation from the primate himself, gave him a considerable grant from the abbey of Walbeck in Nottinghamshire, which his family enjoyed after his decease. King Edward made some addition to his private fortune; and his heirs were restored in blood by an act of parliament in the reign of Elizabeth.

Archbishop Cranmer wrote a great number of books: many of them he published himself; and many of them still remain in MSS. viz. two folio volumes in the king's library, several letters in the Cotton collection, &c.

Mr Gilpin remarks, that "the character of the archbishop hath been equally the subject of exaggerated praise and of undeserved censure. The most indefensible parts of the archbishop's character are the readiness with which he sometimes concurred in the unjustifiable proceedings of Henry VIII. and the instances wherein he showed himself to be actuated by intolerant principles.

"He first recommended himself to Henry by the zeal which he displayed in promoting the king's divorce from Queen Catharine. As to this, it may be allowed, that Dr Cranmer might think the marriage wrong: but though it possibly might be a point of conscience with the king, it could, however, be none with him; and there was manifestly a difference between advising not to do a thing, and advising to undo it when already done, at least in a matter of so disputable a nature. On the other hand, to repudiate a woman with whom the king had cohabited near 20 years as his wife, and to illegitimate a daughter, bred up in the highest expectations, and now marriageable, were acts of such cruelty, that it seems to indicate a want of feeling to be in any degree accessary to them. To this may be added, that the notoriety of the king's passion for Ann Boleyn, which all men believed to be, if not the first mover, at least the principal spring of his pretended scruples, threw a very indelicate imputation on all who had any concern in the affair. No serious churchman, one would imagine, could be fond of the idea of administering to the king's passions. It is with concern, therefore, that we see a man of Dr Cranmer's integrity and simplicity of manners acting so much out of character as to compound an affair of this kind, if not with his conscience, at least with all delicacy of sentiment; and to parade through Europe, in the quality of an ambassador, defending everywhere the king's *pious intentions*. But the cause (continues Mr Gilpin) animated him. With the illegality of the king's marriage, he endeavoured virtually to establish the insufficiency of the pope's dispensation; and the latter was an argument so near his heart, that it seems to have added merit to the former. We cannot, indeed, account for his embarking so zealously in this business, without supposing his principal motive was to free his country from the tyranny of Rome, to which this step very evidently led. So desirable an end would in some degree, he might imagine, sanctify the means."

Of two of the instances of persecution in which Archbishop Cranmer was concerned, Mr Gilpin gives the following account. "Joan Bocher and George Paris where accused, though at different times; one for denying the humanity of Christ, the other for denying his divinity. They were both tried and condemned to the stake; and the archbishop not only consented to these acts of blood, but even persuaded the aversion of the young king into a compliance. "Your majesty must distinguish (said he, informing his royal pupil's conscience) between common opinions and such as are the essential articles of faith. These latter we must on no account suffer to be opposed." Mr Gilpin justly observes, that "nothing even plausible can be suggested in defence of the archbishop on this occasion, except only that the spirit of Popery was not yet wholly repressed." These instances of injustice and barbarity were indeed totally indefensible, and a great disgrace to Cranmer, and to all who were concerned in them. It does not appear that he endeavoured to promote the death of Lambert; but, as Mr Gilpin observes, it were to be wished he had rid his hand of the disputation likewise. The public disputation, in which Cranmer bore some part, proved the means of bringing Lambert to the stake.

One of the most honourable transactions of Archbishop Cranmer's life, was the firm stand that he made against the act of the six articles. This act was so strongly supported by the king, that even the Protestants in parliament made little opposition to it. But Cranmer opposed it with great zeal and steadiness. "The good archbishop (says Mr Gilpin) never appeared in a more truly Christian light than on this occasion. In the midst of so general a defection (for there were numbers in the house who had hitherto shown great forwardness in reformation) he alone made a stand. Three days he maintained his ground, and baffled the arguments of all opposers. But argument was not their weapon, and the archbishop saw himself obliged to sink under superior power. Henry ordered him to leave the house. The primate refused: 'It was God's business (he said), and not man's.' And when he could do no more, he boldly entered his protest. Such an instance of fortitude is sufficient to wipe off many of those courtly stains which have fastened on his memory."

His behaviour in the cause of the duke of Norfolk was also entitled to great commendation. "The last act

 act of this reign (says Mr Gilpin) was an act of blood, and gave the archbishop a noble opportunity of showing how well he had learned that great Christian lesson of forgiving an enemy. Almost without the shadow of justice, Henry had given directions to have the duke of Norfolk attainted by an act of parliament. The king's mandate stood in lieu of guilt, and the bill passed the house with great ease. No man, except the bishop of Winchester, had been so great an enemy to the archbishop as the duke of Norfolk. He had always thwarted the primate's measures, and oftener than once had practised against his life. How many would have seen with secret pleasure the working of Providence against so rancorous an enemy; satisfied in having themselves no hand in his unjust fate! But the archbishop saw the affair in another light: he saw it with horror; and although the king had in a particular manner interested himself in this business, the primate opposed the bill with all his might; and when his opposition was vain, he left the house with indignation, and retired to Croydon."

He was indeed remarkable for the placability of his temper, and for showing kindness to those by whom he had been greatly injured. Hence it is mentioned in Shakespeare's Henry VIII. as a common saying concerning him:

——————" Do my lord of Canterbury
But one shrewd turn, and he's your friend for ever."

Archbishop Cranmer was a great friend and patron of learned foreigners, who had been persecuted for their attachment to the principles of the reformation. Mr Gilpin says, " the suffering professors of Protestantism, who were scattered in great numbers about the various countries of Europe, were always sure of an asylum with him. His palace at Lambeth might be called a seminary of learned men: the greater part of whom persecution had driven from home. Here, among other celebrated reformers, Martyr, Bucer, Aless, Phage, found sanctuary. Martyr, Bucer, and Phage, were liberally pensioned by the archbishop till he could otherwise provide for them. It was his wish to fix them in the two universities, where he hoped their great knowledge and spirit of inquiry would forward his designs of restoring learning; and he at length obtained professorships for them all. Bucer and Phage were settled at Cambridge; where they only showed what might have been expected from them, both dying within a few months after their arrival. But at Oxford Martyr acted a very conspicuous part, and contributed to introduce among the students there a very liberal mode of thinking.

Of the learning of Archbishop Cranmer, Mr Gilpin remarks, that " it was chiefly confined to his profession. He had applied himself in Cambridge to the study of the Greek and Hebrew languages; which though esteemed at that time as the mark of heresy, appeared to him the only sources of attaining a critical knowledge of the Scriptures. He had so accurately studied canon law, that he was esteemed the best canonist in England; and his reading in theology was so extensive, and his collections from the Fathers so very voluminous, that there were few points in which he was not accurately informed, and in which he could not give the opinions of the several ages of the church from the times of the apostles. He was a sensible writer, rather nervous than elegant. His writings were entirely confined to the great controversy which then subsisted, and contain the whole sum of the theological learning of those times. His library was filled with a very noble collection of books, and was open to all men of letters.

Mr Gilpin, after remarking that Archbishop Cranmer preached often wherever he visited, says, " In his sermons to the people, he was very plain and instructive; insisting chiefly on the essentials of Christianity. The subjects of his sermons, for the most part, were from whence salvation is to be fetched, and on whom the confidence of men ought to lean. They insisted much on doctrines of faith and works; and taught what the fruits of faith were, and what place was to be given to works; they instructed men in the duties they owed their neighbour, and that every one was our neighbour, to whom we might any way do good; they declared what men ought to think of themselves after they had done all; and, lastly, what promises Christ hath made, and who they are to whom he will make them good. Thus he brought in the true preaching of the gospel, altogether different from the ordinary way of preaching in those days; which was to treat concerning saints, to tell legendary tales of them, and to report miracles wrought for the confirmation of transubstantiation and other popish corruptions. And such a heat of conviction accompanied his sermons, that the people departed from them with minds possessed of a great hatred of vice, and burning with a desire of virtue."

He was a great economist of his time. Mr Gilpin says, " he rose commonly at five o'clock, and continued in his study till nine. These early hours, he would say, were the only hours he could call his own. After breakfast he generally spent the remainder of the morning either in public or private business. His chapel-hour was eleven, and his dinner-hour twelve. After dinner he spent an hour either in conversation with his friends, in playing at chess, or in what he liked better, overlooking a chess-board. He then retired again to his study till his chapel-bell rang at five. After prayers, he generally walked till six, which was in those times the hour of supper. His evening meal was sparing. Often he ate nothing; and when that was the case, it was his usual custom, as he sat down to table, to draw on a pair of gloves; which was as much as to say, that his hands had nothing to do. After supper, he spent an hour in walking and another in his study, retiring to his bedchamber about nine. This was his usual mode of living when he was most vacant, but very often his afternoons as well as his mornings were engaged in business. He generally, however, contrived, if possible, even in the busiest day, to devote some portion of his time to his books besides the morning. And Mr Fox tells us, he always accustomed himself to read and write in a standing posture; esteeming constant sitting very pernicious to a studious man."

Mr Gilpin also observes, " that he was a very amiable master in his family, and admirably preserved the difficult medium between indulgence and restraint. He had, according to the custom of the times, a very numerous retinue, among whom the most exact order was a primitive saint, he offered more prayers in the night than others usually offer in the day. There he penned the said poems called "Steps to the Temple for Happy Souls to Climb to Heaven by." To the said Steps are joined other poems called, "The Delight of the Muses," wherein are several Latin poems, which though of a mere human mixture, yet they are sweet as they are innocent. He hath also written *Carmen Deo Nostro*, being hymns and other sacred poems, addressed to the countess of Denbigh. He was excellent in five languages besides his mother tongue, namely, Hebrew, Greek, Latin, Italian, and Spanish.

CRASIS (from *κεραννυμι*, "to mix,") the temper of the blood peculiar to every constitution.

CRASIS, in *Grammar*, is a figure whereby two different letters are either contracted into one long letter or a diphthong. Such, e. g. is *οφις* for *οφιας*; *αληθη* for *αληθεα*, &c. *τυχυς* for *τυχεος*, &c. where *ι* and *α* are contracted into *ι*; and *ε* and *α* into *η*; and *ε* and *ο* into *υ*.

CRASSAMENTUM, in *Physic*, the thick red or fibrous part of the bload, otherwise called *cruor*, in contradistinction to the serum or aqueous part.

CRASSULA, LESSER ORPINE, or *Live-ever*; a genus of plants, belonging to the pentandria class; and in the natural method ranking under the 13th order, *Succulentæ*. See BOTANY *Index*.

CRASSUS, M. LICINIUS, a celebrated Roman, surnamed *Rich* on account of his opulence. At first he was very circumscribed in his circumstances, but by educating slaves and selling them at a high price he soon enriched himself. The cruelties of Cinna obliged him to leave Rome, and he retired to Spain, where he remained concealed for eight months. After Cinna's death he passed into Africa, and thence to Italy, where he served Sylla and ingratiated himself in his favour. When the gladiators with Spartacus at their head had spread an universal alarm in Italy and defeated some of the Roman generals, Crassus was sent against them. A battle was fought, in which Crassus slaughtered 12,000 of the slaves, and by this decisive blow soon put an end to the war, and was honoured with an *ovatio* at his return. He was soon after made consul with Pompey in the year of Rome 682, and in this high office he displayed his opulence by entertaining the populace at 10,000 tables. He was afterwards censor, and formed the first triumvirate with Pompey and Cæsar. As his love of riches was more predominant than that of glory, Crassus never imitated the ambitious conduct of his colleagues, but was satisfied with the province of Syria, which seemed to promise an inexhaustible source of wealth. With hopes of enlarging his possessions he set off from Rome, though the omens proved unfavourable, and every thing seemed to threaten his ruin. He crossed the Euphrates, and forgetful of the rich cities of Babylon and Seleucia, he hastened to make himself master of Parthia. He was betrayed in his march by the delay of Artavasdes king of Armenia, and the perfidy of Ariamnes. He was met in a large plain by Surena the general of the forces of Orodes king of Parthia, and a battle was fought in which 20,000 Romans were killed and 10,000 taken prisoners. The darkness of the night favoured the escape of the rest; and Crassus, forced by the mutiny and turbulence of his soldiers, and the treachery of his guides, trusted himself to the general of the enemy on pretence of proposing terms of accommodation, and he was killed. His head was cut off and sent to Orodes, who poured melted gold down his throat, and insulted his misfortunes. Though he has been called avaricious, yet he showed himself always ready of lending money to his friends without interest. He was fond of philosophy, and his knowledge of history was great and extensive.

CRATÆGUS, WILD SERVICE TREE, *Hawthorn*, &c. a genus of plants, belonging to the icosandria class; and in the natural method ranking under the 36th order, *Pomaceæ*. See BOTANY *Index*.

The oxycanthus, hawthorn, or white thorn, grows naturally all over Europe. It is sometimes cultivated as an ornamental tree, but it is chiefly propagated for the purpose of planting as a fence. In order to propagate a quantity of quicks, one method is generally practised; namely, first burying the haws, and taking them up to sow the October following; though, says Hanbury, there is another way more preferable; namely, to prepare the beds, and sow the haws soon after they are gathered. Whoever pursues the former method, having gathered what quantity of haws will answer his purpose, should in some bye-corner of the kitchen-garden or nursery dig a hole or pit capacious enough to receive them; some of the earth which came out of the hole, after the haws are put in it, should be laid upon them; and being thus carefully covered down, they may remain there till October. Then, having ground well dug, and cleared of the roots of all troublesome weeds, and the mould being fit for working, the beds should be made for the haws. Four feet is a very good width of these beds, as they may be easily reached over to be weeded; and if the alleys between be each one foot and a half wide, they will be of a good size. The beds being marked out with a line, sufficient mould must be raked out to cover the haws an inch and a half deep. This being done, and the bottom of the beds being made level and even, the haws should be sown, and afterwards gently tapped down with the back of the spade; and then the fine mould, which had been raked out of the beds, must be thrown over them, covering them an inch and a half deep. In the spring the plants will come up, and in the summer following should be kept clear of weeds; though it does sometimes happen, that few of them will appear till the second spring after sowing. Sometimes the young plants are planted out from the seed-beds at one, two, or three years old; but the best plants are obtained by transplanting them into fresh mould the first or second year, letting them remain in the nursery two or three years longer. The practice of the London nurserymen is this: The strongest of the seed-bed plants having been drawn at two or three years old for sale, they clean the beds entirely by drawing the remaining weak underling plants, and transplanting them into fresh beds in this manner, which they call *bedding them*: The ground having been trenched, and the tips of the plants as well as the lower fibres of their roots having been taken off with a sharp knife, they strain a line along one side of the bed; and by chopping with a spade by the side of the line, leave a clift or drill of a depth proportioned to the length of the plants to be laid in; and drawing the loose mould somewhat towards them, leave the side of the drill next of our Saviour. It is a capital design of Crayer; and although it consists of a great number of figures, the harmony and union are well preserved.

CRAYON, a general name for all coloured stones, earths, or other minerals and substances, used in designing or painting in pastel; whether they have been beaten and reduced to a paste, or are used in their primitive consistence, after sawing or cutting them into long narrow slips. In this last manner are red crayons made, of blood-stone or red chalk; black ones, of charcoal and black-lead. Crayons of all other colours are compositions of earths reduced to paste.

Crayon-Painting. Whether the painter works with oil-colours, water-colours, or crayons, the grand object of his pursuit is still the same: a just imitation of nature. But each species has its peculiar rules and methods. Painting with crayons requires in many respects a treatment different from painting in oil-colours; because all colours used dry are in their nature of a much warmer complexion than when wet with oils, &c. For this reason, in order to produce a rich picture, a much greater portion of what painters term *cooling teints* must be applied in crayon painting than would be judicious to use in oils. Without any danger of a mistake, it is to be supposed, the not being acquainted with this observation is one great cause why so many oil painters have no better success when they attempt crayon-painting. On the contrary, crayon painters being so much used to their teints, which are of a cold nature when used wet, are apt to introduce them too much when they paint oils, which is seldom productive of a good effect.

We shall now endeavour to give the student some directions towards the attainment of excellence in this art.

Of the Application of the Crayons, with some previous Dispositions. The student must provide himself with some strong blue paper, the thicker the better, if the grain is not too coarse or knotty, though it is almost impossible to get any entirely free from knots. The knots should be levelled with a penknife or razor, otherwise they will prove exceedingly troublesome. After this is done, the paper must be pasted very smooth on a linen cloth, previously strained on a deal frame, the size according to the artist's pleasure: on this the picture is to be executed; but it is most eligible not to paste the paper on till the whole subject is first dead coloured. The method of doing this is very easy, by laying the paper with the dead colour on its face, upon a smooth board or table, when, by means of a brush, the backside of the paper must be covered with paste; the frame with the strained cloth, must then be laid on the pasted side of the paper; after which turn the painted side uppermost, and lay a piece of clean paper upon it, to prevent smearing it: this being done, it may be stroked gently over with the hand; by which means all the air between the cloth and the paper will be forced out.

When the paste is perfectly dry, the student may proceed with the painting. The advantages arising from pasting the paper on the frame according to this method, after the picture is begun, are very great, as the crayons will adhere much better than any other way; which will enable the student to finish the picture with a firmer body of colour and greater lustre.

When the painters want to make a very correct copy of a picture, they generally make use of tiffany or black gauze, strained tight on a frame, which they lay flat on the subject to be imitated, and with a piece of sketching chalk trace all the outlines on the tiffany. They then lay the canvas to be painted on flat upon the floor, placing the tiffany with the chalked lines upon it, and with an handkerchief brush the whole over; this presents the exact outlines of the picture on the canons. The crayon-painter may also make use of this method when the subject of his imitation is in oils; but in copying a crayon picture, he must have recourse to the following method, on account of the glass.

The picture being placed upon the easel, let the outlines be drawn on the glass with a small camel's hair pencil dipped in lake, ground thin with oils, which must be done with great exactness. After this is accomplished, take a sheet of paper of the same size, and place it on the glass, stroking over all the lines with the hand, by which means the colour will adhere to the paper, which must be pierced with pin-holes pretty close to each other. The paper intended to be used for the printing must next be laid upon a table, and the pierced paper placed upon it; then with some fine pounded charcoal, tied up in a piece of lawn, rub over the pierced lines, which will give an exact outline; but great care must be taken not to brush this off till the whole is drawn over with sketching chalk, which is a composition made of whiting and tobacco-pipe clay, rolled like the crayons, and pointed at each end.

When a student paints immediately from the life, it will be most prudent to make a correct drawing of the outlines on another paper, the size of the picture he is going to paint, which he may trace by the preceding method, because erroneous strokes of the sketching chalk (which are not to be avoided without great expertness) will prevent the crayons from adhering to the paper, owing to a certain greasy quality in the composition.

The student will find the sitting posture, with the box of crayons in his lap, the most convenient method for him to paint. The part of the picture he is immediately painting should be rather below his face; for, if it be placed too high, the arm will be fatigued. Let the windows of the room where he paints be darkened, at least to the height of six feet from the ground; and the subject to be painted should be situated in such a manner, that the light may fall with every advantage on the face, avoiding too much shadow, which seldom has a good effect in portrait painting, especially if the face he paints from has any degree of delicacy.

Before he begins to paint, let him be attentive to his subject, and appropriate the action or attitude proper to the age of the subject: if a child, let it be childish; if a young lady, express more vivacity than in the majestic beauty of a middle-aged woman, who also should not be expressed with the same gravity as a person far advanced in years. Let the embellishments of the picture, and introduction of birds, animals, &c. be regulated by the rules of propriety and consistency.

The features of the face being correctly drawn with chalks,

chalks, let the student take a crayon of pure carmine, and carefully draw the nostril and edge of the nose next the shadow; then, with the faintest carmine teint, lay in the highest light upon the nose and forehead, which must be executed broad. He is then to proceed gradually with the second teint, and the succeeding ones, till he arrives at the shadows, which must be covered brilliant, enriched with much lake, carmine, and deep green. This method will at first offensively strike the eye, from its crude appearance; but in the finishing, it will be a good foundation to produce a pleasing effect, colours being much more easily sullied when too bright than when the first colouring is dull, to raise the picture into a brilliant state. The several pearly teints discernible in fine complexions must be imitated with blue verditer and white, which answers to the ultramarine teints used in oils. But if the parts of the face where these teints appear are in shadow, the crayons composed of black and white must be substituted in their place.

Though all the face when first coloured should be laid in as brilliant as possible, yet each part should be kept in its proper tone; by which means the rotundity of the face will be preserved.

Let the student be careful, when he begins the eyes, to draw them with a crayon inclined to the carmine teint, of whatever colour the irises are of; he must lay them in brilliant, and at first not loaded with colour, but executed lightly: no notice is to be taken of the pupil yet. The student must let the light of the eye incline very much to the blue cast, cautiously avoiding a staring white appearance (which, when once introduced, is seldom overcome), preserving a broad shadow thrown on its upper part by the eyelash. A black and heavy teint is also to be avoided in the eyebrows; it is therefore best to execute them like a broad glowing shadow at first, on which, in the finishing, the hairs of the brow are to be painted; by which method of proceeding, the former teints will show themselves through, and produce the most pleasing effect.

The student should begin the lips with pure carmine and lake, and in the shadow use some carmine and black; the strong vermilion teints should be laid on afterwards. He must beware of executing them with stiff, harsh lines, gently intermixing each with the neighbouring colours, making the shadow beneath broad, and enriched with brilliant crayons. He must form the corner of the mouth with carmine, brown ochre, and greens, variously intermixed. If the hair is dark, he should preserve much of the lake and deep carmine teints therein; this may easily be overpowered by the warmer hair-teints, which, as observed in painting the eyebrows, will produce a richer effect when the picture is finished; on the contrary, if this method is unknown or neglected, a poverty of colouring will be discernible.

After the student has covered over, or, as artists term it, has dead-coloured the head, he is to sweeten the whole together, by rubbing it over with his finger, beginning at the strongest light upon the forehead, passing his finger very lightly, and uniting it with the next teint, which he must continue till the whole is sweetened together, often wiping his finger on a towel to prevent the colours being sullied. He must be cautious not to smooth or sweeten his picture too often, because it will give rise to a thin and scanty effect, and have more the appearance of a drawing than a solid painting; as nothing but a body of rich colours can constitute a rich effect. To avoid this (as the student finds it necessary to sweeten with the finger), he must commonly replenish the picture with more crayon.

When the head is brought to some degree of forwardness, let the back ground be laid in, which must be treated in a different manner, covering it as thin as possible, and rubbing it into the paper with a leather stump. Near the face the paper should be almost free from colour, for this will do great service to the head, and by its thinness give both a soft and solid appearance. In the back ground also, no crayon that has whiting in its composition should be used, but chiefly such as are the most brilliant and the least adulterated. The ground being painted thin next the hair, will give the student an opportunity of painting the edges of the hair over in a light and free manner when he gives the finishing touches.

The student having proceeded thus far, the face, hair, and back ground being entirely covered, he must carefully view the whole at some distance, remarking in what respect it is out of keeping, that is, what parts are too light, and what too dark, being particularly attentive to the white or chalky appearances, which must be subdued with lake and carmine. The above method being properly put into execution, will produce the appearance of a painting principally composed of three colours, viz. carmine, black, and white, which is the best preparation a painter can make for the producing a fine crayon picture.

The next step is, to complete the back-ground and the hair, as the dust, in painting these, will fall on the face, and would much injure it if that was completed first. From thence proceed to the forehead, finishing downward till the whole picture is completed.

In painting over the forehead the last time, begin the highest light with the most faint vermilion teint, in the same place where the faint carmine was first laid, keeping it abroad in the same manner. In the next shade succeeding the lightest, the student must work in some light blue teints, composed of verditer and white, intermixing with them some of the deeper vermilion teints, sweetening them together with great caution, insensibly melting them into one another, increasing the proportion of each colour as his judgment shall direct. Some brilliant yellows may also be used, but sparingly; and towards the roots of the hair, strong verditer teints, intermixed with greens, will be of singular service. Cooling crayons, composed of black and white, should succeed these, and melt into the hair. Beneath the eyes, the sweet pearly teints are to be preserved, composed of verditer and white, and under the nose, and on the temples, the same may be used; beneath the lips, teints of this kind also are proper, mixing them with the light greens and some vermilion.

In finishing the cheeks, let the pure lake clear them from any dust contracted from the other crayons; then with the lake may be intermixed the bright vermilion; and last of all (if the subject should require it) a few touches of the orange-coloured crayon, but with extreme caution; after, sweeten that part with the finger as little as possible, for fear of producing a heavy disagreeable effect on the cheeks; as the beauty of a crayon-picture consists in one colour showing itself through, or rather between, another: this the student cannot too often remark, it being the only method of imitating beautiful complexions.

The eye is the feature most difficult to execute in crayons, as every part must be expressed with the utmost nicety, to appear finished; at the same time that the painter must preserve its breadth and solidity while he is particularizing the parts. To accomplish this, it will be a good general rule for the student to use his crayon in sweetening as much, and his finger as little, as possible. When he wants a point to touch a small part with, he may break off a little of his crayon against the box, which will produce a corner fit to work with in the minutest parts. If the eye-lashes are dark, he must use some of the carmine and brown ochre, and the crayon of carmine and black; and with these he may also touch the iris of the eye (if brown or hazel), making a broad shadow, caused by the eye-lash. Red teints of vermilion, carmine, and lake, will execute the corners of the eye properly; but if the eyelids are too red, they will have a disagreeable sore appearance. The pupil of the eye must be made of pure lamp-black: between this and the lower part of the iris, the light will catch very strong, but it must not be made too sudden, but be gently diffused round the pupil till it is lost in shade. When the eye-balls are sufficiently prepared, the shining speck must be made with a pure white crayon, which should be first broken to a point, and then laid on firm; but as it is possible they may be defective in neatness, they should be corrected with a pin, taking off the redundant parts, by which means they may be formed as neat as can be required.

The difficulty with respect to the nose, is to preserve the lines properly determined, and at the same time so artfully blended into the cheek, as to express its projection, and yet no real line to be perceptible upon a close examination; in some circumstances it should be quite blended with the cheek, which appears behind it, and determined entirely with a slight touch of red chalk. The shadow caused by the nose is generally the darkest in the whole face, partaking of no reflection from its surrounding parts. Carmine and brown ochre, carmine and blacks, and such brilliant crayons, will compose it best.

The student having before prepared the lips with the strongest lake and carmine, &c. must with these colours make them completely correct; and when finishing, introduce the strong vermilions, but with great caution, as they are extremely predominant. This, if properly touched, will give the lips an appearance equal, if not superior, to those executed in oils, notwithstanding the seeming superiority the latter has by means of glazing (A), of which the former is entirely destitute.

When the student paints the neck, he should avoid expressing the muscles too strong in the stem, nor should the bones appear too evident on the chest, as both have an unpleasing effect, denoting a violent agitation of the body; a circumstance seldom necessary to express in portrait painting. The most necessary part to be expressed, and which should ever be observed, (even in the most delicate subjects), is a strong marking just above the place where the collar bones unite; and if the head is much thrown over the shoulders, some notice should be taken of the large muscle that rises from behind the ear, and is inserted into the pit between the collar bones. All inferior muscles should be, in general, quite avoided. The student will find this caution necessary, as most subjects, especially thin persons, have the muscles of the neck much more evident than would be judicious to imitate. As few necks are too long, it may be necessary to give some addition to the stem, a fault on the other side being quite unpardonable, nothing being more ungraceful than a short neck. In colouring the neck, let the student preserve the stem of a pearly hue, and the light not so strong as on the chest. If any part of the breast appears, its transparency must also be expressed by pearly teints; but the upper part of the chest should be coloured with beautiful vermilions delicately blended with the other.

Of the Drapery. Dark blue, purple, black, pink, and all kinds of red draperies also, should be first tinged with carmine, which will render the colours much more brilliant than any other method; over this should be laid on the paper the middle teint (a medium between the light and dark teints), of which the drapery is to be painted, except the dark masses of shadow, which should be laid on at first as deep as possible; these, sweetened with the finger, being destitute of the smaller folds, will exhibit a masterly breadth, which the lesser folds when added ought by no means to destroy. With the light and dark teints, the smaller parts are next to be made with freedom, executing as much with the crayon, and as little with the finger, as possible; in each fold touching the last stroke with the crayon, which stroke the finger must never touch. In the case of reflections, the simple touch of the crayon will be too harsh, therefore fingering will be necessary afterwards, as reflected lights are always more gentle than those which are direct. With respect to reflections in general, they must always partake of the same colour as the object reflecting, but in the case of single figures, it may be useful to make some particular observations.

In a blue drapery, let the reflections be of a greenish cast; in green draperies make them of a yellow teint; in yellow, of an orange; in orange, reflect a reddish cast; all reds, something of their own nature, but inclined to the yellow: black should have a reddish reflection; the reflection of a reddish teint will also present purples to the best advantage.

Of whatever colour the drapery is, the reflection on the face must partake thereof, otherwise the picture,

(A) The method with which painters in oils express transparency in the lips is, by painting them first with light vermilion teints, and, when dry, touching them over with pure lake.

ture, like painting on glass, will have but a gaudy effect.

Linens, lace, fur, &c. should be touched spiritedly with the crayon, fingering very little, except the latter; and the last touches, even of this, like all other parts, should be executed with the crayon, without sweetening with the finger.

The methods above recommended have been practised by the most celebrated crayon-painters, whose works have been held in public estimation; but the knowledge of, and ability to execute, each separate part with brilliancy and truth, will be found very insufficient to constitute a complete painter, without his judgment enables him to unite them with each other, by correctness of drawing, propriety of light and shadow, and harmony of colouring. In order to accomplish this, the student should carefully avoid finishing one part in particular, till he has properly considered the connection it is to have with the rest. The neglect of this is the principal reason why the performances of indifferent painters are so destitute of what is termed breadth, so conspicuously beautiful in the works of great masters. It must be granted, that this observation relates more particularly to large compositions, where a diversity of figures requires such a judicious disposition, that each may assist in the combination of a kind of universal harmony; yet, even in portrait-painting, the student should be particularly attentive to observe this idea of breadth, if he is desirous of acquiring that importance and dignity which constitutes excellence in painting.

Of the Materials. The perfection of the crayons consists, in a great measure, in their softness; for it is impossible to execute a brilliant picture with them if they are otherwise; on which account great care should be observed in the preparing them, to prevent their being hard. In all compositions, flake-white and white-lead should be wholly rejected, because the slightest touch with either of these would unavoidably turn black.

The usual objection to crayon-paintings is, that they are subject to change; but whenever this happens, it is entirely owing to an injudicious use of the above-mentioned whites, which will stand only in oils. To obviate the bad effects arising from the use of such crayons, let the student make use of common whiting prepared in the following manner.

Take a large vessel of water, put the whiting into it, and mix them well together; let this stand about half a minute, then pour off the top into another vessel, and throw the gritty sediment away; let what is prepared rest about a minute, and then pour it off as before, which will purify the whiting and render it free from all dirt and grittiness. When this is done, let the whiting settle, and then pour the water from it; after which, lay it on the chalk to dry, and keep it for use, either for white crayons, or the purpose of preparing teints with other colours, for with this all other teints may be safely prepared. If the student chooses to make crayons of the whiting immediately after it is washed, it is not necessary to dry it on the chalk, for it may be mixed instantly with any other colour, which will save considerable trouble. All colours of a heavy or gritty nature, especially blue verditer, must be purified by washing after this method.

The student must be provided with a large, flexible pallet-knife, a large stone and muller to levigate the colours, two or three large pieces of chalk to absorb the moisture from the colours after they are levigated, a piece of flat glass to prevent the moisture from being absorbed too much, till the colours are rolled into form, and vessels for water, spirits, &c. as necessity and convenience as shall direct.

I. Reds. It is rather difficult to procure either good carmine or good lake. Good carmine is inclined to the vermilion teint, and good lake to the carmine teint. The carmine crayons are prepared in the following manner.

1. Carmine. As their texture is inclinable to hardness, instead of grinding and rolling them, take a sufficient quantity of carmine, lay it upon the grinding-stone, mix it with a levigating knife with spirit of wine till it become smooth and even. The chalk-stone being ready, lay the colour upon it to absorb the spirit; but be careful that it is laid on in a proper state for painting. If it is levigated too thin, the crayons will be too flat; and if too thick, it will occasion a waste of colour, by their adhering to the pallet-knife; but practice will render the proper degree of consistency familiar. The simple colour being prepared, the next step is to compose the different teints by a mixture with whiting; the proportion to be observed consisting of 20 gradations to one, which may be clearly understood by the following directions. Take some of the simple colour, and levigate it with spirit of wine, adding about one part of washed whiting to three parts of carmine, of which, when properly incorporated, make two parcels. The next gradation should be composed of equal quantities of carmine and whiting, of which four crayons may be made. The third composition should have one fourth carmine and three fourths whiting; of this make six crayons, which will be a good proportion for the rest. The last teint should be made of whiting, very faintly tinged with carmine, of which make about eight crayons, which will complete the above-mentioned proportion. As these compound teints are levigated, they are to be laid immeately upon the chalk, that the moisture may be absorbed to the proper degree of dryness for forming into crayons, which may be known by its losing the greater part of its adhesive quality when taken into the hand; if the consistency is found to be right, it may be then laid upon the glass, which having no pores, will prevent the moisture from being carried off before it is convenient to form it into crayons, otherwise the crayons would be full of cracks and very brittle, which will be a great inconvenience when they are used in painting.

2. Lake. This is a colour very apt to be hard; to prevent which the student must observe the following particulars. Take about half the quantity of lake intended for the crayons, and grind it very fine with spirit of wine; let it dry, and then pulverize it, which is easily done if the lake is good; then take the other half, and grind it with spirits, after which mix it with the pulverized lake, and lay it out directly in crayons on the chalk. This colour will not bear rolling. The simple colour being thus prepared, proceed with the compound crayons as directed before, and in the same degrees of gradation as the carmine teints.

3. Vermilion

3. Vermilion. The best is inclined to the carmine teint. Nothing is required to prepare this colour more than to mix it on the stone with soft water or spirits, after which it may be rolled into crayons. The different teints are produced by a mixture of the simple colour with whiting, according to the proportion already given.

II. Blues. 1. Prussian blue is a colour very apt to bind, and is rendered soft with more difficulty than carmine and lake. The same method of preparation is to be followed with this as is directed with respect to lake, only it is necessary to grind a larger quantity of the pure colour, as it is chiefly used for painting draperies. The different teints may be made according to necessity, or the fancy of the painter. 2. Blue verditer is a colour naturally gritty, and therefore it is necessary to wash it well. Its particles are so coarse as to require some binding matter to unite them, otherwise the crayons will never adhere together. To accomplish this, take a quantity sufficient to form two or three crayons, to which add a piece of slaked plaster of Paris about the size of a pea; mix these well together, and form the crayons upon the chalk. This blue is extremely brilliant, and will be of great use in heightening draperies, &c. The teints must be formed with whiting as directed in the former instances, and are highly serviceable for painting flesh, to produce those pearly teints so beautiful in crayon pictures. It is not necessary to mix the compounds with spirits, as clear water will be sufficient.

III. Greens. Brilliant greens are produced with great difficulty. In Switzerland, they have a method of making them far superior to ours. We usually take yellow ochre, and after grinding it with spirits, mix it with the powder of Prussian blue, then temper it with a knife, and lay the crayons on the chalk, without rolling them. Instead of this, some use king's yellow mixed with Prussian blue, and others brown ochre and Prussian blue. The crayons made of the two last may be rolled. Various teints may be produced by these colours, according to fancy or necessity; some to partake more of the blue, and others of the yellow.

IV. Yellows. 1. King's yellow is the most useful and the most brilliant, levigated with spirit of wine, to compose the different teints as before directed. 2. Yellow ochre, and Naples yellow ground with spirits, will make useful crayons. 3. Orange is produced with king's yellow and vermilion ground together with spirits, and the teints formed as in other cases, but no great quantity of them is required.

V. Browns. 1. Cullen's earth is a fine dark brown. After six or eight of the simple crayons are prepared, several rich compound teints may be produced from it, by a mixture with carmine, in various degrees. Black, carmine, and this colour, mixed together, make useful teints for painting hair; several gradations may be produced from each of these by a mixture with whiting. Roman or brown ochre is an excellent colour, either simple or compounded with carmine. Whiting tinged in several degrees with either of these, will prove very serviceable in painting. 2. Umber may be treated in just the same manner; only it is necessary to levigate it with spirit of wine.

VI. Purples. Prussian blue ground with spirits and mixed with pulverized lake, will produce a good purple. Carmine, thus mixed with Prussian blue, will produce a purple something different from the former. Various teints may be made from either of these compounds by a mixture with whiting.

VII. Black. 1. Lamp-black is the only black that can be used with safety, as all others are subject to mildew; but as good lamp-black is very scarce, the student will, perhaps, find it most expedient to make it himself; the process of which is as follows: Provide a tin cone, fix it over a lamp at such a height that the flame may just reach the cone for the soot to gather within it. When a sufficient quantity is collected, take it out, and burn all the grease from it in a crucible. It must then be ground with spirits, and laid on the chalk to absorb the moisture. Various gray teints may be formed from this by a mixture with whiting, as mentioned in the former instance.—2. Vermilion mixed with carmine: this is a composition of great use, and teints made from this with whiting will be found to be very serviceable. 3. Carmine and black is another good compound, of which five or six gradations should be made, some partaking more of the black, and others having the carmine most predominant, besides several teints by a mixture with whiting. 4. Vermilion and black is also a very useful compound, from which several different teints should be made. 5. Prussian blue and black is another good compound, and will be found of singular service in painting draperies.

It is impossible to lay down rules for the forming every teint necessary in composing a set of crayons, there being many accidental compositions, entirely dependent on fancy and opinion. The student should make it a rule to save the leavings of his colours; for of these he may form various teints, which will occasionally be useful.

Of Rolling the Crayons, and disposing them for painting. The different compositions of colours must be cut into a proper magnitude, after they are prepared, in order to be rolled into pastils, for the convenience of using them. Each crayon should be formed in the left hand with the ball of the right, first formed cylindrically, and then tapering at each end. If the composition is to dry, dip the finger in water; if too wet, the composition must be laid upon the chalk again to absorb more of the moisture. The crayons should be rolled as quick as possible; and when finished, must be laid upon the chalk again, to absorb all remaining moisture. After the gradation of teints from one colour is formed, the stone should be well scraped and cleansed with water before it is used for another colour.

When the set of crayons is completed according to the rules prescribed, they should be arranged in classes for the convenience of painting with them. Some thin drawers, divided into a number of partitions, is the most convenient method of disposing them properly. The crayons should be deposited according to the several gradations of light. The bottom of the partitions must be covered with bran, as a bed for the colours; because it not only preserves them clean, but prevents their breaking.

The box made use of when the student paints should be

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rational, intelligent beings. The existence of intelligences of a higher order than man, though infinitely below the Deity, appears extremely probable.—Of these spiritual beings called Angels we have express intimation in Scripture; (see the article ANGELS). Such are our notions concerning the existence of beings essentially distinct from matter, and in their nature far superior to it; these, too, must be the creatures of the Deity, and of his works of creation the noblest part. But the limits of creation we must not pretend to define. How far the regions of space extend, or how they are filled, we know not. How the planetary world, the sun and the fixed stars, are occupied, we do not pretend to have ascertained. We are even ignorant how wide a diversity of forms, what an infinity of living animated beings may inhabit our own globe. So confined is our knowledge of creation; yet so grand, so awful, that part which our narrow understandings can comprehend!

2
The periods of time at which God executed his works of creation.

Concerning the periods of time at which the Deity executed his several works of creation, it cannot be pretended that mankind have had opportunities of receiving very particular information. From viewing the phenomena of nature, and considering the general laws by which they are regulated, we cannot draw any conclusive or even plausible inference with respect to the precise period at which the universe must have begun to exist. We know not, nor can we hope to ascertain, whether the different systems of planets circulating round our sun and the other fixed stars, were all created at one period, or each at a different period. We cannot even determine, from any thing that appears on the face of nature, whether our earth was not created at a later period than any of her fellow planets which revolve round the same sun. Astronomers are, from time to time, making new discoveries in the heavens; and it is impossible to say whether some of these successive discoveries may not be owing to successive creations.

Philosophers have, indeed, formed some curious conjectures concerning the antiquity of the earth, from the appearances of its surface, and from the nature and disposition of its interior strata. The beds of lava in the neighbourhood of volcanoes have afforded ground for some calculations, which, though they do not fix the period of the earth's origin, are yet thought to prove that period to have been much more remote than the earliest age of sacred or profane history. * In the neighbourhood of Mount Ætna, or on the sides of that extensive mountain, there are beds of lava covered with a considerable thickness of earth; and at least another, again, which though known from ancient monuments and historical records to have issued from the volcano at least 2000 years ago, is still almost entirely destitute of soil and vegetation: in one place a pit has been cut through seven different strata of lava; and these have been found separated from each other by almost as many thick beds of rich earth. Now, from the fact that a stratum of lava 2000 years old is yet scantily covered with earth, it has been inferred by the ingenious canon Recupero, who has laboured 30 years on the natural history of Mount Ætna, that the lowest of these strata which have been found divided by so many beds of earth, must have been emitted from the volcanic crater at least 14,000 years ago; and consequently that the age of the earth, whatever it may exceed this term of years, cannot possibly be less. Other facts of a similar nature likewise concur to justify this conjecture.

* *Brydone's Tour through Sicily and Malta.*

But all these facts are as nothing in comparison with the long series which would be requisite to establish such a conjecture as an incontrovertible truth. And besides, any evidence which they can be supposed to afford, may be very easily explained away. The bed of lava which in the course of 2000 years has scarce acquired a covering of earth, is confessed to stand in a situation in which it is exposed to the spray of the sea, and to all the violence of winds and rains. In such a situation, it cannot be thought that a thick bed of earth could, in any length of time, be formed on it: we might as well expect depth of soil, and vigorous vegetation, on the craggy cliffs of hills. In crevices here and there over it, in which the earth has been retained, there is a depth of soil which supports large trees. This fact, therefore, admits of no such inference as that which Recupero has pretended to deduce from it. The local circumstances, again, of the seven strata that have been pierced through are very different. They are situated at Jaci Reale, in a situation where showers of ashes from the volcano must frequently fall; and where whatever falls must be naturally retained and accumulated:—so that seven beds of earth might be formed on these seven strata of lava much sooner than one thin layer could be formed on the stratum above mentioned. In other places, some of which are within the influence of the same awful volcano, and some adjacent to that of Vesuvius, soil is known to have accumulated on lava with the help of showers of ashes from the volcanoes, with sufficient rapidity to justify this supposition concerning the coverings of the strata at Jaci Real. From the observation of these phenomena of volcanoes, therefore, no facts have been gained that can help us to determine with any certainty the earth's age. And so wide is the variety of circumstances to be here taken into account, that it cannot be hoped that this *desideratum* will be ever supplied from that quarter. See farther the article EARTH.

But by examining the composition and arrangement of the interior strata of the globe, and by viewing the general appearance of its surface, the ingenuity of philosophers has, with better hopes, sought to guess at the length of time during which it must have existed. Observing the exuviæ of sea and land animals deposited at profound depths under ground, and accompanied with vegetable bodies in a good state of preservation, as well as with oleaginous and bituminous substances which have in all probability been formed from vegetable bodies; and remarking at the same time with what confusion the other materials, composing the crust of this terrestrial ball, are, in various instances not arranged, but cast together; they have concluded that the earth must have existed for many an age before the earliest events recorded in sacred or profane history, and must have undergone many a revolution, before it settled in its present state. Such at least are the ideas which Buffon and M. de Luc, and also Dr Hutton †, seem desirous to impress us with concerning its changes and antiquity. It will be only doing justice to these philosophers to acknowledge, that they

† *Ed. Phil. Trans.* vol. i.

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and his angels he charged with folly*." "And unto man (or to Adam), he said, Behold, the fear of the Lord is wisdom, and to depart from evil is understanding †." These passages rather hint at than relate facts. But it has been inferred from them, that there were stars in the firmament, and angels in heaven, before the formation of our globe; that angels as well as man have fallen; and that other injunctions, besides that of abstaining from the forbidden fruit, were laid on Adam when he was first placed in Paradise ‡. If the interpretation be admitted as just, the first of these facts may be considered as forming, as it were, a point with which our knowledge of the works of the Deity commences: the period of time at which the second event took place is not specified: and the precept to Adam must no doubt have been uttered after he was formed and inspired with intelligence. Yet with regard to the first of the above quotations from the book of Job, the only one that is of importance to us at present, it must be acknowledged, that it has been differently understood. The morning stars might sing together, and the sons of God shout for joy, on account both of their own creation and of the creation of the earth at one time; and yet Job, having been himself made a conscious being at a much later period, not be able to tell where he was at that era of exulting gratitude and congratulation.

* Chap. iv. ver. 18.

† Ch. xxviii. ver. 28.

‡ *Milne's Lectures*, Lect. I.

7

Mosaic account of the creation.

Moses relates, that || "in the beginning God created the heavens and the earth. And the earth (continues he) was without form and void; and darkness was upon the face of the deep: and the spirit of God moved upon the face of the waters. And God said, Let there be light; and there was light. And God saw the light, that it was good: and God divided the light from the darkness. And God called the light day, and the darkness he called night: and the evening and the morning were the first day." During five succeeding days the work of creation was carried on. On the second day, a firmament was made to separate the waters, and that firmament called *heaven*: on the third day the waters were collected into seas, and the land from which the waters retired caused to produce grass and trees and other plants: on the fourth day, lights were made to appear in the firmament; to enlighten the earth, to divide the day from the night, and to distinguish time into seasons and years: on the fifth day the seas were peopled with whales and other fishes, and the air with fowls: on the sixth day, the earth was furnished with reptiles and quadrupeds of all kinds; and on the same day, the first human pair, the progenitors of all the human race, were created in God's own image.

|| Gen. i. 1.

8

Difficulties occurring in the above account.

Some difficulties occur in comparing this account of the creation with the laws which appear at present to regulate the system of nature. We find it hard to conceive how the earth, while yet a stranger to the influence of the sun, could experience the vicissitude of day and night; and are astonished at the rapidity with which trees and herbage first overspread its surface. The condition of matter when the earth was without form and void, and the operation of the spirit of God on the face of the waters are equally mysterious.

9

Attempts to solve those difficulties. Dr Burnet's theory.

Some ingenious men have eagerly laboured to remove these difficulties. Among these is Dr Burnet, whose theory of the earth has now been long considered as fanciful and ill-founded. He supposes all the celestial bodies, even the sun and all the other planets of the solar system, to have existed long before the earth. The chaos on which the spirit of God moved, consisted, according to him, of the first principles from which all terrestrial bodies have been formed. When those laws by which the material world is regulated first began to operate on the mass, he supposes that its grosser and heavier parts would sink towards the centre, and there form a solid ball. Around this solid ball two species of particles would still float together in confusion. Of these he thinks one, being more volatile, would by degrees make its escape from the other, would leave it still recumbent on the solid centre, and spread around it in an atmosphere. The middle stratum he composes of aqueous and oleaginous fluids; and he makes no doubt, that after the air had made its escape, the levity of the oleaginous fluids would enable them to rise above the aqueous, and dispose themselves next the surface of the liquid mass. On them he supposes the impure atmosphere to have then deposited a quantity of terrene particles, sufficient to form, by intermixture with the oils, a thick crust of rich earth for the production of plants and herbage, and to afford an habitation to animals. This delicate shell he was careful not to furrow with seas or load with mountains: either of these would have reduced all to confusion. Such is his earth; and after moulding it with so much ingenuity, and into so happy a form, he contents himself, without venturing to use the same freedoms with the remaining part of Moses's account of the creation.

10

Objections to Dr Burnet's theory.

But Moses affords nothing that can be with any propriety used in the foundation of such a theory: he tells not whether the chaos consisted of those terrene, and aqueous, and oleaginous, and aerial particles which Dr Burnet finds in it; he confines not the seas within a crust of earth; nor does he inform us that the scenery of nature was not diversified by hills and vales. Besides, the author of this theory has, without any evidence, supposed matter to have been originally under the influence of laws very different from those by which it is at present regulated. Oil, indeed, while fluid, floats above water: but in a concrete state, it sinks in water like other solid bodies. If reduced into that state by combination with terrene matters, sufficient to render the mixture proper for the nourishment and production of vegetables, its specific gravity will be still greater, and it will consequently sink so much the sooner. How a concrete substance, consisting of earth and oil, could float on water, appears an inexplicable enigma. But we need not here take farther pains in combating and triumphing over this theory, which has long since fallen and sunk to its grave.

11

Mr Whiston's theory.

Mr Whiston treats both the scriptures and the laws of nature with greater reverence. Yet he certainly involves himself in no trifling difficulties in attempting to solve those which Moses presents. He supposes the sun, moon, and stars, to be all more ancient than the earth. The chaos from which the earth was formed he represents as having been originally the atmosphere of a comet. The six days of the creation he would persuade us to believe equal to six of our years:

tions or facts, before he has considered their evidence.

CREECH, Thomas, eminent for his translations of ancient authors both in prose and verse, was son of Thomas Creech, and born near Sherborne in Dorsetshire in 1659. He was educated in grammar learning under Mr Curganven of Sherborne, to whom he afterwards dedicated a translation of one of Theocritus's Idylliums: and entered a commoner of Wadham college in Oxford in 1675. Wood tells us that his father was a gentleman; but Giles Jacob says, in his Lives and Characters of English poets, that his parents circumstances not being sufficient to afford him a liberal education, his disposition and capacity for learning raised him up a patron in Colonel Strangeways, whose generosity supplied that defect. Be that as it will, Creech distinguished himself much, and was accounted a good philosopher and poet, and a diligent student. June 13. 1683, he took the degree of master of arts, and not long after was elected probationer fellow of All-souls college; to which, Jacob observes, the great reputation acquired by his translation of Lucretius recommended him. Wood tells us, that upon this occasion he gave singular proofs of his classical learning and philosophy before his examiners. He also took the degree of B. D. on the 18th of March 1696. He now began to be well known by the works he published; but Father Niceron observes, that they were of no great advantage to his fortune, since his circumstances were always indifferent. In 1699, having taken holy orders, he was presented by his college to the living of Welwynn in Hertfordshire; but this he had not long enjoyed before he put an end to his own life. The motives of this fatal catastrophe have been variously represented. The author of the *Nouvelles de la Republique des Lettres* informs us, that in the year 1700 Mr Creech fell in love with a woman who treated him with great neglect, though she was complaisant enough to several others. This affront he could not bear, and resolved not to survive it. Whereupon he shut himself up in his study, where he hanged himself about the end of June 1700, and was found in that situation three days after. The Poetical Register says nothing of the particular manner of his death, but only that he unfortunately made away with himself in the year 1701; and ascribes this fatal catastrophe of Mr Creech's life to the moroseness of his temper, which made him less esteemed than his great merit deserved, and engaged him in frequent animosities and disputes upon that account. But from an original letter of Arthur Charlett, preserved in the Bodleian librrary, it has lately been discovered, that this unhappy event was owing to a very different cause. There was a fellow collegian of whom Creech frequently borrowed money: but repeating his applications too often, he met one day with such a cold reception, that he retired in a fit of gloomy disgust, and in three days was found hanging in his study. Creech's principal performances are, 1. A translation of Lucretius. 2. A translation of Horace; in which, however, he has omitted some few odes. 3. The Idylliums of Theocritus, with Rapin's Discourse of Pastorals. 4. A translation of Manilius's Astronomicon. Besides translations of several parts of Virgil, Ovid, and Plutarch; printed in different collections.

CREED, a brief summary of the articles of a Christian's belief.

The most ancient form of creeds is that which goes under the name of the apostolic creed: besides this, there are several other ancient forms and scattered remains of creeds to be met with in the primitive records of the church. The first is the form of apostolical doctrine, collected by Origen; the second is a fragment of a creed preserved by Tertullian; the third remains of a creed is in the works of Cyprian; the fourth, a creed composed by Gregory Thaumaturgus, for the use of his own church; the fifth, the creed of Lucian the martyr; the sixth, the creed of the apostolical constitutions. Besides these scattered remains of the ancient creeds, there are extant some perfect forms, as those of Jerusalem, Cæsarea, Antioch, &c.

The most universal creeds are, the Apostolical, the Athanasian, and the Nicene creeds. See these articles.

These three creeds are used in the public offices of the church of England; and subscription to them is required of all the established clergy. Subscription to these was also required of the dissenting teachers, by the toleration act; but from which they are now relieved by 19 Geo. III.

CREEK, a part of a haven, where any thing is landed from the sea. So many landing places as there are in a harbour or port, so many creeks there are. It is also said to be a shore or bank whereon the water beats, running in a small channel from any part of the sea; from the Latin *crepido*. This word is used in the stat. 4 Hen. IV. c. 20. and 5. Eliz. c. 5.

CREENGLES. See Cringle.

CREEPER. See Certhia, Ornithology *Index*.

Creeper, in naval affairs, an instrument of iron resembling a grappling, having a *shank*, and four hooks or claws. It is used to throw into the bottom of any river or harbour, with a rope fastened to it, to hook and draw up any thing from the bottom which may have been lost. See Plate CL.

CRELLIUS, John, a famous Socinian, born in 1590, in a village near Noremberg. In 1612, he went into Poland, where the Unitarians had a school, in which he became professor of divinity, and minister at Crackow, where he died in 1632, aged 42. He was the author, 1. Of a famous Treatise against the Mystery of the Trinity; 2. Commentaries on a part of the New Testament; and other works. All of them are scarce.

CREMA, a city and bishop's see of Italy, capital of a district of the Milanese, called from it *Cremasco*; it stands almost in the middle between Milan and Mantua, in E. Long. 10. 15. and N. Lat. 45. 20.

CREMASTER, in *Anatomy*, the name of a muscle of the testicle, of which there is one on each side. See Anatomy, *Table of the Muscles*.

CREMATION is sometimes used for burning, particularly when applied to the ancient custom of burning the dead. The custom is well known to have prevailed among most eastern nations, and continued with their descendants after they had peopled the different parts of Europe. Hence we find it prevailing in Greece, Italy, Gaul, Britain, Germany, Sweden, Norway, and Denmark, till Christianity abolished it.

CREMONA,

CREMONA, in *Ancient Geography*, a Roman colony, with municipal rights, settled beyond the Po, below the confluence of the Addua, on the report of Hannibal's march into Italy (Polybius) : a town at this day still maintaining its name and flourishing state. It was an opulent and mercantile city; but suffered greatly in the civil wars of Augustus (Virgil). In the war with Vitellius, it was destroyed by the partizans of Vespasian; but was soon after rebuilt by the munificence of the citizens and exhortations of Vespasian, (Tacitus.) Now capital of the Cremonese, in the duchy of Milan. E. Long. 10. 30. N. Lat. 45.

CRENATED, a term used in botany. See BOTANY *Index*.

CRENELLE, or IMBATTLED, in *Heraldry*, is used when any honourable ordinary is drawn, like the battlements on a wall to defend men from the enemies shot. This attribute belongs to the arms of such as have defended castles for their prince or country, or of such as are skilled in architecture.

CRENOPHYLAX, in antiquity, a magistrate of Athens, who had the inspection of fountains.

CREODIBA, in the customs of the middle age, a robbery and murder committed in a wood, where the body of the person killed was burnt in order to prevent any discovery of the crime. The word, says Wendelinus, is compounded of *cruy* and *diven*, that is, " wood-robbers."

CREOLES, a name originally given to the families descended from the Spaniards who first settled at Mexico in America. These are much more numerous than the Spaniards properly so called, and the Mulattoes, which two other species of inhabitants they distinguish; and are excluded from all considerable employments. It is now used in a more extensive sense, and applied to all natives of the West Indies.

CREON, king of Corinth, was son of Sisyphus. He promised his daughter Glauce to Jason, who had repudiated Medea. To revenge the success of her rival, Medea sent her for a present a gown covered with poison. Glauce put it on, and was seized with sudden pains. Her body took fire, and she expired in the greatest torments. The house also was consumed by the fire, and Creon and his family shared Glauce's fate.

CREON, son of Menœtius, was father to Jocasta, the wife and mother of Oedipus. At the death of Laius, who had married Jocasta, Creon ascended the vacant throne of Thebes. As the ravages of the Sphynx were intolerable, Creon offered his crown and daughter in marriage to him who could explain the enigmas which the monster proposed. Oedipus was happy in his explanations, and he ascended the throne of Thebes, and married Jocasta without knowing that she was his mother, and by her he had two sons, Polynices and Eteocles. These two sons mutually agreed after their father's death to reign in the kingdom each a year alternately. Eteocles first ascended the throne by right of seniority; but when he was once in power he refused to resign at the appointed time, and his brother led against him an army of Argives to support his right. The war was decided by a single combat between the two brothers. They both killed one another, and Creon ascended the throne till Leodamus the son of Eteocles should be of sufficient age to assume the reins of government. In his regal capacity he commanded that the Argives, and more particularly Polynices, who was the cause of all the bloodshed, should remain unburied. If this was in any manner disobeyed, the offenders were to be buried alive. Antigone the sister of Polynices transgressed, and was accordingly punished. Hæmon the son of Creon, who was passionately fond of Antigone, killed himself on her grave, when his father refused to grant her pardon. Creon was afterwards killed by Theseus, who had made war with him because he refused burial to the Argives.

CREPANCE, in the manege, a chop or cratch in a horse's leg, given by the spunges of the shoes of one of the hinder feet crossing and striking against the other hinder foot. This cratch degenerates into an ulcer.

CREPIDÆ, among the Romans, a kind of slippers or shoes, which were always worn with the *pallium*, as the *calcei* were with the *toga*.

CREPIS, HAWK-WEED, a genus of plants belonging to the syngenesia class; and in the natural method ranking under the 49th order, *Compositæ*. See BOTANY *Index*.

CREPITATION, that noise which some salts make over the fire in calcination, called also *detonation*.

CREPITATION is also used in surgery, for the noise made by the ends or pieces of bones, when the surgeon moves a limb to assure himself by his ear of the existence of a fracture.

CREPUNDIA, in antiquity, a term used to express such things as were exposed along with children, as rings, jewels, &c. serving as tokens whereby they afterwards might be known.

CREPUSCULUM, in *Astronomy*, twilight; the time from the first dawn or appearance of the morning to the rising of the sun; and again, between the setting of the sun and the last remains of day.

Papias derives the word from *creperus*; which, he says, anciently signified *uncertain*, *doubtful*, q. d. a *dubious light*. The crepusculum is usually computed to begin and end when the sun is about 18 degrees below the horizon; for then the stars of the sixth magnitude disappear in the morning and appear in the evening. It is of longer duration in the solstices than in the equinoxes, and longer in an oblique than in a right sphere.

The crepuscula are occasioned by the sun's rays refracted in our atmosphere, and reflected from the particles thereof to the eye. See TWILIGHT.

CRESCENT, the new moon, which as it begins to recede from the sun, shows a little rim of light, terminating in points or horns, which are still increasing till it become full and round in the opposition. The word is formed from *cresco*, " I grow."

The term is also used for the same figure of the moon in its wane or decrease, but improperly; because the points or horns are then turned towards the west, whereas they look to the east in the just crescent.

CRESCENT, in *Heraldry*, is a bearing in form of a half moon. The Ottomans bear sinople, a crescent montant, argent.

The crescent is frequently used as a difference in coat armour, to distinguish it for that of a second brother or junior family.

The figure of the crescent is the Turkish symbol; or rather is that of the city of Byzantium, which bore this device from all antiquity; as appears from medals struck in honour of Augustus, Trajan, &c.

The crescent is sometimes montant, i. e. its points look towards the top of the chief, which is its most ordinary representation; whence some contend, that the crescent, absolutely so called, implies that situation; though other authors blazon it montant, when the horns are towards the dexter side of the escutcheon, in which position others call it *incroissant*.

Crescents are said to be *adossed*, when their backs or thickest parts are turned towards each other; their points looking to the sides of the shield. *Crescent inverted*, is that whose points look towards the bottom; *turned crescents* are placed like those adossed; the difference is, that all their points look to the dexter side of the shield: *conturned crescents*, on the contrary, look to the sinister side: *affronted* or *appointed crescents*, are contrary to the adossed, the points looking towards each other.

Crescent is also the name of a military order, instituted by Renatus of Anjou, king of Sicily, &c. in 1448; so called from the badge or symbol thereof, a crescent of gold enamelled. What gave occasion to this establishment was, that Renatus took for his device a crescent, with the word *loz*, "praise," which, in the style of rebus, makes *loz in crescent*, q. d. *by advancing in virtue, one merits praise*.

CRESCENTIA, the Calabash Tree; a genus of plants belonging to the didynamia class; and in the natural method ranking under the 25th order, *Putamineæ*. See Botany *Index*.

The shells of calabashes are made use of for various purposes. At Barbadoes, besides drinking-cups and punch bowls, there are made of them spoons, dishes, and other utensils for the slaves. Some of these shells are so large, as to be capable of holding 15 pints of water. The pulp is seldom eaten, except by cattle in the time of drought. The wood, which is hard and smooth, is made into stools, chairs, and other furniture.

CRESCIMBENI, John Maria, an Italian poet, was born at Macerata in Ancona, 1663. His talents for poetry and eloquence developed themselves early. His verses at first had too much pomp and point; but residing in Rome, and reading the best Italian poets, brought him back to nature. He not only reformed himself, but undertook to reform bad taste in general. From this motive he projected the establishment of a new academy, under the name of *Arcadia;* the members of which at first did not exceed 14, but afterwards increased much. They called themselves the shepherds of Arcadia, and each took the name of some shepherd and some place in that ancient kingdom. The founder of this society was appointed the director of it in 1690, and held this honourable post 38 years; namely, to the year of his death, which happened in 1728. Among a great number of works, in verse and prose, the principal is, A History of the Italian Poetry, very much esteemed, and reprinted, in 1731, at Venice, in six volumes 4to. This history is accompanied with a commentary, containing anecdotes of Italian poets. He published also A History of the Academy of Arcadia, together with the lives of the most illustrious Arcadians: and many other works.

CRESCY, or Cressy. See Cressy.

CRESS, Water Cress, or Cresses. See Sisymbrium, Botany *Index*.

Indian Cress. See Tropæolum, Botany *Index*.

CRESSY, a port town of Picardy in France, about 44 miles south of Calais, and 27 north-west of Abbeville, remarkable on account of the victory obtained there over the French by Edward III. of England, in the year 1346. E. Long. 2. 0. N. Lat. 50. 20.

Edward having encountered and overcome many difficulties in his expedition, was at last so closely followed and harassed by the French army, commanded by the king of France in person, that he determined to make a stand at this place, and to give his pursuers a check. For this purpose he chose his ground with great judgment, on the gentle declivity of a hill, with a thick wood in his rear. He ordered deep entrenchments to be made on each flank, and waited with firmness the approach of his enemies. The king of France, dreading nothing so much as the escape of the English, began the march of his great army from Abbeville early in the morning, August 26. and continued it several hours with great eagerness, till he received intelligence that the English had halted at Cressy, and were prepared to give him battle. He was advised at the same time not to engage that day, when his troops were much fatigued with their march, and in great disorder; and he was disposed to have taken this advice. But the discipline of these times was so imperfect, that the orders given for halting were not obeyed; and one corps of this mighty host impelling another, they continued advancing till they came into the presence of their enemies in much confusion.

Edward had employed the forenoon of this important day in drawing up his army in the most excellent order, in three lines. The first line, which consisted of 800 men at arms, 4000 English archers, and 600 Welch foot, was commanded by his young, amiable, and heroic son, the prince of Wales, assisted by the earls of Warwick and Oxford, and several other noblemen. The second line, composed of 800 men at arms, 4000 halbardiers, and 2400 archers, was led by the earls of Arundel and Northampton; the last line or body of reserve, in which were 700 men at arms, 5300 billmen, and 6000 archers, was ranged along the summit of the hill, and conducted by the king in person, attended by the lords Moubray, Mortimer, and others. When the army was completely formed, Edward rode along the lines, and by his words and looks inspired his troops with the most ardent courage and strongest hopes of victory. He then commanded the cavalry to dismount, and the whole army to sit down upon the grass, in their ranks, and refresh themselves with meat, drink, and rest. As soon as the French army came in view, they sprung from the ground, full of strength and spirit, and stood ready to receive them.

The king of France, assisted by the kings of Bohemia and Majorca, the dukes of Lorraine and Savoy, and several other sovereign princes, with the flower of the French nobility, laboured to restore some degree of led in religious mysteries. Orpheus, who distinguished himself so highly in poetry and music, was their disciple. They discovered the use of fire, iron, and brass, and invented the art of working these metals in Berecynthius, a mountain near Aptera. Those invaluable discoveries procured them divine honours. One of them, named Hercules, rendered himself famous by his courage and great exploits. He instituted the Olympic games; though posterity, by a mistake arising from his bearing the same name, have ascribed that institution to the son of Alcmena; who, indeed, trode in the steps of his predecessor, and raised himself also to immortality.

The Dactyli Idæi were the ancestors of the Curetes. These last at first inhabited the forests and caves of the mountains. Afterwards they entered into domestic life, and contributed, by their institutions, to the civilization of mankind. They taught men to collect flocks of sheep, to tame the ferocity of wild animals for domestic purposes, and to invite bees into hives, that they might rifle them of the fruit of their labours. They first prompted men to the chase, and taught the use of the bow. They were the inventors of swords and of military dances. The noise which they made, by dancing in armour, hindered Saturn from hearing the cries of Jupiter, whose education Rhea had entrusted to them. With the assistance of the nymphs, they brought up that god in a cave in Mount Ida, feeding him with the milk of the goat Amalthea, and with honey.

To this period mythology assigns the origin of the Titans; their abode near Gnossus, where stood the palace of Rhea; their travels over the whole earth; their war against Ammon, and his defence by Bacchus; the nuptials of Jupiter and Juno, celebrated nigh the river Therenus in Crete; the gods, goddesses, and heroes who descended from them.

The most illustrious of those heroes were Minos and Rhadamanthus. They are said to have been the sons of Jupiter and Europa, who was conveyed into the island on a bull. Minos becoming king, built several cities; the most considerable of which are—Gnossus, on that side of the island which faces Asia, Phœstus on the southern shore, and Cydon on the western, facing Peloponnesus. He gave to his subjects a code of admirable laws, which he pretended to have received from his father Jupiter in the grotto of Mount Ida.

Rhadamanthus distinguished himself by the impartiality of his judgments, and by the inflexible severity with which he inflicted punishment on the impious and wicked. His empire extended over the chief isles of the Archipelago; and the inhabitants of the adjacent coasts of Asia submitted to him on account of his high reputation for probity and justice. Mythologists have constituted him judge in the regions below, to determine the future state of the righteous and the wicked. They have conferred on him the same honours which were bestowed on Minos, the justest of kings.

Thus far have been followed the Cretan traditions as they are related by Diodorus; but historians differ about the truth of them. There are a variety of opinions concerning the first inhabitants of Crete. Strabo, who has discussed them with great erudition, says, after several pages on the subject: "I am not fond of fables; yet I have detailed these at some length, because they are connected with theology. Every discourse concerning the gods should examine the religious opinions of antiquity, and distinguish them from fable. The ancients were pleased to conceal their knowledge of nature under a veil. It is now impossible to unfold the meaning of their enigmas. But by exposing to light the numerous allegories which they have left us, and by examining attentively their mutual relations and differences, genius may perhaps be able to unfold the truths which are couched under them."

But leaving mythology for the more certain records and monuments of history, we find that Crete received its name from Crés, the first of its monarchs. He was author of several useful inventions, which contributed to the happiness of his subjects. Prompted by gratitude, they endeavoured to perpetuate the memory of his favours, and to immortalize his name, by naming the island after him.

In order to distinguish the true Cretans from strangers, they were named *Eteocretes*. A number of colonies, from different parts of Greece, settled in the island. The agreeableness of the climate, and the fertility of the soil, invited them to fix their habitation there. The Lacedæmonians, Argives, and Athenians, were the principal people who sent colonies into Crete. This is what makes Homer say, "Crete is an extensive island in the midst of the stormy main. The soil is rich and fertile. It contains an immense number of inhabitants. It is adorned with a hundred cities. Its inhabitants speak in various languages. We find there Achæans, valiant Eteocretes, Cydonians, Dorians, and godlike Pelasgians." The Eteocretes inhabited the southern division of the island; they built there the city of Prœsus, and erected a temple to Dictæan Jove.

Crés was not the only monarch who reigned in the island of Crete. He had a series of successors. But history affords little information concerning them: only the names of a few of them are preserved, and a small number of events which happened under the reign of some others, but blended and disfigured with an intermixture of fable. Among those monarchs we find two Jupiters, and two of the name of Minos. However, most writers confound them, and ascribe to one those transactions and exploits which should be shared between the two.

This remark chiefly regards Minos, who was esteemed the wisest legislator of antiquity. The office assigned him in the regions below is a clear and certain proof of his having gained an exalted reputation by his justice. Greece, says Plato, has with great propriety adopted the laws of Crete; for they are founded on the solid basis of reason and equity, and have a natural tendency to render the people who live in subjection to them, opulent and happy. One of those laws forbade "the Cretans ever to carry their festivity so far as to intoxicate themselves with wine." The following was very suitable to repress the presumptuous ardour of youth: "Let young people not canvass the laws with an indiscreet curiosity; let them not examine whether the lawgiver has done right or wrong in promulgating them; but let them join unanimously in declaring them good, since they proceed from the gods. If any of the old men perceive something in them meriting amendment, let

Crete.

let him mention it to the magistrate, or discuss it with his equals, but never in the presence of the young people." That excellent code was engraven on tables of brass: and Talos, chief minister to Minos, visited all the towns and cities in the island, three times a-year, to observe in what manner the laws were executed and obeyed. The king of Crete, well knowing that the marvellous is necessary to command the belief and enforce the obedience of the people, pretended that he had received those laws from his father Jupiter, in the grotto of Mount Ida. In the same manner, Lycurgus, before promulgating his laws, repaired to Delphos, and gave out they had received the sanction of Apollo. A like reason induced Numa to pretend to an intimacy with the nymph Egeria, and Mahomet to ascribe his doctrines and institutions to the revelation of the angel Gabriel.

In contradiction to this account, others of the ancients describe Minos as a prince impotently abandoned to the fury of his passions, and a barbarous conqueror. Falling passionately in love with the nymph Dictynna, who refused to gratify his wishes, he pursued her to the brink of the shore, and forced her to plunge into the sea, where she was saved by some fishermen, who received her in their nets. He was the first of the Greeks who appeared in the Mediterranean at the head of a naval armament. He conquered the Cyclades, expelled the Carians, established Cretan colonies in those islands, and committed the government of them to his son.

Being informed, while he was at Paros, that his son Androgeus was slain at Athens, he declared war against Egeus, and imposed on him a disgraceful tribute; from the payment of which Theseus delivered his country. He took arms against Nisus, king of Megara, made him prisoner by the treachery of his daughter Scylla, and put him to death, together with Megarus, the son of Hippomanes, who had brought some forces to his assistance. Dædalus, who had by some means incurred his displeasure, despairing of pardon from so severe and inflexible a prince, employed the resources of his inventive genius, in order to escape from his power. He fled to Sicily, gained the protection of King Cocalus, and obtained an asylum in his court. Valerius Flaccus has described his flight in a very lively and picturesque manner. "Thus Dædalus, with the wings of a bird, ascended from Mount Ida. Beside him flew the comrade of his flight, with shorter wings. They appeared like a cloud rising in the air. Minos, seeing his vengeance thus eluded, glowed with impotent rage. In vain he followed with his eyes the secure flight of his enemies through the wide expanse of heaven. His guards returned to Gortynia with their quivers filled with arrows." The Cretan monarch did not, however, give up his prey. He equipped a fleet, pursued the fugitive to Sicily, and fell before the walls of Camicum.

It is plain, that those actions cannot agree to the character of that just monarch, whose merits raised him to the office of determining, in the regions below, the unalterable fate of the righteous and the wicked. We may, therefore, reasonably conclude, that Minos the legislator is a different person from the conqueror; that it was the former who gained a lasting reputation by his wisdom and justice; and the latter who subdued most of the islands of the Archipelago, but being enslaved by his passions, tarnished his glory by his cruelty and merciless thirst for vengeance.

The last king of Crete was Idomeneus. This prince, accompanied by Merion, conducted 24 ships to the assistance of Agamemnon. Homer informs us of the illustrious exploits by which he signalized himself before the walls of Troy. At his departure, he committed the government of his kingdom to Leucus his adopted son, promising him the hand of his daughter Clisithera if he governed wisely in his absence. That ambitious young man soon forgot the favours which had been so lavishly bestowed on him. Gaining a number of partisans, he in a short time aspired to the immediate possession of the crown. His impatience would not wait till he should obtain it lawfully by marriage. Flattering himslf, from the long absence of the king, that he was perhaps fallen before Troy, he determined to mount the throne. Mida, wife to Idomeneus, and the princess Clithera, were an obstacle to his wishes. But ambition knows no restraint, and tramples under foot the most sacred obligations. The base wretch having seduced the people from their allegiance, and captivated the affections of the nobles, sacrificed those unfortunate victims in the temple. When Idomeneus, crowned with laurels, landed on the coast of Crete, Leucus, who had now firmly established his power, attacked him with an armed force; and obliged him to reimbark. A different account is also given of the banishment of Idomeneus. Servius says that he had vowed, in a storm, to sacrifice to the gods the first person that his eyes should behold on the Cretan shore; that his son having met him first after his arrival, he fulfilled his vow, by sacrificing him; and that the island, being soon after depopulated by pestilence, the inhabitants looked upon that affliction as the effect of divine vengeance, and expelled the parricide; who, retiring to Italy, founded Salentum, on the Messapian coast. But that opinion appears entirely groundless. History mentions no son of Idomeneus. If he had a son of his own blood, why did he adopt Leucus? Why did he trust to him the government of the island, when he promised him his daughter in marriage? The more probable opinion is, that the plague was introduced into the island by his ships, when he returned from the siege of Troy, as Herodotus asserts; and that Leucus artfully made use of that pretext to expel his lawful sovereign from the island. But it appears that the usurper did not long enjoy the fruit of his crimes. Soon after the departure of Idomeneus, monarchy was abolished, and the government of Crete became republican.

The republic of Crete has been celebrated by the panegyric of Plato, served Lycurgus as a model for that which he established in Lacedemon, and was beheld by all Greece with respect and admiration. Strabo has thought it not unworthy of his pencil, and has consecrated the leading features of its constitution to lasting fame in his immortal work. It was indeed a system of legislature, whose direct tendency was to call forth the buds of virtue in the heart of infancy; to open and expand them in youth; to inspire man, as he reached maturity, with the love of his country, of glory, losophers of Greece: but the highest honour it ever obtained, was that of serving Lycurgus as a model for the admirable form of government which he established at Sparta.

The republic of Crete continued to flourish till the age of Julius Cæsar. No other state has enjoyed so long a period of strength and grandeur. The legislature, regarding liberty as the only sure basis of a nation's happiness, had instituted a system of laws, the natural tendency of which was, to inspire men with an ardent passion for liberty, and with such virtue and valour as are necessary to support and defend it. All the citizens were soldiers: all of them were skilled in the art of war. The valiant youth of other nations resorted to Crete, to learn the exercises, manœuvres, and evolutions, of the military art. "Philopœmen (says Plutarch) being impatient of indolence, and eager to acquire skill in arms, embarked for Crete. After spending a considerable time in the noblest exercises among that brave people, who were skilled in the art of war, and accustomed to an austere and temperate life, he returned to the Achæans. The knowledge which he had acquired made him so eminent among them, that he was immediately appointed general of the cavalry."

On the other hand, the legislator, being persuaded that conquests are generally unjust and criminal, that they often exhaust the strength of the victorious nation, and almost always corrupt its manners, endeavoured to preserve the Cretans from the ambition of conquest. The fertility of the island abundantly supplied their wants. They needed not that commerce should introduce among them the riches of foreign countries, along with which luxury and her train of attendant vices would also be introduced; and he knew how to inspire them with an indifference for such acquisitions without expressly forbidding them. The gymnastic exercises, which occupied the leisure of the gallant youth; the pleasures of the chase; the ardour of friendship; the public shows, at which all the different orders of the community, both men and women, used to assemble; the love of equality, order, and their country, with which he inflamed every breast; the wise institutions, which united a whole nation so closely that they composed but one family;—all these ties attached the Cretans to their native island: and finding at home that happiness which was the object of their wishes, they never thought of wandering abroad in search of an imaginary glory, or of extending their empire over other nations. Therefore, from the period at which that state assumed a republican form till the time when they were attacked by the arms of Rome, the nation was not once known to send a hostile force into the territories of any of their neighbours. This instance of moderation is unparalleled in history; no other nation can divide the glory of it with the Cretans. Individuals indeed might leave their country to engage in foreign armies. Those princes and states who knew their valour and skill in archery eagerly sought to take them into their pay; all the neighbouring monarchs were desirous of having in their armies a body of Cretan archers. Over the whole world none were more celebrated than they for bending the bow. "The arrows of Gortynia (says Claudian), aimed from a trusty bow, are sure to wound, and never miss the destined mark."

Though the multitude of independent cities which flourished in Crete did not unite their arms to subjugate the neighbouring islands, and drench them with the blood of their inhabitants; yet they were not so wise as to live in peace among themselves. Discord often stalked among them with her flaming torch. The most powerful wished to enslave the rest. Sometimes Gnossus and Gortynia marched with social banners against their neighbours, levelled their fortresses, and subjected them to their power, at other times they attacked each other with hostile violence, and saw their bravest youth perish amid the horrors of civil war. Lyctos and Cydon opposed an invincible barrier to their ambition, and preserved their own liberty. The last of these cities had acquired such strength and influence, that she held the balance between the rival powers of the island. Those wars destroyed a number of the cities, and drenched the native country of Jupiter with blood.

To what source must we attribute those intestine dissensions? One part of the island was occupied by the Eteocretes, the original inhabitants; the rest was peopled with colonies from Athens, Sparta, Argos, and Samos. Perhaps the ancient grudges which had subsisted among those strangers, being still unextinguished in their breasts, were easily rekindled by accident or circumstances, and inflamed with new fury. We may also suppose, that the most powerful among them, exulting in their superiority, would endeavour to take advantage of the weakness of the rest, and disregard all laws but those of force: besides, the glowing ardour of the youth, trained to military exercises, was ever ready to fly to arms. Such probably were the causes which fomented discord and hostility among a people living under the same religion, customs, and laws.—Whatever these might be, the Cretans being persuaded that the firm union of their soldiers was essential to victory, arrayed the bravest youths of the army in splendid robes, and caused them to sacrifice to friendship before engaging in battle. In some countries it would be very proper to oblige the generals on such occasions, to sacrifice to concord. If such a sacrifice were performed with sincerity, it might preserve their glory unstained, and prevent such deluges of blood from being wasted without producing any advantages to the state.

Their passion for war did not extinguish in the breasts of the Cretans that exquisite sensibility which is the mother and nurse of the fine arts. "The Cretans (says Sozomen) gave an illustrious proof of their munificence to genius, by making Homer a present of a thousand pieces of silver; and to perpetuate the memory of this act of generosity, they recorded it by an inscription on a public column." In Crete, adds Ptolemy, men are still more desirous of cultivating their understandings than of exercising their bodily powers. Often when dissensions arose, the voice of wisdom and the charms of poesy recalled them to reason and harmony. Thales of Gortynia, the preceptor of Lycurgus, was one of their most celebrated philosophers. Being both a poet and legislator, he made a happy use of his abilities and knowledge to extinguish among

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his countrymen the kindling sparks of discord. "His poems were moral discourses in verse, which recalled the people to concord and submission to the laws. Using a regular measure, he recommended the austerity of his subject by the insinuating and powerful charm of sentiment. So powerful were the effects of his verses, which addressed at once the ears, the heart, and the understanding of his hearers, that their rage was gradually softened. Next, opening their hearts to the love of peace, the advantages of which he described in glowing colours, they forgot their intestine dissensions, and ranged themselves around the standard of concord." That sage is said to have invented tunes for the military dances and for the Cretan Pyrrhic. Men who felt so strongly the influence of poetry and music could scarcely be enemies to pleasure. Accordingly, they had a custom of distinguishing their fortunate days with white flint stones, their unfortunate days with black. At the end of the year they counted the number of their white stones, and reckoned that they had lived only so many days as were distinguished for having been fortunate. They did not think mere existence, without the enjoyment of pleasure, worthy of the name of *life*. For this reason, they caused to be inscribed on their tombs: "He lived so many days; he continued in existence so long."

A passion for glory is easily awaked in a feeling and generous breast. The Cretans eagerly repaired to the famous solemnities of Greece, and were often crowned at the Olympic, Nemæan, and Pythian games; others of them were favourites of the muses, and versified the predictions of prophets, or celebrated the glorious deeds of their heroes. Several of them distinguished themselves by historical composition. At the most ancient games, a prize is said to have been bestowed on the poet who sung the noblest hymn in honour of Apollo: Chrysothemis of Crete sung and gained the prize.

The ravages of time have deprived us of almost all their works; and if Pindar had not preserved the memory of some of their crowns, we should not know even the names of the conquerors who wore them. The temple of Diana at Ephesus, built by the Cretan Ctesiphon and his son Metagenes, was not proof against the frantic hand of the incendiary. Those ingenious architects had built it on the principles of the Ionic order; to the costliness of the materials, the elegance of the architecture, the symmetry of the parts, and the majesty and perfection of the whole, they had added solidity and strength, without which the rest must have been of small value. Their names have descended to posterity, but the pillars of that monument which has perpetuated their memory have been dispersed or destroyed. Scarce a vestige remains of that building which was esteemed one of the seven wonders of the world.

Nations are effaced from the earth like the monuments of their power, and after the revolution of several ages we can scarcely trace in their posterity any remains of their ancient character. Some of them exist longer, others shorter; but we may almost always calculate the period of their duration by the excellence of their laws, and the fidelity with which they support and obey them. The republic of Crete, being established on a solid basis, knew no foreign master for a period of ten centuries. She bravely repelled the attacks of those princes who attempted to enslave her. At length the time arrived when the warlike and victorious Romans aspired to the empire of the world, and would suffer none but their subjects or slaves to inhabit within the reach of their arms. Florus does not scruple to acknowledge, that the Romans had no other motives for invading Crete but the ambitious desire of subduing the renowned native country of Jupiter. "If any person wish to know the reason which induced us to attack Crete (says he), the true reason was our desire to subdue so celebrated an island. The Cretans had appeared to favour Mithridates, and the Romans thought proper to declare war against them on that pretext. Mark Antony, father of the triumvir, attacked them with strong hopes of success; but was severely punished for his presumption and imprudence. The Cretans took a great part of his fleet, hung up his soldiers and sailors on the masts amid the sails and cordage, and returned in triumph into their harbours."

The Romans never forgot nor forgave a defeat. As soon as the Macedonian war was brought to a happy conclusion, they again took arms against the Cretans to revenge their ignominy and loss. Quintus Metellus was sent to Crete with a powerful armament. He met with an obstinate and vigorous resistance. Panarus and Lasthenes, two experienced leaders, collecting a body of 20,000 young warriors, all eager for battle, and of determined courage, employed their arms and arrows successfully against the Romans, and protracted the fate of Crete for three years. Those conquerors could not make themselves masters of the island before destroying its bravest warriors. They lost a great number of troops, and bought a bloody victory at the price of many a danger and much fatigue. However, their usual good fortune at length prevailed. The first care of the conqueror was to abolish the laws of Minos, and to establish in their room those of Numa. Strabo, that enlightened philosopher, complains of this act of severity; and informs us, that in his days the original laws of Crete were no longer in force, because the Romans compelled the conquered provinces to adopt their civil code. To secure themselves still more fully in the possession of the island, they sent a powerful colony to Gnossus.

From that era to the present time, that is, for a period of 1900 years, the Cretans have no longer formed a separate nation, or made any figure among the states and kingdoms of the world: their noble and ingenious manners, their arts and sciences, their valour and their virtues, are no more. They have lost these with the loss of liberty. So true it is that man is not born for himself; and that, when deprived of that aid which Nature has designed to strengthen and support his weakness, the flame of genius and the ardent glow of valour are extinguished in his breast; he becomes incapable of vigorous resolution, and sinks below the natural virtue and dignity of the species.

The island of Crete, joined with the small kingdom of Cyrene, on the Libyan coast, formed a Roman province. It was at first governed by a proconsul; a questor and an assistant were afterwards sent there; at last, as Suetonius informs us, it was put under the government of a consul. This island was one of the first places

Crichton. and ridiculed all the weaknesses and failures of the several employments in which men are engaged. This composition was regarded as one of the most ingenious satires that ever was made upon mankind. But the most astonishing part of the story is that Crichton sustained 15 characters in the representation of his own play. Among the rest, he acted the divine, the philosopher, the lawyer, the mathematician, the physician, and the soldier, with such inimitable grace, that every time he appeared on the theatre he seemed to be a different person.

From being the principal actor in a comedy, Crichton soon became the subject of a dreadful tragedy. One night, during the time of carnival, as he was walking along the streets of Mantua, and playing upon his guitar, he was attacked by half a dozen people in masks. The assailants found that they had no ordinary person to deal with, for they were not able to maintain their ground against him. In the issue, the leader of the company being disarmed, pulled off his mask, and begged his life, telling him that he was the prince his pupil. Crichton immediately fell upon his knees and expressed his concern for his mistake; alleging, that what he had done was only in his own defence, and that if Gonzaga had any design upon his life, he might always be master of it. Then taking his own sword by the point, he presented it to the prince, who immediately received it, and was so irritated by the affront which he thought he had sustained in being foiled with all his attendants, that he instantly ran Crichton through the heart.

Various have been the conjectures concerning the motives which could induce Vincentio di Gonzaga to be guilty of so ungenerous and brutal an action. Some have ascribed it to jealousy, asserting that he suspected Crichton to be more in favour than himself with a lady whom he passionately loved; and Sir Thomas Urquhart has told a story upon this head which is extravagant and ridiculous in the highest degree. Others, with great probability, represent the whole transaction as the result of a drunken frolic: and it is uncertain, according to Imperialis, whether the meeting of the prince and Crichton was by accident or design. However, it is agreed on all hands that Crichton lost his life in the rencounter. The time of his decease is said, by the generality of his biographers, to have been in the beginning of July 1583; but others fix it to the same month in the preceding year. There is a difference, likewise, with regard to the period of life at which Crichton died. The common accounts declare that he was killed in the 32d year of his age: but Imperialis asserts that he was only in his 22d year when that calamitous event took place; and this fact is confirmed by other writers.

Crichton's tragical end excited a very great and general lamentation. If Sir Thomas Urquhart is to be credited, the whole court of Mantua went three quarters of a year into mourning for him; the epitaphs and elegies that were composed upon his death and stuck upon his hearse, would exceed, if collected, the bulk of Homer's works; and, for a long time afterwards, his picture was to be seen in most of the bedchambers and galleries of the Italian nobility, representing him on horseback, with a lance in the one hand and a book in the other. The same author tells us, that Crichton gained the esteem of kings and princes, by his magnanimity and knowledge; of noblemen and gentlemen, by his courtliness and breeding; of knights, by his honourable deportment and pregnancy of wit; of the rich, by his affability and good fellowship; of the poor, by his munificence and liberality; of the old, by his constancy and wisdom; of the young, by his mirth and gallantry; of the learned, by his universal knowledge; of the soldiers, by his undaunted valour and courage; of the merchants and artificers, by his upright dealing and honesty; and of the fair sex, by his beauty and handsomeness, in which respect he was a masterpiece of nature.

Joannes Imperialis, in his life of Crichton, says, that he was the wonder of the last age; the prodigious production of nature; the glory and ornament of Parnassus, in a stupendous and unusual manner; and that, in the judgment of the learned world, he was the phœnix of literature, and rather a shining particle of the Divine Mind and Majesty than a model of what could be attained by human industry. The same author, after highly celebrating the beauty of his person, asserts that his extraordinary eloquence and his admirable knowledge of things testified that he possessed a strength of genius wholly divine. "What (adds this writer) can more exceed our comprehension, than that Crichton, in the 21st year of his age, should be master of ten different languages, and perfectly well versed in philosophy, mathematics, theology, polite literature, and all other sciences? Besides, was it ever heard in the whole compass of the globe, that to these extraordinary endowments of the mind, should be added a singular skill in fencing, dancing, singing, riding, and in every exercise of the gymnastic art?" Nay, Imperialis, in his account of Crichton's death, declares, that the report of so sad a catastrophe was spread to the remotest parts of the earth; that it disturbed universal nature; and that in her grief for the loss of the wonder she had produced, she threatened never more to confer such honour upon mankind. Compared with these extravagancies, the assertion of Bayle that Crichton was one of the greatest prodigies of wit that ever lived, and the testimony of Felix Astolfus concerning his wonderful memory, may be considered as modest encomiums.

Such are the accounts which, by a succession of writers, and particularly since the time of Mackenzie, have been given of the admirable Crichton. These accounts are indeed so wonderful, that many persons have been disposed to consider them as in a great measure, if not entirely, fabulous. We shall therefore subjoin from the *Biographia Britannica* the following observation of Dr Kippis, with a view to ascertain what portion of faith is due to the different parts of the preceding narrative, or at least to assist the reader in forming a proper judgment concerning them.

The doctor begins with observing, "That no credit can be granted to any facts that depend upon the sole authority of Sir Thomas Urquhart. Mr Pennant indeed speaks of him with approbation; and Dr Samuel Johnson laid a stress on his veracity, in the account of Crichton which he dedicated to Dr Hawkesworth, and is inserted in the 81st number of the Adventurer: of which account, it may be observed, that it is only an an elegant summary of the life written by Mackenzie. But with all deference to these respectable names, I must declare my full persuasion that Sir Thomas Urquhart is an author whose testimony to facts is totally unworthy of regard; and it is surprising that a perusal of his works does not strike every mind with this conviction. His productions are so inexpressibly absurd and extravagant, that the only rational judgment which can be pronounced concerning him is, that he was little, if at all, better than a madman. To the character of his having been a madman must be added that of his being a liar. Severe as this term may be thought, I apprehend that a diligent examination of the treatise which contains the memorials concerning Crichton would show that it is strictly true. But of his total disregard to truth there is incontestable evidence in another work of his, entitled, The true Pedigree and Lineal Descent of the most ancient and honourable Family of the Urquharts in the House of Cromarty, from the Creation of the World until the year of God 1652. In this work it is almost incredible what a number of falsities he has invented both with respect to names and facts. Perhaps a more flagrant instance of imposture and fiction was never exhibited; and the absurdity of the whole pedigree is beyond the power of words to express. It can only be felt by those who have perused the tract itself. Such a man therefore can justly be entitled to no degree of credit, especially when he has a purpose to serve, as was the case with Sir Thomas Urquhart. His design was to exalt his own family and his own nation at any rate. With respect to his own nation, there was no occasion for having recourse to fiction, in order to display the lustre of Scotland, in the eminent men whom it has produced in arms and literature. The pencil of truth alone would have been amply sufficient for that purpose (A).

"So far therefore as Sir Thomas Urquhart's authority is concerned, the wonderful exhibitions of Crichton at Paris, his triumph at Rome, his combat with the gladiator, his writing an Italian comedy, his sustaining fifteen characters in the representation of that comedy, the extraordinary story of the amour which is described as the cause of his death, the nine months mourning for him at Mantua, and the poems hung round his hearse to the quantity of Homer's works, must be regarded as in the highest degree doubtful, or rather absolutely false. I cannot forbear mentioning two circumstances, which show how much Sir Thomas Urquhart was destitute of prudence, as well as of scrupulosity, in his violations of truth. He says that the duke of Mantua was pleased to confer upon the young lady that was Crichton's mistress and future wife, a pension of five hundred ducats a year; and that the prince also bestowed as much upon her during all the days of his life, 'which was (adds Sir Thomas) but short; for he did not long enjoy himself after the cross fate of so miserable an accident.' Now it is well known that Vincenzo di Gonzaga succeeded his father in the dukedom of Mantua in 1587, and that he did not die till the year 1612; which was almost, if not entirely, thirty years after Crichton's decease. The other instance of the imprudence of Sir Thomas Urquhart in the contrivance of his fictions, occurs at the conclusion of his narrative, where he asserts that the verity of the story which he hath related concerning the incomparable Crichton, 'may be certified by two thousand men yet living who have known him.' *Two thousand men yet living!* that is, in 1652, sixty-nine or seventy years after Crichton's death, for such was the time of Sir Thomas's publication. Our author would have been sadly puzzled to collect together these two thousand living witnesses who could certify the verity of his story.

"With regard, however, to the account which is given of the prodigious exertions of Crichton, both corporeal and mental, at Paris, Mackenzie imagines that he has found a full confirmation of them in a passage produced by him from the *Disquisitiones* of Stephen Pasquier, and which he considers as the testimony of an eye-witness. But the whole of what has been built upon it by Mackenzie, and succeeding biographers, is founded on a mistake. In the quotation from the *Disquisitiones*, the name of Crichton is not mentioned, and the author doth not appear to have been personally present at the exhibitions of the extraordinary youth there described. The expressions which are supposed to carry that meaning may well be referred not to the writer himself, but to his countrymen the French, before whom the young man is said to have displayed his surprising talents. But the discussion of this point is totally needless, because the passage in question is not an original authority. The book entitled *Stephani Paschieri Disquisitiones* is only an abridgment in Latin of Pasquier's *Des Recherches de la France*. Now, in this last work there is indeed an account of a wonderful youth, such as is related in Mackenzie's quotation, and from which that passage was formed. But this wonderful youth, whoever he might be, was not the admirable Crichton: for Pasquier, who does not tell his name, expressly says that he appeared in the year 1445 (B). The evidence, therefore, produced by Mackenzie falls entirely to the ground. Indeed, if the story of Crichton's exploits at

Paris

(A) This was probably meant as a satire, and not as a serious production.

(B) This matter has been set in a clear light by the writer of the following letter.

"Sir,

"We are informed by Sir John Hawkins, that Dr Johnson dictated from memory that account of the person vulgarly named *the Admirable Crichton*, which is to be found in one of the papers of the Adventurer.

"That account is plainly an abridgment of the life of Crichton by Dr George Mackenzie. Dr Mackenzie supposes that Pasquier, the French lawyer and antiquary, was an eye-witness of the feats performed in arts as well as in arms by Crichton. This is one of the grossest errors in biography which has occurred to me in the course of my reading; and it is an error which I perceive is gaining ground daily, and bids fair in a short time to be received as an indisputable truth.

"The

"The truth of the matter is, that some slight circumstances excepted, neither Dempster nor Imperialis have produced any evidences of Crichton's extraordinary abilities besides those which are recorded by the younger Aldus Manutius. He therefore is to be regarded as the only living authority upon the subject. Manutius was contemporary with Crichton; he was closely connected with him in friendship; and he relates several things on his own personal knowledge. He is a positive and undoubted witness with respect to our young Scotsman's intellectual and literary exertions at Venice and at Padua; and from him it is that our account of them is given above. Nevertheless, even Aldus Manutius is to be read with some degree of caution. Dedications are apt to assume the style of exaggeration, and this is the case with Manutius's dedication of the *Paradoxa Ciceronis* to Crichton. In addition to the general language of such addresses, he might be carried too far by his affection for his friend, which appears to have been very great: nor was the younger Aldus eminent for steadiness and consistency of character. It is even said that by his imprudencies he fell into contempt and misery. But independently of any considerations of this kind, it may be observed, that Manutius's narrative, previous to Crichton's arrival at Venice, could not be derived from personal knowledge. For that part of it (which is sufficiently erroneous) he was probably indebted to Crichton himself. Neither does he appear to have been an eye-witness of the whole of the disputations which were held at Padua; for speaking of his young friend's praise of ignorance, he relates, that those who were present told him afterwards how much they were struck with that oration. However, at the other disputation, which lasted three days, Manutius seems certainly to have attended; for he concludes his accounts of it with saying, that he was not only the adviser but the spectator of Crichton's wonderful contests. It is evident, however, from the dedication, that his extraordinary abilities were not universally acknowledged and admired. Some there were who detracted from them, and were displeased with Manutius for so warmly supporting his reputation.

"As to the real cause and manner of our young Scotsman's death, both of them still remain in some degree of obscurity. That he was killed in a rencounter at the carnival at Mantua, is testified by too many authors to be reasonably doubted. But whether there was that particular malignity on the part of Vincenzo di Gonzaga, which is commonly ascribed to him, may be considered as uncertain.

"One important method yet remains by which we may be enabled to form a judgment of Crichton's genius, and that is from a perusal of the four poems of his which are still preserved. It is, however, to be feared, that these will not exhibit him in a very high point of view. Some fancy, perhaps, may be thought to be displayed in the longest of his poems, which was written on occasion of his approach to the city of Venice. He there represents a Naiad as rising up before him; and, by the order of the Muses and of Minerva, directing him how to proceed. But this is a sentiment which so easily presents itself to a classical reader, that it can scarcely be considered as deserving the name of a poetical invention. The three other poems of Crichton have still less to recommend them. Indeed his verses will not stand the test of a rigid examination even with regard to quantity.

"What then is the opinion which on the whole we are to form of the admirable Crichton? It is evident that he was a youth of such lively parts as excited great present admiration, and high expectation with regard to his future attainments. He appears to have had a fine person, to have been adroit in his bodily exercises, to have possessed a peculiar facility in learning languages, to have enjoyed a remarkably quick and retentive memory, and to have excelled in a power of declamation, a fluency of speech, and a readiness of reply. His knowledge, likewise, was probably very uncommon for his years; and this, in conjunction with his other qualities, enabled him to shine in public disputation. But whether his knowledge and learning were accurate or profound, may justly be questioned; and it may equally be doubted whether he would have arisen to any extraordinary degree of eminence in the literary world. It will always be reflected upon with regret, that his early and untimely death prevented this matter from being brought to the test of experiment."

From the portraits which remain of Crichton, it appears that in his face and form he was beautiful and elegant, and that his body and limbs, though not muscular or athletic, were well proportioned and fitted for feats of agility. The following catalogue of Crichton's works is given by Dempster: 1. *Odæ ad Laurentium Massam plures.* 2. *Laudes Patavinæ, Carmen extempore effusum, cum in Jacobi Moysii Cornelii domo experimentum ingenii coram tota Academiæ frequentia, non sine multorum stupore, faceret.* 3. *Ignorationis Laudatio, extemporale Thema ibidem redditum, post sex horarum disputationes, ut præsentes somnia potius fovere quam rem se veram videre affirmarint, ait Manutius.* 4. *De Appulso suo Venetias.* 5. *Odæ ad Aldum Manutium.* 6. *Epistolæ ad Diversos.* 7. *Præfationes solemnes in omnes Scientias sacras et profanas.* 8. *Judicium de Philosophis.* 9. *Errores Aristotelis.* 10. *Arma an Literæ Præstant, Controversia oratoria.* 11. *Refutatio Mathematicorum.* 12. A Comedy in the Italian language.

CRICK, among farriers, is when a horse cannot turn his neck any manner of way, but holds it fore right, insomuch that he cannot take his meat from the ground without great pain.

CRICKET. See GRYLLUS, ENTOMOLOGY *Index*.

CRICKET is also the name of an exercise or game, with bats and a ball.

Mole-CRICKET. See GRYLLOTALPA, ENTOMOLOGY *Index*.

CRICKLADE, a borough town of Wiltshire, situated on the river Isis, about 26 miles south-west of Oxford. It sends two members to parliament. Population 1556. W. Long. 1. 55. N. Lat. 51. 35.

CRICOARYTENOIDÆUS, in *Anatomy*, a name given to two muscles of the larynx. See ANATOMY, *Table of the Muscles*.

CRICOIDES, in *Anatomy*, a cartilage of the larynx, called also the *annular cartilage*. It occupies the lowest part by way of base to the rest of the cartilages, and to the lower part of it the aspera arteria adheres. See ANATOMY, *Table of the Muscles*.

CRICOTHYROIDÆUS,

CRICOTHYROIDÆUS, in *Anatomy*, one of the five proper muscles of the larynx. See ANATOMY, *Table of the Muscles*.

CRIM-TARTARS, a people of Asia, so called because they originally came from Crimea. They rove from place to place in search of pastures, their houses being drawn on carts. There are a great number of them about Astrachan, to which place they flock in the winter-time; but they are not permitted to enter the city: for this reason, they erect huts up and down in the open fields: which are made either of bulrushes or reeds, being about 12 feet in diameter, of a round form, and with a hole at the top to let out the smoke. Their fuel is turf or cow-dung; and when the weather is very cold, they cover the hut with a coarse cloth, and sometimes pass several days without stirring out. They are generally of small stature, with large faces, little eyes, and of an olive complexion. The men are generally so wrinkled in their faces, that they look like old women. Their common food is fish dried in the sun, which serves them instead of bread; and they eat the flesh of horses as well as camels. Their drink is water and milk, especially mares milk, which they carry about in nasty leathern bags. Their garments are of coarse gray cloth, with a loose mantle made of a black sheep's skin, and a cap of the same. The women are clothed in white linen, with which they likewise dress their heads, hanging a great many Moscovian pence about them; and there is likewise a hole left to stick feathers in. As for their religion, they are a sort of Mahometans; but do not coop up their women like the Turks.

CRIM-Tartary, or *Crimea*. See CRIMEA.

CRIME *and* PUNISHMENT. The discussion and admeasurement of crimes and punishments forms in every country the code of criminal law; or, as it is more usually denominated in England, the doctrine of the *pleas of the crown;* so called, because the king, in whom centres the majesty of the whole community, is supposed by the law to be the person injured by every infraction of the public rights belonging to that community; and is therefore in all cases the proper prosecutor for every public offence.

The knowledge of this branch of jurisprudence, which teaches the nature, extent, and degrees of every crime, and adjusts to it its adequate and necessary penalty, is of the utmost importance to every individual in the state. For no rank or elevation in life, no uprightness of heart, no prudence or circumspection of conduct, should tempt a man to conclude, that he may not at some time or other be deeply interested in these researches. The infirmities of the best among us, the vices and ungovernable passions of others, the instability of all human affairs, and the numberless unforeseen events which the compass of a day may bring forth, will teach us (upon a moment's reflection), that to know with precision what the laws of our country have forbidden, and the deplorable consequences to which a wilful disobedience may expose us, is a matter of universal concern.

In proportion to the importance of the criminal law, ought also to be the care and attention of the legislature in properly forming and enforcing it. It should be founded upon principles that are permanent, uniform and universal; and always conformable to the dictates of truth and justice, the feelings of humanity, and the indelible rights of mankind: though it sometimes (provided there be no transgressions of those eternal boundaries) may be modified, narrowed, or enlarged, according to the local or occasional necessities of the state which it is meant to govern. And yet, either from a want of attention to those principles in the first concoction of the laws, and adopting in their stead the impetuous dictates of avarice, ambition, and revenge; from retaining the discordant political regulations, which successive conquerors or factions have established, in the various revolutions of government; from giving a lasting efficacy to sanctions that were intended to be temporary, and made (as Lord Bacon expresses it) merely upon the spur of the occasion; or, lastly, from too hastily employing such means as are greatly disproportionate to their ends, in order to check the progress of some very prevalent offence;—from some, or from all, of these causes, it hath happened, that the criminal law is in every country of Europe more rude and imperfect than the civil. We shall not here enter into any minute inquiries concerning the local constitutions of other nations; the inhumanity and mistaken policy of which have been sufficiently pointed out by ingenious writers of their own *. But even with us in Britain, where our crown-law is with justice supposed to be more nearly advanced to perfection; where crimes are more accurately defined, and penalties less uncertain and arbitrary; where all our accusations are public, and our trials in the face of the world; where torture is unknown, and every delinquent is judged by such of his equals, against whom he can form no exception, or even a personal dislike:—even here we shall occasionally find room to remark some particulars that seem to want revision and amendment. These have chiefly arisen from too scrupulous an adherence to some rules of the ancient common law, when the reasons have ceased upon which those rules were founded; from not repealing such of the old penal laws as are either obsolete or absurd; and from too little care and attention in framing and passing new ones. The enacting of penalties to which a whole nation shall be subject, ought not to be left, as a matter of indifference to the passions or interests of a few, who upon temporary motives may prefer or support such a bill; but be calmly and maturely considered by persons who know what provisions the laws have already made to remedy the mischief complained of, who can from experience foresee the probable consequences of those which are now proposed, and who will judge without passion or prejudice how adequate they are to the evil. It is never usual in the house of peers even to read a private bill which may affect the property of an individual, without first referring it to some of the learned judges, and hearing their report thereon. And surely equal precaution is necessary, when laws are to be established which may affect the property, the liberty, and perhaps even the lives of thousands. Had such a reference taken place, it is impossible that in the 16th century it could ever have been made a capital crime, to break down (however maliciously) the mound of a fishpond, whereby any fish shall escape; or to cut down a cherry-tree in an orchard. Were even a committee appointed

* As Baron Montesquieu, Marquis of Beccaria, &c.

Blackst. Comment.

ambassadors, even with death itself; in case they have offended, not indeed against the municipal laws of the country, but against the divine laws of nature, and become liable thereby to forfeit their lives for their guilt.

As to offences merely against the laws of society, which are only *mala prohibita*, and not *mala in se*; the temporal magistrate is also impowered to inflict coercive penalties for such transgression: and this by the consent of individuals; who, in forming societies, did either tacitly or expressly invest the sovereign power with a right of making laws, and of enforcing obedience to them when made, by exercising, upon their non-observance, severities adequate to the evil. The lawfulness, therefore, of punishing such criminals is founded upon this principle, that the law by which they suffer was made by their own consent; it is a part of the original contract into which they entered, when first they engaged in society; it was calculated for, and has long contributed to, their own security.

This right therefore, being thus conferred by universal consent, gives to the state exactly the same power, and no more, over all its members, as each individual member had naturally over himself or others; which has occasioned some to doubt, how far a human legislature ought to inflict capital punishments for positive offensives; offences against the municipal law only, and not against the law of nature; since no individual has naturally a power of inflicting death upon himself or others for actions in themselves indifferent. With regard to offences *mala in se*, capital punishments are in some instances inflicted by the immediate command of God himself to all mankind; as, in the case of murder, by the precept delivered to Noah, their common ancestor and representative, "Whoso sheddeth man's blood, by man shall his blood be shed." In other instances they are inflicted after the example of the Creator, in his positive code of laws for the regulation of the Jewish republic; as in the case of the crime against nature. But they are sometimes inflicted without such express warrant or example, at the will and discretion of the human legislature; as for forgery, for theft, and sometimes for offences of a lighter kind. The practice is thus justified by that great and good man Sir Matthew Hale: "When offences grow enormous, frequent, and dangerous to a kingdom, or state, destructive or highly pernicious to civil societies, and to the great insecurity and danger of the kingdom or its inhabitants, severe punishment, and even death itself, is necessary to be annexed to laws in many cases by the prudence of lawgivers." It is therefore the enormity, or dangerous tendency, of the crime, that alone can warrant any earthly legislature in putting him to death that commits it. It is not its frequency only, or the difficulty of otherwise preventing it, that will excuse our attempting to prevent it by a wanton effusion of human blood. For though the end of punishment is to deter men from offending, it never can follow from thence, that it is lawful to deter them at any rate and by any means; since there may be unlawful methods of enforcing obedience even to the justest laws. Every humane legislator will be therefore extremely cautious of establishing laws that inflict the penalty of death, especially for slight offences, or such as are merely positive. He will expect a better reason for his so doing than that loose one which generally is given; that it is found by former experience that no lighter penalty will be effectual. For is it found upon farther experience, that capital punishments are more effectual? Was the vast territory of all the Russias worse regulated under the late empress Elizabeth, than under her more sanguinary predecessors? Is it now, under Catharine II. less civilized, less social, less secure? And yet we are assured, that neither of these illustrious princesses have, throughout their whole administration, inflicted the penalty of death: and the latter has, upon full persuasion of its being useless, nay even pernicious, given orders for abolishing it entirely throughout her extensive dominions. But indeed, were capital punishments proved by experience to be a sure and effectual remedy, that would not prove the necessity (upon which the justice and propriety depend) of inflicting them upon all occasions when other expedients fail. It is feared this reasoning would extend a great deal too far. For instance, the damage done to our public roads by loaded waggons is universally allowed, and many laws have been made to prevent it, none of which have hitherto proved effectual. But it does not therefore follow, that it would be just for the legislature to inflict death upon every obstinate carrier, who defeats or eludes the provisions of former statutes. Where the evil to be prevented is not adequate to the violence of the preventive, a sovereign that thinks seriously can never justify such a law to the dictates of conscience and humanity. To shed the blood of our fellow creature is a matter that requires the greatest deliberation, and the fullest conviction of our own authority; for life is the immediate gift of God to man; which neither he can resign, nor can it be taken from him, unless by the command or permission of Him who gave it, either expressly revealed, or collected from the laws of nature or society by clear and indisputable demonstration.

We would not be understood to deny the right of the legislature in any country to enforce its own laws by the death of the transgressor, though persons of some abilities have doubted it; but only to suggest a few hints for the consideration of such as are, or may hereafter become, legislators. When a question arises, whether death may be lawfully inflicted for this or that transgression, the wisdom of the laws must decide it: and to this public judgment or decision all private judgments must submit; else there is an end of the first principle of all society and government. The guilt of blood, if any, must lie at their doors, who misinterpret the extent of their warrant; and not at the doors of the subject, who is bound to receive the interpretations that are given by the sovereign power.

2. As to the end, or final cause, of human punishments. This is not by way of atonement or expiation for the crime committed; for that must be left to the just determination of the Supreme Being; but as a precaution against future offences of the same kind. This is effected three ways: either by the amendment of the offender himself; for which purpose all corporeal punishments, fines, and temporary exile or imprisonment, are inflicted; or, by deterring others by the dread of his example from offending in the like way, "*ut pœna* (as Tully expresses it), *ad paucos, metus*

" *tus ad omnes, perveniat;* which gave rise to all ignominious punishments, and to such executions of justice as are open and public; or, lastly, by depriving the party injuring of the power to do future mischief; which is effected by either putting him to death, or condemning him to perpetual confinement, slavery, or exile. The same one end, of preventing future crimes, is endeavoured to be answered by each of these three species of punishment. The public gains equal security, whether the offender himself be amended by wholesome correction, or whether he be disabled from doing any farther harm: and if the penalty fails of both these effects, as it may do, still the terror of his example remains as a warning to other citizens. The method, however, of inflicting punishment ought always to be proportioned to the particular purpose it is meant to serve, and by no means to exceed it; therefore the pains of death, and perpetual disability by exile, slavery, or imprisonment, ought never to be inflicted, but when the offender appears incorrigible: which may be collected either from a repetition of minuter offences; or from the perpetration of some one crime of deep malignity, which of itself demonstrates a disposition without hope or probability of amendment: and in such cases it would be cruelty to the public to defer the punishment of such a criminal till he had an opportunity of repeating perhaps the worst of villanies.

3. As to the *measure* of human punishments. From what has been observed in the former articles, we may collect, that the quantity of punishment can never be absolutely determined by any standing invariable rule; but it must be left to the arbitration of the legislature to inflict such penalties as are warranted by the laws of nature and society, and such as appear to be the best calculated to answer the end of precaution against future offences.

Hence it will be evident, that what some have so highly extolled for its equity, the *lex talionis*, or " law of retaliation," can never be in all cases an adequate or permanent rule of punishment. In some cases indeed it seems to be dictated by natural reason: as in the case of conspiracies to do an injury, or false accusations of the innocent; to which we may add that law of the Jews and Egyptians, mentioned by Josephus and Diodorus Siculus, that whoever without sufficient cause was found with any mortal poison in his custody, should himself be obliged to take it. But, in general, the difference of persons, place, time, provocation, or other circumstances, may enhance or mitigate the offence; and in such cases retaliation can never be a proper measure of justice. If a nobleman strikes a peasant, all mankind will see, that if a court of justice awards a return of the blow, it is more than a just compensation. On the other hand, retaliation may sometimes be too easy a sentence; as, if a man maliciously should put out the remaining eye of him who had lost one before, it is too slight a punishment for the maimer to lose only one of his: and therefore the law of the Locrians, which demanded an eye for an eye, was in this instance judiciously altered; by decreeing, in imitation of Solon's laws, that he who struck out the eye of a one-eyed man, should lose both his own in return. Besides, there are very many crimes, that will in no shape admit of these penalties, without manifest absurdity and wickedness. Theft cannot be punished by theft, defamation by defamation, forgery by forgery, adultery by adultery, and the like. And we may add, that those instances, wherein retaliation appears to be used, even by the divine authority, do not really proceed upon the rule of exact retribution, by doing to the criminal the same hurt he has done to his neighbour, and no more; but this correspondence between the crime and punishment is barely a consequence from some other principle. Death is ordered to be punished with death; not because one is equivalent to the other, for that would be expiation, and not punishment. Nor is death always an equivalent for death: the execution of a needy decrepid assassin is a poor satisfaction for the death of a nobleman in the bloom of his youth, and full enjoyment of his friends, his honours, and his fortune. But the reason upon which this sentence is grounded seems to be, that this is the highest penalty that man can inflict, and tends most to the security of the world: by removing one murderer from the earth, and setting a dreadful example to deter others: so that even this grand instance proceeds upon other principles than those of retaliation. And truly, if any measure of punishment is to be taken from the damage sustained by the sufferer, the punishment ought rather to exceed than equal the injury; since it seems contrary to reason and equity, that the guilty (if convicted) should suffer no more than the innocent has done before him; especially as the suffering of the innocent is past and irrevocable, that of the guilty is future, contingent, and liable to be escaped or evaded. With regard indeed to crimes that are incomplete, which consist merely in the intention, and are not yet carried into act, as conspiracies and the like; the innocent has a chance to frustrate or avoid the villany, as the conspirator has also a chance to escape his punishment; and this may be one reason why the *lex talionis* is more proper to be inflicted, if at all, for crimes that consist in intention, than for such as are carried into act. It seems indeed consonant to natural reason, and has therefore been adopted as a maxim by several theoretical writers, that the punishment due to the crime of which one falsely accuses another, should be inflicted on the perjured informer. Accordingly, when it was once attempted to introduce into England the law of retaliation, it was intended as a punishment for such only as preferred malicious accusations against others; it being enacted by statute 37 Edw. III. c. 18. that such as preferred any suggestions to the king's great council should put in sureties of taliation; that is, to incur the same pain that the other should have had, in case the suggestion were found untrue. But, after one year's experience, this punishment of taliation was rejected, and imprisonment adopted in its stead.

But though from what has been said it appears, that there cannot be any regular determinate method of rating the quantity of punishments for crimes, by any one uniform rule; but they must be referred to the will and discretion of the legislative power: yet there are some general principles, drawn from the nature and circumstances of the crime, that may be of some assistance in allotting it an adequate punishment.

As, first, with regard to the object of it: for the greater and more exalted the object of an injury is, the

the more care should be taken to prevent that injury, and of course under this aggravation the punishment should be more severe. Therefore treason in conspiring the king's death is (in Britain) punished with greater rigour than even actually killing any private subject. And yet, generally, a design to transgress is not so flagrant an enormity as the actual completion of that design. For evil, the nearer we approach it, is the more disagreeable and shocking; so that it requires more obstinacy in wickedness to perpetrate an unlawful action, than barely to entertain the thought of it; and it is an encouragement to repentance and remorse, even till the last stage of any crime, that it never is too late to retract; and that if a man stops even here, it is better for him than if he proceeds; for which reason an attempt to rob, to ravish, or to kill, is far less penal than the actual robbery, rape, or murder. But in the case of a treasonable conspiracy, the object whereof is the king's majesty's, the bare intention will deserve the highest degree of severity; not because the intention is equivalent to the act itself; but because the greatest rigour is no more than adequate to a treasonable purpose of the heart, and there is no greater left to inflict upon the actual execution itself.

Again, The violence of passion, or temptation, may sometimes alleviate a crime: as theft, in case of hunger, is far more worthy of compassion, than when committed through avarice, or to supply one in luxurious excesses. To kill a man upon sudden and violent resentment is less penal than upon cool deliberate malice. The age, education, and character, of the offender; the repetition (or otherwise) of the offence; the time, the place, the company wherein it was committed; all these, and a thousand other incidents, may aggravate or extenuate the crime (A).

Farther, As punishments are chiefly intended for the prevention of future crimes, it is but reasonable that among crimes of different natures those should be most severely punished, which are the most destructive of the public safety and happiness; and, among crimes of an equal malignity, those which a man has the most frequent and easy opportunities of committing, which cannot be so easily guarded against as others, and which therefore the offender has the strongest inducement to commit: according to what Cicero observes, *Ea sunt animadvertenda peccata maxime, quæ difficillime præcaventur*. Hence it is, that for a servant to rob his master is in more cases capital than for a stranger. If a servant kills his master, it is a species of treason; in another it is only murder. To steal a handkerchief, or other trifle of above the value of twelvepence, privately from one's person, is made capital; but to carry off a load of corn from an open field, though of fifty times greater value, is punished with transportation only. And in the island of Man this rule was formerly carried so far, that to take away a horse or an ox was there no felony, but a trespass; because of the difficulty in that little territory to conceal them or carry them off: but to steal a pig or a fowl, which is easily done, was a capital misdemeanour, and the offender was punished with death.

Lastly, As a conclusion to the whole, we may observe, that punishments of unreasonable severity, especially when indiscriminately inflicted, have less effect in preventing crimes, and amending the manners of a people, than such as are more merciful in general, yet properly intermixed with due distinctions of severity. It is the sentiment of an ingenious writer, who seems to have well studied the springs of human action, that crimes are more effectually prevented by the certainty than by the severity of punishment; for the excessive severity of the laws (says Montesquieu) hinders their execution. When the punishment surpasses all measure, the public will frequently prefer impunity to it. This also the statute 1 Mar. st. 1. c. 1 recites in its preamble, "that the state of every king consists more assuredly in the love of the subjects towards their prince, than in the dread of laws made with rigorous pains: and that laws made for the preservation of the commonwealth without great penalties, are more often obeyed and kept than laws made with extreme punishments." Happy had it been for the nation if the subsequent practice of that deluded princess in matters of religion, had been correspondent to these sentiments of herself and parliament in matters of state and government! We may further observe, that sanguinary laws are a bad symptom of the distemper of any state, or at least of its weak constitution. The laws of the Roman kings, and the twelve tables of the *decemviri*, were full of cruel punishments: the Porcian law, which exempted all citizens from sentence of death, silently abrogated them all. In this period the republic flourished: under the emperors severe punishments were revived, and then the empire fell.

It is, moreover, absurd and impolitic to apply the same punishment to crimes of different malignity. A multitude of sanguinary laws, (besides the doubt that may be entertained concerning the right of making them) do likewise prove a manifest defect either in the wisdom of the legislative, or the strength of the executive power. It is a kind of quackery in government, and argues a want of solid skill, to apply the same universal remedy, the *ultimum supplicium*, to every case of difficulty. It is, it must be owned, much easier to extirpate than to amend mankind; yet that magistrate must be esteemed both a weak and a cruel surgeon, who cuts off every limb which through ignorance or indolence he will not attempt to cure. It has been therefore ingeniously proposed, that in every state a scale of crimes should be formed, with a corresponding scale of punishments, descending from the greatest to the least. But if that be too romantic an idea, yet at least a wise legislator will mark the principal divisions, and not assign penalties of the first degree to offences of an inferior rank. Where men see no distinction

(A) Thus Demosthenes (in his oration against Midas) finely works up the aggravations of the insults he had received, "I was abused (says he) by my enemy, in cold blood, out of malice, not by heat of wine, in "the morning, publicly, before strangers as well as citizens; and that in the temple, whither the duty of my "office called me."

mixed with a black earth, and the hills abound with marle. The whole flat from Perekop to the river Salgir, which may be an extent of 80 miles, is full of salt marshes and lakes; from whence the neighbouring Russian governments, as well as the Crim itself, Anatolia, and Bessarabia, are supplied with salt. The most remarkable of these lakes are five in number; Koslof and Keffa, so called after the towns near which they lie, are very large; the Tusla, about 15 versts from Perekop, on the road from Keffa; the Red lake, not far from the last mentioned; and the Black lake. Besides these, there are many other swamps and lakes, from whence the inhabitants get salt for their own consumption.

The greatest part of the peninsula is so level that a man may travel over the half of it without meeting with a river or even the smallest brook. The inhabitants of the villages, therefore, make a pit in the yard of every house for receiving the rain or the water that runs from the hills. The whole tract is bare of every kind of tree. Not a bush or a bramble is to be seen, and the herbage is extremely scanty. This, however, does not proceed so much from the unfruitfulness of the place, as from the vast herds of cattle which rove the whole year long from place to place; by which means all the grass in spring, summer, or autumn, no sooner appears through the long drought which succeeded the rainy season, but it is immediately devoured or trodden down. The universal prevalence of this custom of keeping cattle to wander up and down, joined to the slothfulness of the Tartars, with their inaptitude and aversion to agriculture, is the reason of the total neglect of that science here. Otherwise, were the land divided into portions and properly managed, there would be a sufficiency for the cattle, and the rest would be fruitful in corn and grain. By this means alone the Crim would become a fertile country, and no natural defect would be found in opposition to the welfare of its inhabitants. The truth of this is well known by their neighbours; where, of a hundred Tartars, one perhaps follows husbandry, who finds it to answer to so much profit, that he has not only enough for his own use, but wherewith to sell to the ninety-nine.

This peninsula, which is indeed but a little district, yet, from the many advantages conferred upon it by nature, may be esteemed peculiarly rich, is divided into the hill country and the flat. The latter, which extends from Perekop to Koslof and the river Bulganap, to Karasubasar, Keffa, and Yenicali, is strewn there and there with little Tartar villages, maintained by cattle and the produce of the salt lakes. The highlands, or hill country, form the southern part of the Crim, along the straight coast of the Black sea, and stretching westward in a right line from Keffa to the vicinity of Belbek. These hills are composed of layers of chalk; which, in the headlands and promontories, is soft, but more inland quite hard. The strata of the high hills are like those of the promontories, and take a direction from north to south. These qualities of the strata prevail not throughout the whole hills, but only in the large and lofty ones; such as the two that rise near Karasubasar, and one very high by Achmetsched, which bears the name of Aktau. The other smaller hills lie scattered and dispersed, but take the names of the greater ones, to which they seem to belong; as the great ridge of Caucasus does, which extends beyond the Donau, through Bulgaria, and are named *Palkans*.

All accounts agree in this, that nature has favoured those highland countries with great advantages, and blessed them with abundance of all things. A number of springs that flow from the mountains form the two considerable rivers Salgir and Karasu, which run into the Rotten sea. The former, which takes its rise from a cavern in a high hill near Achmetsched, falls straight into the plain below, and waters a great part of the Crim; the other, commencing behind Karasubasar, falls likewise into the plain, and mingles with the Salgir. There are many other little rivers and streams, which run eastward, and either join the two fore-mentioned or fall immediately into the Rotten sea. All the streams, for the whole length of the hills, which begin at Keffa, and proceed in a chain of the same height, flow to the north or the north-east, excepting the one behind Achmetsched, where the great mountain Aktau is, which falls on the other side; this river, rising on the northern side of this mountain, flows, as was before observed, towards the north-east, to the Salgir and the Rotten sea; as likewise those which spring on the western side take their course westward to the Bulganak, and thence straight to the Black sea; which also receives all the other little rivers that arise from these hills, as the Amma, the Katscha, the Belbek, the Kasulkioi, &c.

The mountains are well covered with wood fit for the purpose of ship-building, and contain plenty of wild beasts. The valleys consist of fine arable land; on the sides of the hills grow corn and vines in great abundance, and the earth is rich in mines. But these mountaineers are as careless and negligent as the inhabitants of the deserts; slighting all these advantages; and, like their brethren of the lowlands, are sufficiently happy if they are in possession of a fat sheep and as much bread as serves them to eat.

About 20 years ago this peninsula was uncommonly full of inhabitants and wealth. They reckoned at that time at least 1200 villages; but, from the subsequent troubles in the Crim, it lost more than a third part of its inhabitants, but they have again begun to increase. The people were composed of various nations, who lived together under the Tartars in the most unbounded freedom; but in the late Turkish war they either put themselves under the Russian government, and were transferred to that empire, or fled to Abcasia and the Tschirkassian hills.

The houses in the towns, as well as the villages, are for the most part of square timbers, having the interstices filled with brick work, if the possessor can afford it, and those of the poorer sort with turf. The chinks and crannies are made tight with clay, and then plastered within and without. The covering is commonly either of bricks or of turfs. Only the medscheds, minarets, and baths, are of stone, and a few extremely handsome of marble. They have chimneys in the chambers, at which they likewise dress their victuals; but stoves in the Russia manner none. In extreme frosts a great iron pan of charcoal is brought into the room, for making it comfortable. Their custom is, to to sit upon low sofas, with Turkish coverings and cushions, or upon a clay seat, somewhat raised above the earth and spread with a carpet. In these rooms are cupboards and chests, often covered with cushions, to serve as seats; in which they keep their gold, silver, and valuables. Such are the inner apartments or harams, in which the women generally live; the others are not so fine. These contain only a sofa, or a bank of clay covered with a carpet, as in the chimney rooms.

The rich Tartars, and their nobility or murzas (excepting only such as are about the person of the khan), commonly dwell all the year round in the country, coming only to town when they have business there. There are but few towns in the Crim, at least in comparison of its former population. The Krimskoi Tartars have no tribunal of justice, controversies and quarrels being seldom heard of among them; and if a dispute should arise, it is immediately settled by an appeal to the Koran. Little differences in the villages inevitably happening about property, or other matters not taken notice of in that code, are amicably adjusted by the eldermen or abeses; but in the towns all weighty concerns, excepting the single case of murder or homicide, are brought before the kaimakan, or commandant, who settles them absolutely without appeal.

The residence of the khans of the Crimea was formerly Bachtschisarai, in which city they held their seat for upwards of 200 years. They went thither from Eski-Crim, or Old Crim, the capital city of the Genoese, upon Bengli Ghirei Khan's plundering the seaports, and driving all the Genoese from their stations. Before Eski-Crim, and indeed upon the first coming of the Tartars into this peninsula, the sovereign residence was at Koslof; but here they remained not long. Under the late khan Shagin Ghirei it was held at Keffa, the ancient Theodosia; which is ten miles distant from Eski-Crim, said to be the Cimmerium of the ancients.

The principal cities or towns of the Crimea are: 1. *Bachtschisarai*, an extensive and wealthy city, lying in a vale between two high mountains, and surrounded by a number of gardens. From this circumstance it had its name; *bachtschi*, signifying in the Tartarian language "a garden," and *sarai*, "a palace." It formerly contained 3000 houses, and many sumptuous medscheds. The palace of the khans, with its gardens and ponds, was much improved under the government of Khan Kerim Ghirei, under whose government the last Turkish war took its rise. In this palace is the burial-place of all the khans of Crimea, wherein all the khans that have reigned here lie interred. The fine Krimskoi vines, with their large clusters of grapes, grow in great plenty all about this town, and a profusion of other delicious fruits, from whence the neighbouring parts of Russia are supplied. 2. *Keffa*, the present residence of the khans, stands on the shore of a large harbour in the Black sea. Its site is on the declivity of a long ridge of mountains: and is mantled by a stone wall, fortified by several towers, and encompassed by a deep ditch. On both sides of the city formerly stood castles, and in the middle of them a lofty turret for the purpose of giving signals by fire. Before the wall were wide extended suburbs; containing among other considerable buildings, medscheds, churches for the Greek and Armenian worship: of all which now only the vestiges remain. The castles and towers lie also in ruins; and not one-third part of the houses of the city itself are now remaining, and those chiefly built of materials taken from the aforesaid ruins. They formerly reckoned Keffa to contain 4000 houses, including the suburbs, with a number of medscheds and Christian churches; but this number has been much diminished by the last Turkish war. The present inhabitants consist mostly of Tartars; who carry on a trade by no means inconsiderable, in commodities brought from Turkey. The late khan, an intelligent and enlightened personage, made this city the place of his residence, and brought hither the mint from Bachtschisarai, built himself a palace, and erected a divan, which assembled three times a-week, and the fourth time was held in the palace of the khan, in which he always personally assisted. Here is also a customhouse, the management of which is farmed out. 3. *Karasubasar*, likewise a very rich city in former times, stands at the beginning of the mountains, about half-way between Keffa and Bachtschisarai. It is a large trading town; contains a considerable number of dwelling houses and medscheds, but the greatest part of them in decay, and many fine gardens. This place is the most famous in all the Crim for its trade in horses, and has a market once a-week for that article of traffic: to which are likewise brought great numbers of buffaloes, oxen, cows, camels, and sheep for sale. Near this city flows one of the principal rivers of the Crim, called the *Karasu*, that is, the Black water. Of this river they have an opinion in Russia, that one part of it flows upwards for several versts together. But this is in some sort true, not only of the Karasu, but of all the rivers of the Crim that have a strong current. The Tartars, who dwell either in the valleys or on the sides of the mountains (frequently without considering whether the place is supplied with water or not), dig canals either from the source of the next river, or from that part of it which lies nearest to their particular habitation, about an arshine in breadth, for their gardens and domestic use. From these they cut smaller ones through the villages, to supply them with water, and not unfrequently to drive a mill. These canals appear, to the imagination of the common people, to run in a contrary direction to the current of the river; and in fact these canals do lie, in many places for a verst in length, some fathoms higher than the level of the stream from whence they are supplied. 4. *Achmetsted*, a pretty large city not far from Bachtschisarai; now made the capital of all the Crimea by the regulations of Prince Potemkin in the summer of 1785. 5. *Koslof*, formerly a very considerable trading town, lies on the western side of the peninsula, in a bay of the Black sea; which, as well as the sound at Keffa, might rather be called a road than a haven. This was the first town the Tartars possessed themselves of on their first entrance into the Crim, and established a customhouse therein, after the example of the Genoese, which is now farmed out.

The other remarkable places are, *Sudak*, which is built on the hills upon the shore of the Black sea, at the south side of the peninsula, and is famous for its excellent wine, resembling Champagne both in colour and strength; *Aluschti*, on the same side, among the hills

hills on the sea shore; *Baluklava*, where there is a fine harbour, and perhaps the only one on the Black sea, containing ample room for a very good fleet; *Inkerman* may be noticed for its commodious though not very large haven, called *Achtiar;* and *Mangup*, the old Chersonesus: which were all formerly very flourishing towns; but are now either in ruins, or dwindled into small villages.

All these places, so long as the Genoese remained masters of the Crim, were well fortified; but the Tartars, in taking them, demolished all the works. While they were under the Turks, they left the fortresses of Keffa, Kertsch, and Koslof, and built the fort Arabat on the neck of land between the sea of Azof (or Palus Mæotis) and the Rotten sea, where Perekop also is.

In *Arabat* are but few houses; but here the warlike stores of the khans were kept.—*Perekop*, called by the Turks *Or-capi*, is a fortress of moderate strength; standing about the middle of the neck of land that joins the peninsula with the continent. This isthmus, which is at least six miles broad, is cut through with a wide and deep ditch lined with stone, and reaches from the Black to the Rotten sea. This was formerly kept without water, but now is filled from both seas. On the Crimean side a high wall of earth runs the whole length of it, straight from one sea to the other. The people pass over the ditch by means of a drawbridge, and through the wall by a gateway. The walls of the fortress are some fathoms from the road side; of which the ruins are only now discernible, namely, large brick houses, with a number of bomb-shells and cannon-balls about them, which were formerly kept in the fortress. At least two miles from this is a pretty populous but miserable place, which was probably the town to which this fort belonged. Near the gate is a customhouse, where all imports and exports pay duty.

This peninsula was formerly extremely populous; the number of its inhabitants, in Tartars, Turks, Greeks, Armenians, Jews, and others, amounted to above 200,000 men. Afterwards a part of the Christian population removed to other parts of the Russian empire, particularly the government of Azof; and many other inhabitants, particularly Tartars, have gone to Taman and Abchasia: but since the beginning of the present century, a rapid increase has taken place, partly from the influx of emigrants; and at present the peninsula is more populous than ever.

The Crim was heretofore divided into 24 kaduliks or districts; namely, Yenikali, Kertsch, Arabat, Eski-krim, Keffa, Karasubasar, Sudak, Achmetsched, Yalof, Bachtschisarai, Baluklava, Mangup, Inkerman, Koslof, Or, Mansur, Tarkan, Sivasch, Tischongar, Sarubulat, Barun, Argun, Sidschugut, and Schirin. Several of these districts are named after the town or village wherein the governor dwells.

CRIMEN FALSI. See *Falsi Crimen*.

CRIMSON, one of the seven red colours of the dyers. See DYEING.

CRINGLE, a small hole made in the bolt-rope of a sail, by intertwisting one of the divisions of a rope, called a *strand*, alternately round itself and through the *strands* of the bolt-rope, till it becomes threefold, and assumes the shape of a wreath or ring. The use of the cringle is generally to contain the end of some rope, which is fastened thereto for the purpose of drawing up the sail to its yard, or of extending the skirts by the means of *bridles*, to stand upon a side wind. The word seems to be derived from *krinckelen* (Belg.) "to run into twists."

CRINUM, ASPHODEL-LILY; a genus of plants belonging to the hexandria class; and in the natural method ranking under the 6th order, *Spathaceæ*. See BOTANY *Index*.

CRISIS, in *Medicine*, is used in different senses, both by the ancient and modern physicians. With some it means frequently no more than the excretion of any noxious substance from the body. Others take the word for a secretion of the noxious humours made in a fever. Others use it for the critical motion itself; and Galen defines a crisis in fevers, a sudden and instantaneous change, either for the better or the worse, productive of recovery or death.

CRISPIN *and* CRISPIANUS, two legendary saints, whose festival, as marked in the kalendar, is on the 25th of October. According to the legend, they were brethren, born at Rome; from whence they travelled to Soissons in France, about the year 303, to propagate the Christian religion; and because they would not be chargeable to others for their maintenance, they exercised the trade of shoemakers: but the governor of the town discovering them to be Christians, ordered them to be beheaded. From which time the shoemakers made choice of them for their tutelar saints.

CRISTÆ, in *Surgery*, a term for certain excrescences about the anus and pudenda. See MEDICINE *Index*.

CRISTA GALLI, in *Anatomy*, an eminence in the middle of the *os ethmoides*, advancing within the cavity of the cranium; and to which is fastened that part of the dura mater which divides the brain, called *falx*. It has its name from its figure, which resembles that of a cock's comb. In adults, this process appears of a piece with the *septum narium*. See ANATOMY *Index*.

CRITERION, or CRITERIUM, a standard by which propositions and opinions are compared, in order to discover their truth or falsehood.

CRITHE, in *Surgery*, commonly called the *stye*, is a sort of tubercle that grows on the eyelids. When small, it is seated on the edge of the eyelid; but when large, it spreads further. When they do not suppurate they become wens. They are apt to disappear and return. If there is inflammation, endeavour to suppurate it with the white bread poultice: if it is hard, destroy it with a mixture of equal parts of hog's lard and quicksilver. If the lower eyelid is affected, the tumour is more frequently on its inside; and then it is best to dissect it, or to make way for it outwardly by applying a caustic on the skin just upon it.

CRITHUM, SAMPHIRE; a genus of plants belonging to the pentandria class; and in the natural method ranking under the 45th order, *Umbellatæ*. See BOTANY *Index*.—Its leaves are an excellent pickle used for sauces, and are by many eaten raw in salads. It is of a saltish relish, palatable, and comfortable to the stomach. It is not very easily preserved in gardens. It must be sown on gravelly or rocky ground, half an inch deep; in which situation the plants will come up, and last some years.

CRITHOMANCY, a kind of divination, performed by considering the dough or matter of the cakes offered in sacrifice, and the meal strewed over the victims to be killed. Hence, in regard they ordinarily used barley-meal in these ceremonies, this kind of divination was called *crithomancy*, from κριθη, *barley*, and μαντεια, *divination*.

CRITIAS, one of the 30 tyrants set over Athens by the Spartans. He was eloquent and well bred, but of dangerous principles. He cruelly persecuted his enemies, and put them to death. He was killed about 400 years before the Augustan age, in a battle against those citizens whom his oppression had banished. He had been among the disciples of Socrates, and had written elegies and other compositions, of which some fragments remain.

CRITICAL DAYS and SYMPTOMS, among physicians, are certain days and symptoms in the course of acute diseases, which indicate the patient's state, and determine him either to recover or grow worse. See MEDICINE *Index*.

CRITICISM, the art of judging with propriety concerning any object or combination of objects. But, in a more limited sense, the science of criticism is confined to the fine arts. The principles of the fine arts are best unfolded by studying the sensitive part of our nature, and by learning what objects are naturally agreeable and what are naturally disagreeable. The man who aspires to be a critic in these arts, must pierce still deeper: he must clearly perceive what objects are lofty, what low, what are proper or improper, what are manly, and what are mean or trivial. Hence a foundation for judging of taste, and for reasoning upon it: where it is conformable to principles, we can pronounce with certainty that it is correct; otherwise, that it is incorrect, and perhaps whimsical. Thus the fine arts, like morals, become a rational science; and, like morals, may be cultivated to a high degree of refinement.

Manifold are the advantages of criticism, when thus studied as a rational science. In the first place, a thorough acquaintance with the principles of the fine arts redoubles the entertainments those arts afford. To the man who resigns himself entirely to sentiment or feeling, without interposing any sort of judgment, poetry, music, painting, are mere pastime; in the prime of life, indeed, they are delightful, being supported by the force of novelty and the heat of imagination: but they lose their relish gradually with their novelty; and are generally neglected in the maturity of life, which disposes to more serious and more important occupations. To those who deal in criticism as a regular science, governed by just principles, and giving scope to judgment as well as to fancy, the fine arts are a favourite entertainment; and in old age maintain that relish which they produce in the morning of life.

In the next place, a philosophical inquiry into the principles of the fine arts, inures the reflecting mind to the most enticing sort of logic: the practice of reasoning upon subjects so agreeable tends to a habit; and habit strengthening the reasoning faculties, prepares the mind for entering into subjects more difficult and abstract. To have, in this respect, a just conception of the importance of criticism, we need but reflect upon the common method of education; which, after some years spent in acquiring languages, hurries us, without the least preparatory discipline, into the most profound philosophy: a more effectual method to alienate the tender mind from abstract science, is beyond the reach of invention: and accordingly, with respect to such speculations, the bulk of our youth contract a sort of hobgoblin terror, which is seldom, if ever, subdued. Those who apply to the arts are trained in a very different manner: they are led, step by step, from the easier parts of the operation to what are more difficult; and are not permitted to make a new motion till they be perfected in those which regularly precede it. The science of criticism appears then to be a middle link, connecting the different parts of education into a regular chain. This science furnisheth an inviting opportunity to exercise the judgment: we delight to reason upon subjects that are equally pleasant and familiar; we proceed gradually from the simpler to the more involved cases: and in a due course of discipline, custom, which improves all our faculties, bestows acuteness upon those of reason, sufficient to unravel all the intricacies of philosophy.

Nor ought it to be overlooked, that the reasonings employed upon the fine arts are of the same kind with those which regulate our conduct. Mathematical and metaphysical reasonings have no tendency to improve social intercourse; nor are they applicable to the common affairs of life: but a just taste in the fine arts, derived from rational principles, furnishes elegant subjects for conversation, and prepares us finely for acting in the social state with dignity and propriety.

The science of rational criticism tends to improve the heart not less than the understanding. It tends, in the first place, to moderate the selfish affections: by sweetening and harmonizing the temper, it is a strong antidote to the turbulence of passion and violence of pursuit; it procures to a man so much mental enjoyment, that, in order to be occupied, he is not tempted in youth to precipitate into hunting, gaming, drinking; nor in middle age, to deliver himself over to ambition; nor in old age, to avarice. Pride and envy, two disgustful passions, find in the constitution no enemy more formidable than a delicate and discerning taste: the man upon whom nature and culture have bestowed this blessing feels great delight in the virtuous dispositions and actions of others; he loves to cherish them, and to publish them to the world: faults and failings, it is true, are to him not less obvious; but these he avoids, or removes out of sight, because they give him pain. On the other hand, a man void of taste, upon whom the most striking beauties make but a faint impression, has no joy but in gratifying his pride or envy by the discovery of errors and blemishes. In a word, there may be other passions, which, for a season, disturb the peace of society more than those mentioned: but no other passion is so unwearied an antagonist to the sweets of social intercourse: these passions, tending assiduously to their gratification, put a man perpetually in opposition to others; and dispose him more to relish bad than good qualities, even in a companion. How different that disposition of mind, where every virtue in a companion or neighbour, is, by refinement of taste, set in its strongest light; and defects

defects or blemishes, natural to all, are suppressed, or kept out of view!

In the next place, delicacy of taste tends not less to invigorate the social affections than to moderate those that are selfish. To be convinced of this tendency, we need only reflect, that delicacy of taste necessarily heightens our sensibility of pain and pleasure, and of course our sympathy, which is the capital branch of every social passion. Sympathy, in particular, invites a communication of joys and sorrows, hopes and fears: such exercise, soothing and satisfactory in itself, is necessarily productive of mutual good-will and affection.

One other advantage of rational criticism is reserved to the last place, being of all the most important; which is, that it is a great support to morality. No occupation attaches a man more to his duty than that of cultivating a taste in the fine arts: a just relish of what is beautiful, proper, elegant, and ornamental, in writing or painting, in architecture or gardening, is a fine preparation for the same just relish of those qualities in character and behaviour. To the man who has acquired a taste so acute and accomplished, every action wrong or improper must be highly disgustful: if, in any instance, the overbearing power of passion sway him from his duty, he returns to it upon the first reflection with redoubled resolution never to be swayed a second time: he has now an additional motive to virtue, a conviction derived from experience, that happiness depends on regularity and order, and that a disregard to justice or propriety never fails to be punished with shame and remorse.

For this rule of criticism applicable to the fine arts, and derived from human nature, see ARCHITECTURE, BEAUTY, CONGRUITY, COMPARISON, GRANDEUR, &c.

CRITO, an Athenian philosopher, flourished 400 years before Christ. He was one of the most zealous disciples of Socrates, and supplied him with whatever he wanted. He had several scholars who proved great men, and he composed some dialogues which are lost.

CRITOLAUS, a citizen of Tegea in Arcadia. He with two brothers fought against the three sons of Demonstratus of Pheneus, to put an end to a long war between their respective nations. These brothers of Critolaus were both killed, and he alone remained to withstand his three bold antagonists. He conquered them; and when at his return his sister deplored the death of one of his antagonists, to whom she was betrothed, he killed her in a fit of resentment. The offence deserved capital punishment; but he was pardoned on account of the services he had rendered his country. He was afterwards general of the Achæans; and it is said that he poisoned himself because he had been conquered at Thermopylæ by the Romans, about 146 years before the Augustan age.

CRIZZELLING, in the glass trade, a kind of roughness arising on the surface of some kinds of glass. This was the fault of a peculiar sort of glass made in Oxfordshire and some other places, of black flints, a crystallized sand, and a large quantity of nitre, tartar, and borax. The glass thus made is very beautiful, but, from the too great quantities of the salts in the mixture,

is subject to crizzel; that is, the salts in the mixture, from their too great proportion, are subject, either from the adventitious nitre of the air from without, or from warm liquors put in them, to be either increased in quantity or dissolved, and thereby induce a scabrities or roughness irrecoverably clouding the transparence of the glass. This is what was called *crizzelling*; but by using an Italian white pebble, and abating the proportions of the salts, the manufacture is now carried on with advantage, and the glass made with these salts is whiter than the finest Venetian, and is subject to no faults.

CROATIA, a part of the ancient Illyricum, is bounded on the east by Sclavonia and Bosnia, on the south and south-west by Morlachia, and on the north by the Drave, which separates it from a part of Sclavonia. It is about 160 miles in length and 100 in breadth, and was once divided between the Hungarians and Turks; but now the greatest part of it is subject to the house of Austria. The Croats derive their origin from the Sclavi; and their language is a dialect of the Sclavonian, approaching very near to that of the Poles. The country is divided into two parts, viz. that under, and that beyond, the Save. The soil, where cultivated, is fruitful in wine, oil, &c. but being a frontier country, and much exposed to inroads, it is not well cultivated. It contains 9421 square miles, and 800,000 inhabitants. In 1809 the part of Croatia lying south of the Save was ceded to France, and united with the Illyrian provinces, but in 1815 it was restored to Austria.

CROCODILE. See LACERTA, ERPETOLOGY *Index*.

Fossil CROCODILE, one of the remarkable discoveries in the fossil world which later times have produced. It is the skeleton of a large crocodile, almost entire, found at a great depth under ground, bedded in stone. This was in the possession of Linkius, who wrote many pieces of natural history, and particularly an accurate description of this curious fossil. It was found in the side of a large mountain in the interior of Germany, and in a stratum of black stone, somewhat like slate, (marl probably), but of a coarser texture, the same with that in which the fossil fishes in many parts of the world are found. This skeleton had the back and ribs very plain, and was of a much deeper black than the rest of the stone; as is also the case in the fossil fishes which are preserved in this manner. The part of the stone where the head lay was not found; this being broken off just at the shoulders, but that irregularly; so that in one place a part of the back of the head was visible in its natural form. The two shoulder bones were very fair, and three of the feet were well preserved: the legs were of their natural shape and size, and the feet preserved even to the extremities of the five toes of each.

CROCODILE (*crocodilus*), in *Rhetoric*, a captious and sophistical kind of argumentation, contrived to seduce the unwary, and draw them speciously into a snare. It has its name crocodile from the following occasion, invented by the poets. A poor woman, begging a crocodile that had caught her son walking by the river-side to spare and restore him, was answered, that he would restore him, provided she would give a true answer to a question he should propose: the question was, Will I restore thy son or not: To this the poor woman behind. When they approached the royal presence, Adrastus stepped forward and entreated Crœsus to put him to death; thinking life no longer to be endured after killing, first his own brother, and then the son of his benefactor. But the Lydian king, notwithstanding the excess of his affliction, acknowledged the innocence of Adrastus, and the power of fate. "Stranger, your action is blameless, being committed without design. I know that my son was destined to a premature death." Adrastus, though pardoned by Crœsus, could not pardon himself. When the mourners were removed, he privately returned, and perished by his own hand on the tomb of Atys.

Two years Crœsus remained disconsolate for the loss of his son: and might have continued to indulge his unavailing affliction during the remainder of life, had not the growing greatness of Persia, which threatened the safety of his dominions, roused him from his dream of misery. (See LYDIA.)—He marched against Cyrus with a great army, but was defeated; and retreating to his capital Sardis, was there besieged. The city was taken by assault; and as a Persian soldier was going to kill Crœsus, that prince's only surviving son, who had hitherto been dumb, terrified at his danger, cried, *Stop soldier, and touch not Crœsus*. But though delivered by this extraordinary accident from the blind rage of the soldier, he seemed to be reserved for a harder fate. Dragged into the presence of his conqueror, he was loaded with irons; and the stern, unrelenting Cyrus, of whose humane temper of mind we have so beautiful, but so flattering, a picture in the philosophical romance of Xenophon, ordered him, with the melancholy train of his Lydian attendants, to be committed to the flames. An immense pile of wood and other combustibles was erected in the most spacious part of the city. The miserable victims, bound hand and foot, were placed on the top of the pyre. Cyrus, surrounded with his generals, witnessed the dreadful spectacle. Either from an abominable principle of superstition he had bound himself by a vow to sacrifice Crœsus as the first fruits of his Lydian victory, or from a motive of curiosity, equally cruel and impious, to try whether Crœsus, who had so magnificently adorned the temples and enriched the ministers of the gods, would be helped in time of need by the miraculous interposition of his much honoured protectors. Meanwhile the unfortunate Lydian, oppressed and confounded by the intolerable weight of his present calamity compared with the security and splendour of his former state, recollected his memorable conversation with the Athenian sage, and uttered with a deep groan the name of *Solon*. Cyrus asked by an interpreter, "Whose name he invoked?" "*His*," replied Crœsus, emboldened by the prospect of certain death, "whose words ought ever to speak to the heart of kings." This reply not being satisfactory, he was commanded to explain at full length the subject of his thoughts. Accordingly he related the important discourse which had passed between himself and the Athenian, of which it was the great moral, That no man could be called happy till his death.

The words of a dying man are fitted to make a strong impression on the heart. Those of Crœsus deeply affected the mind of Cyrus. The Persian considered the speech of Solon as addressed to himself. He repented of his intended cruelty towards the unfortunate prince, who had formerly enjoyed all the pomp of prosperity: and dreading the concealed vengeance that might lurk in the bosom of fate, gave orders that the pyre should be extinguished. But the workmen who had been employed to prepare it, had performed their task with so much care, that the order could not speedily be obeyed. At that moment, Crœsus calling on Apollo, whose favourite shrine of Delphi had experienced his generous munificence, and whose perfidious oracle had made him so ungrateful a return; the god, it is said, sent a plentiful shower to extinguish the pyre. This event, which saved the life, and which sufficiently attested the piety, of Crœsus, strongly recommended him to the credulity of his conqueror. It seemed impossible to pay too much respect to a man who was evidently the favourite of heaven. Cyrus gave orders that he should be seated by his side, and thenceforth treated as a king; a revolution of fortune equally sudden and unexpected. But the mind of Crœsus had undergone a still more important revolution: for, tutored in the useful school of adversity, he learned to think with patience and to act with prudence, to govern his own passions by the dictates of reason, and to repay by wholesome advice the generous behaviour of his Persian master.

The first advantage which he derived from the change in Cyrus's disposition towards him, was the permission of sending his fetters to the temple of the Delphian Apollo, whose flattering oracles had encouraged him to wage war with the Persians. "Behold," were his messengers instructed to say, "the trophies of our promised success! behold the monuments of the unerring veracity of the god!" The Pythia heard their reproach with a smile of contemptuous indignation, and answered it with that solemn gravity which she was so carefully taught to assume: "The gods themselves cannot avoid their own destiny, much less avert, however they may retard, the determined fates of men. Crœsus has suffered, and justly suffered, for the crime of his ancestor Gyges; who, entrusted as chief of the guards, with the person of Candaules, the last king of the race of Hercules, was seduced by an impious woman to murder his master, defile his bed, and to usurp his royal dignity. For this complicated guilt of Gyges the misfortunes of Crœsus have atoned; but know, that through the favour of Apollo, these misfortunes have happened three years later than the fates ordained." The Pythia then proceeded to explain her answers concerning the event of the war against Cyrus, and proved, to the conviction of the Lydians, that her words, if properly understood, portended the destruction, not of the Persian, but of the Lydian empire. Crœsus heard with resignation the report of his messengers, and acknowledged the justice of the Delphian oracle, which maintained and increased the lustre of its ancient fame. This fallen monarch survived Cyrus. The manner of his death is not known.

CROFT, a little close adjoining to a dwelling-house, and inclosed for pasture or arable land, or any other purpose.—In some ancient deeds, *crufta* occurs as the Latin word for a "croft;" but *cum toftis et croftis* is more frequent. Croft is translated in Abbo Floriacensis by *prædium*, a "farm."

CROISADE, or CRUSADE, a name given to the expeditions

Croisade. expeditions of the Christians against the infidels for the conquest of Palestine.

These expeditions commenced in the year 1096. The foundation of them was a superstitious veneration for those places where our Saviour performed his miracles, and accomplished the work of man's redemption. Jerusalem had been taken, and Palestine conquered, by Omar the successor of Abu Becr *, who succeeded Mahomet himself. This proved a considerable interruption to the pilgrims, who flocked from all quarters to perform their devotions at the holy sepulchre. They had, however, still been allowed this liberty, on paying a small tribute to the Saracen caliphs, who were not much inclined to molest them. But, in 1065, this city changed its masters. The Turks took it from the Saracens; and being much more fierce and barbarous than the former, the pilgrims now found they could no longer perform their devotions with the same safety they did before. An opinion was about this time also prevalent in Europe, which made these pilgrimages much more frequent than formerly. It was somehow or other imagined, that the thousand years mentioned in the 20th chapter of the Revelations, were fulfilled; that Christ was soon to make his appearance in Palestine, to judge the world; and consequently that journeys to that country were in the highest degree meritorious, and even absolutely necessary. The multitudes of pilgrims which now flocked to Palestine meeting with a very rough reception from the Turks, filled all Europe with complaints against those infidels, who profaned the holy city by their presence, and derided the sacred mysteries of Christianity even in the place where they were fulfilled. Pope Gregory VII. had formed a design of uniting all the princes of Christendom against the Mahometans; but his exorbitant encroachments upon the civil power of princes had created him so many enemies, and rendered his schemes so suspicious, that he was not able to make great progress in the undertaking. The work was reserved for a meaner instrument.

* See *Arabia*, N° 76.

Peter, commonly called the *hermit*, a native of Amiens in Picardy, had made the pilgrimage to Jerusalem; and being deeply affected with the dangers to which that act of piety now exposed the pilgrims, as well as with the oppression under which the eastern Christians now laboured, formed the bold, and, in all appearance, impracticable design of leading into Asia, from the farthest extremities of the west, armies sufficient to subdue those potent and warlike nations that now held the Holy Land in slavery. He proposed his scheme to Martin II. who then filled the papal chair; but he, though sensible enough of the advantages which must accrue to himself from such an undertaking, resolved not to interpose his authority till he saw a greater probability of success. He summoned, at Placentia, a council consisting of 4000 ecclesiastics and 30,000 seculars. As no hall could be found large enough to contain such a multitude, the assembly was held in a plain. Here the Pope himself, as well as Peter, harangued the people, representing the dismal situation of their brethren in the east, and the indignity offered to the Christian name in allowing the holy city to remain in the hands of the infidels. These speeches were so agreeable to those who heard them, that the whole multitude suddenly and violently declared for the war, and solemnly devoted themselves to perform this service, which they believed to be so meritorious in the sight of God.

But though Italy seemed to have embraced the design with ardour, Martin yet thought it necessary, in order to insure perfect success, to engage the greater and more warlike nations in the same enterprise. Having therefore exhorted Peter to visit the chief cities and sovereigns of Christendom, he summoned another council at Clermont in Auvergne. The fame of this great and pious design being now universally diffused, procured the attendance of the greatest prelates, nobles, and princes; and when the Pope and the hermit renewed their pathetic exhortations, the whole assembly, as if impelled by an immediate inspiration, exclaimed with one voice, "It is the will of God! it is the will of God!" These words were deemed so memorable, and so much the effect of a divine impulse, that they were employed as the signal of rendezvous and battle in all future exploits of these adventurers. Men of all ranks now flew to arms with the utmost ardour, and a cross was affixed to their right shoulder by all who inlisted in this holy enterprise.

At this time Europe was sunk in the most profound ignorance and superstition. The ecclesiastics had gained the greatest ascendant over the human mind; and the people, who committed the most horrid crimes and disorders, knew of no other expiation than the observances imposed on them by their spiritual pastors.

But amidst the abject superstition which now prevailed, the military spirit had also universally diffused itself; and, though not supported by art and discipline, was become the general passion of the nations governed by the feudal law. All the great lords possessed the right of peace and war. They were engaged in continual hostilities with one another: the open country was become a scene of outrage and disorder: the cities, still mean and poor, were neither guarded by walls nor protected by privileges. Every man was obliged to depend for safety on his own force, or his private alliances; and valour was the only excellence which was held in esteem, or gave one man the preeminence above another. When all the particular superstitions, therefore, were here united in one great object, the ardour for private hostilities took the same direction; "and all Europe (as the princess Anna Comnena expresses herself) torn from its foundations, seemed ready to precipitate itself in one united body upon Asia."

All orders of men, now deeming the croisades the only road to heaven, were impatient to open the way with their swords to the holy city. Nobles, artisans, peasants, even priests, inrolled their names; and to decline this service was branded with the reproach of impiety or cowardice. The nobles who inlisted themselves were moved, by the romantic spirit of the age, to hope for opulent establishments in the east, the chief seat of arts and commerce at that time. In pursuit of these chimerical projects, they sold at the lowest price their ancient castles and inheritances, which had now lost all value in their eyes. The infirm and aged contributed to the expedition by presents and money; and many of them, not satisfied with this, attended history by the order of M. Colbert: for this minister, altogether intent upon aggrandizing his master, was accustomed every week to call together, either in the king's library or his own, certain of the learned, whom, according as they excelled in their several departments in literature, he constantly set to work. This history, which cost La Croix more than ten years labour, is useful not only to the learned who are curious to know past events, or to geographers who had hitherto been greatly ignorant of Grand Tartary, but likewise to all who trade to China, Persia, or other eastern parts of the world. There is a good map of northern Asia drawn by M. de l'Isle, accompanying the work; which M. Petit de la Croix, the author's son, not only revised, but, to render it more curious, added to it an abridgement of the lives of all those authors from whom it was extracted. It was translated into English, and published at London, 1722, 8vo.

CROMARTY, a town of Scotland, capital of the county of the same name. The town is small, and situated upon a rock or point of land, which overhangs the sea in a romantic manner, and is much exposed to the east wind; it was formerly a royal borough, but was disfranchised by an act of the privy council of Scotland, in consequence of a petition for that purpose presented by Sir John Urquhart, proprietor of the estate of Cromarty; it is now under the baronial jurisdiction of the earl of Cromarty. The parish extends about seven miles in length, and from one to four in breadth, bounded by the frith of Cromarty on the north. On the banks of the frith the surface is level, and covered with verdure. A bank about two miles from the coast, extends the whole length of the parish, above which the ground is covered with heath and moss. The soil is everywhere wet and moorish, which makes the seasons late, and the crop uncertain. The coast towards the east is bold and rocky, some of the cliffs being nearly 250 feet perpendicular to the sea; the rest is flat and sandy. After every storm a great quantity of sea weed is thrown ashore, which is partly used as a manure, and partly burnt into kelp. The harbour of Cromarty is inferior, perhaps, to none in Britain for safety; and at the commodious quay, built at the joint expence of government and the proprietor of the estate of Cromarty, vessels of 350 or 400 tons may lie in perfect security. A considerable trade in the hempen or sack-cloth line has been long established in Cromarty and the neighbourhood. Population of the town and parish in 1811, 2413.

CROMARTY, *County of*, in Scotland, forms a kind of peninsula, washed on three sides by the friths of Cromarty and Moray, and bounded on the south-west and south by the county of Ross. With this are included several detached tracts scattered through Ross-shire, the whole amounting to 344 square miles. It was erected into a distinct county about the end of the 17th century, at the request of Sir James M'Kenzie, earl of Cromarty, to whom it almost entirely belonged. The face of the country is pleasant; a long ridge of hills extending the whole length in the middle of the county, having a fine declivity on either side towards the shores of the friths. The higher grounds are mostly covered with heath, but towards the shores the soils are light and early. The valued rent is 12,897l. 2s. 2d. Scots; and the real rent in 1811 was 10,860l. 2s. 8d. for the lands, 480l. sterling for the houses. The language is generally Gaelic, but many speak that broad Scotch, which is commonly called the Buchan or Aberdeenshire dialect. Freestone, granite, and reddish-coloured porphyry, are almost the only minerals, if we except *topazes*, similar to those of *Cairngorum*, found in the parish of Kincardine. Fisheries are very successfully carried on, and pearls of considerable value are sometimes found in the frith of Cromarty, where the river *Conal* falls into that bay.

Population of the County of Cromarty at two periods.

Parishes.	Population in 1755.	Population in 1790—1798.
Cromarty	2096	2184
Fodderty	1483	1730
Tarbat	1584	1370
	5163	5284

In the returns for 1811, the population of the parish was intermixed with that of Ross-shire. See CROMARTY, SUPPLEMENT.

CROMARTY, *Frith of*, is one of the finest bays in Great Britain; hence called by Buchanan *Portus Salutis*. It is divided from the Moray frith by the county of Cromarty, and washes the southern shore of the county of Ross. It is about 16 miles in length, and sometimes three in breadth. The entrance is between two promontories or headlands, called the *Sutors of Cromarty*, which are about a mile and a half distant: there is the finest anchorage ground after passing the *Sutors*, for several miles up the bay, with deep water on both sides, almost close to the shore, where in most places the coast is so smooth, that supposing a vessel to part her cables (a thing scarcely probable), she might run aground without sustaining much damage. Such is the extent of sea-room in the bay, and such is the capacity, that almost the whole British navy might lie here in safety.

CROMLECH, in British antiquities, are huge, broad, flat stones, raised upon other stones set up on end for that purpose. They are common in ANGLESEA; under which article a very large one is described. See Plate CLXIV.

These monuments are spoken of largely by Mr Rowland, by Dr Borlase, and by Wormius, under the name of *Ara* or altar. Mr Rowland, however, is divided in his opinion; for he partly inclines to the notion of their having been altars, partly to their having been sepulchres: he supposes them to have been originally tombs, but that in after times sacrifices were performed upon them to the heroes deposited within. Mr Keiller preserves an account of King Harold having been interred beneath a tomb of this kind in Denmark, and Mr Wright discovered in Ireland a skeleton deposited under one of them. The great similarity of the monuments throughout the north, Mr Pennant observes, evinces the same religion to have been spread in every part, perhaps with some slight deviations. Many of these monuments are both British and Danish; for we find them where the Danes never penetrated.

The cromlech, or cromleh, chiefly differs from the *Kist-vaen*, in not being closed up at the end and sides, that my prayers alone, but also to the prayers of those who entertain a stricter commerce and greater interest with him. Go on cheerfully, banishing all sadness from your looks; and deal with me as you would deal with a serving man. Ye may have a skill in the nature of things, yet nature can do more than all physicians put together, and God is far more above nature." As this physician was coming out of the chamber, he accidentally met with another, to whom he expressed his fear that the protector was turning light-headed. But the other informed him that the chaplains, being dispersed the preceding night into different parts of the house, had prayed for the protector's recovery, and unanimously received for answer that he should recover. Nay, to such a degree of madness did they at last arrive, that, a public fast being kept at Hampton court, they did not so much pray to God for the protector's health, as return thanks for the undoubted pledges they had of his recovery. On this account, though the physicians perceived his distemper increasing every hour, they took no notice of his danger, till it became necessary for him to appoint a successor while he had any breath remaining. But being then in a lethargic fit, he answered from the purpose; upon which he was again asked whether he did not name his eldest son Richard? and to this question he answered, Yes. Being then asked where his will was which he had formerly made concerning the heirs of the kingdom: he sent to look for it in his closet and other places, but in vain; for somebody had either stolen it, or he himself had burnt it. Soon after, he expired, on the 3d of September 1658, aged somewhat more than 59 years and four months. This day of September he had always reckoned to be the most fortunate for him in the whole year. A violent tempest, which immediately succeeded his death, served as a subject of discourse to the vulgar. His partizans, as well as his opponents, were fond of remarking this event; and each of them endeavoured, by forced inferences, to interpret it as best suited their particular prejudices.

It has been imagined by some, that Oliver Cromwell was poisoned: but for this there seems to be no reasonable foundation. His body was opened by Dr Bates. He found the brain somewhat overcharged with blood, and the lungs a little inflamed; but what he reckoned to have been the principal cause of his disorder was a total degeneracy of the substance of his spleen into a matter resembling the lees of oil. This, he thought, also accounted for the hypochondriac dispositions to which Cromwell had from his infancy been subject. Though the bowels were taken out, and the body filled with spices wrapped in a fourfold cere cloth, put first into a coffin of lead, and then into one of wood, yet the corruption was so great that the humour wrought itself through the whole, and there was a necessity of interring the body before the solemnity of the funeral. A very pompous funeral was ordered at the public expence, and performed from Somerset-house, with a splendour not only equal but superior to that bestowed upon crowned heads. Some have related that his body was deposited in Naseby-field; others, that it was wrapped in lead, and sunk in the deepest part of the Thames, to prevent any insult that might afterwards be offered to it. But it seems beyond doubt that his body was interred at Westminster: as we are informed, that on the order to disinter him after the Restoration, his corpse was found in a vault in the middle aisle of Henry VII.'s chapel. In the inside of the coffin, and on the breast of the corpse, was laid a copper plate finely gilt, enclosed in a thin case of lead. On one side of this plate were engraven the arms of England impaled with those of Oliver, and on the reverse the following legend: *Oliverius Protector Reipublicæ Angliæ, Scotiæ, et Hiberniæ, natus* 25. *Aprilis* 1599, *inauguratus* 16. *Decembris* 1653, *mortuus* 3. *Septembris ann.* 1658, *hic situs est.*

Cromwell was of a robust frame of body, and of a manly though not agreeable aspect. His nose being remarkably red and shining, was often made the subject of ridicule. He left only two sons, Richard and Henry: and three daughters; one married to General Fleetwood, another to Lord Fauconberg, and a third to Lord Rich. His mother lived till after he was protector; and contrary to her orders he buried her with great pomp in Westminster abbey. She could not be persuaded that ever his power or his person was in safety. At every noise she heard she would exclaim that her son was murdered; and was never satisfied that he was alive if she did not receive frequent visits from him. She was a decent woman; and by her frugality and industry had raised and educated a numerous family upon a small fortune. She had even been obliged to set up a brewery at Huntingdon, which she managed to good advantage. Hence Cromwell, in the invectives of that age, is often stigmatized with the name of brewer. Ludlow, by way of insult, mentions the great accession which he would receive to his royal revenues upon his mother's death, who possessed a jointure of 60 pounds a-year upon his estate. She was of a good family of the name of Stuart; and is by some supposed to have been remotely allied to the royal family.

CROMWELL, *Richard*, eldest son of Oliver Cromwell, was by his father appointed successor to the protectorship, but very soon deposed by the army *. They discharged his debts, took all the household stuff, plate, &c. gave him a protection for six months, and so he retired. He was by no means qualified to support the station gained by the aspiring talents of his father. He was of a moderate temper, and untainted with that fanatical spirit which his father had so successfully cultivated. On the Restoration he went abroad; but returned in 1680 under the assumed name of Clark, and settled in Cheshunt in Hertfordshire, where he lived privately, and died in 1712, aged 86.

* See *Britain*, No. 189, 190.

CRONENBURG, a town of Germany, in the circle of the Upper Rhine, and in the landgraviate of Hesse Cassel, with a strong castle. It is seated at the foot of a high mountain, on a fertile soil, and is surrounded with a double wall. E. Long. 8. 15. N. Lat. 50. 15.

CRONENBURG, a strong fortress of Denmark, in the isle of Zealand, at the entrance of the Sound, where the Danes take toll of such ships as are bound for the Baltic. It was very richly furnished, but pillaged by the Swedes in 1658, who took away the furniture, among which were some statues of massy silver. It is built upon piles. E. Long. 12. 50. N. Lat. 56. 0.

CRONIUS, in *Chronology*, the ancient name of the Athenian month Hecatombæon; which was the first

The form of a cross being such as has been already described, the body of the criminal was fastened to the upright piece by nailing the feet to it, and on the other transverse piece generally by nailing the hands on each side. Now, because these parts of the body, being the instruments of action and motion, are provided by nature with a much greater quantity of nerves than others have occasion for; and because all sensation is performed by the spirit contained in these nerves; it will follow, as Stanhope observes, that wherever they abound the sense of pain must needs in proportion be more quick and tender.

The Jews confess, that indeed they crucified people in their nation, but deny that they inflicted this punishment upon any one alive. They first put them to death, and then fastened them to the cross either by the hands or neck. But there are indisputable proofs of their crucifying men frequently alive. The worshipers of Baal-peor and the king of Ai were hung up alive; as were also the descendants of Saul, who were put into the hands of the Gibeonites, 2 Sam. xxi. 9.

Before crucifixion the criminal was generally scourged with cords: sometimes little bones, or pieces of bones, were tied to these scourges, so that the condemned person might suffer more severely. It was also a custom that he who was to be crucified should bear his own cross to the place of execution. After this manner we find Christ was compelled to bear his own cross; and, as he sunk under the burden, Simon the Cyrenian was constrained to bear it after him and with him. But whereas it is generally supposed that our Lord bore the whole cross, i. e. the long and transverse part both, this seems to be a thing impossible; and therefore Lipsius (in his treatise *De Supplicio Crucis*) has set the matter in a true light, when he tells us that Jesus only carried the transverse beam; because the long beam, or the body of the cross, was either fixed in the ground before, or made ready to be set up as soon as the prisoner came: and from hence he observes, that painters are very much mistaken in their description of our Saviour carrying the whole cross.

There were several ways of crucifying: sometimes the criminal was fastened with cords to a tree; sometimes he was crucified with his head downwards. This way St Peter chose out of respect to his master Jesus Christ, not thinking himself worthy to be crucified like him; though the common way of crucifying was by fastening the criminal with nails, one through each hand, and one through both feet, or one through each of them: for this was not always performed in the same manner; the ancients sometimes representing Jesus Christ crucified with four nails, and sometimes with three. The criminal was fixed to the cross quite naked; and in all probability the Saviour of the world was not used with any greater tenderness than others upon whom the punishment was inflicted. The soldiers divided his clothes among them, and cast lots for his tunic, which is an under garment worn over the flesh like a shirt.

The text of the gospel shows clearly, that Jesus Christ was fastened to the cross with nails; and the Psalmist (xxii. 16.) had foretold long before, that they should pierce his hands and his feet: but there are great disputes concerning the number of these nails. The Greeks represent our Saviour as fastened to the cross with four nails; in which particular Gregory of Tours agrees with them, one at each hand and foot. But several are of opinion, that our Saviour's hands and feet were pierced with three nails only, viz. one at at each hand, and one through both his feet: and one custom of the Latins is rather for this last opinion; for the generality of the old crucifixes made in the Latin church have only three nails. Nonnus thinks that our Saviour's arms were besides bound fast to the cross with chains; and St Hilary speaks of the cords wherewith he was tied to it.

Sometimes they who were fastened upon the cross lived a good while in that condition. St Andrew is believed to have continued three days alive upon it. Eusebius speaks of certain martyrs in Egypt who were kept upon the cross till they were starved to death. Pilate was amazed at Jesus Christ dying so soon; because naturally he must have lived long, if it had not been in his power to have laid down his life and to take it up again. The thighs of the two thieves who were crucified together with our Saviour, were broken in order to hasten their death, that their bodies might not remain upon the cross on the Sabbath-day (John xix. 31, 32, 33.), and to comply with the law of Moses, which forbids the bodies to be left there after sunset. But among other nations they were suffered to remain upon the cross a long time. Sometimes they were devoured alive by birds and beasts of prey. Guards were appointed to observe that none of their friends or relations should take them down and bury them. The story of the Ephesian matron and the soldier who was set to guard the cross, is very well known. The Roman soldiers who had crucified Jesus Christ and the two thieves continued near the crosses till the bodies were taken down and buried.

Crosses were usually, in former times, erected on the tops of houses, by which tenants pretended to claim the privileges of the Templars Hospitallers, to defend themselves against their rightful lords. This was condemned by the statute Wil. II. c. 37. It was usual also, in those days, to set up crosses in places where the corpse of any of the nobility rested as it was carried to be buried, that *à transeuntibus pro ejus animo deprecentur*. Crosses, &c. are forbidden to be brought into England by 13 Eliz. c. 2. on pain of a *præmunire*, &c.

Invention of the Cross, an ancient feast solemnized on the third of May, in memory of St Helena's (the mother of Constantine) finding the true cross of Christ deep in the ground on Mount Calvary; where she erected a church for the preservation of part of it; the rest being brought to Rome and deposited in the church of the Holy Cross of Jerusalem.

Theodoret mentions the finding of three crosses; that of Jesus Christ and those of the two thieves; and that they distinguished between them by means of a sick woman, who was immediately healed by touching the true cross. The place is said to have been pointed out to her by St Quiriacus, then a Jew, afterwards converted and canonized.

Exaltation of the Cross, an ancient feast, held on the 14th of September, in memory of this, that Heraclitus restored to Mount Calvary the true cross in 642, which had been carried off 14 years before by Cosroes king of Persia, upon his taking Jerusalem from the emperor Phocas.

The

The adoration of the cross appears to have been practised in the ancient church; inasmuch as the heathens, particularly Julian, reproached the primitive Christians with it. And we do not find that their apologists disclaimed the charge. Mornay, indeed, asserted, that this had been done by St Cyril, but could not support his allegation at the conference of Fountainbleau. St Helena is said to have reduced the adoration of the cross to its just principle, since she adored in the wood, not the wood itself, which had been direct idolatry and heathenism, but him who had been nailed to this wood. With such modifications some Protestants have been induced to admit the adoration of the cross. John Huss allowed of the phrase, provided it were expressly added, that the adoration was relative to the person of Christ. But however Roman Catholics may seem to triumph by virtue of such distinction and mitigations, it is well known they have no great place in their own practice. Imbert, the good prior of Gascony, was severely prosecuted in 1683 for telling the people, that in the ceremony of adoring the cross, practised in that church on Good Friday, they were not to adore the wood, but Christ, who was crucified on it. The curate of the parish told them the contrary: it was the wood! the wood! they were to adore. Imbert replied, it was Christ, not the wood: for which he was cited before the archbishop of Bourdeaux, suspended from his functions, and threatened with chains and perpetual imprisonment. It little availed him to cite the bishop of Meaux's distinction; it was answered that the church allowed it not.

Cross-Bearer (port-croix, cruciger), in the Romish church, the chaplain of an archbishop or a primate, who bears a cross before him on solemn occasions.

The pope has the cross borne before him everywhere; a patriarch anywhere out of Rome; and primates, metropolitans, and those who have a right to the pallium, throughout their respective jurisdictions.

Gregory XI. forbade all patriarchs and prelates to have it borne in presence of cardinals. A prelate bears a single cross, a patriarch a double cross, and the pope a triple one on his arms.

Cross-Bearers also denote certain officers in the inquisition, who make a vow before the inquisitors or their vicars to defend the Catholic faith, though with the loss of fortune and life. Their business is to provide the inquisitors with necessaries. They were formerly of great use; but in process of time some of their constitutions were changed, and they were called of the penance of St Dominic.

Pectoral Cross, is a cross of gold or silver, or other precious materials, often enriched with diamonds, which the bishops, archbishops, &c. and regular abbesses, wear hanging from the neck.

Order of the Cross, or *Croisade*, an order of ladies instituted in 1668 by the empress Eleonora de Gonzagua, wife of the emperor Leopold; on occasion of the miraculous recovery of a little golden cross wherein were inclosed two pieces of the true cross, out of the ashes of part of the palace. It seems the fire had burnt the case wherein it was inclosed, and melted the crystal, yet the wood remained untouched.

Maids of the Cross, a community of young women instituted in 1265 at Roye in Picardy, and since dispersed to Paris and other towns. They instruct young persons of their own sex. Some take the three vows of poverty, chastity, and obedience; others retain their liberty. They are under the direction of a superior.

Cross, in *Heraldry*, defined by Guillim, an ordinary composed of fourfold lines; whereof two are perpendicular, and the other two transverse; for so we must conceive of them, though they be not drawn throughout, but meet by couples, in four right angles near the fesse point of the escutcheon. See Heraldry.

This bearing was first bestowed on such as had performed, or at least undertaken, some service for Christ, and the Christian profession; and is held by divers the most honourable charge in all heraldry. What brought it into such frequent use, was the ancient expeditions into the Holy Land; and the holy war pilgrims, after their pilgrimage, taking the cross for their cognizance; and the ensign of that war being the cross. In those wars, says Mackenzie, the Scots carried St Andrew's cross; the French a cross argent; the English a cross or; the Germans, sable; the Italians, azure; the Spaniards, gules.

St George's Cross, or the red cross, in a field argent, is now the standard of England; that saint being the reputed patron of this nation.

Nor is it only in crosses that the variety is so great; the like is found in many other bearings, and particularly in lions, and the parts of them; whereof Columbiere gives us no less than 96 varieties. Leigh mentions but 46 several crosses; Sylvanus Morgan, 26; Upton, 30; Johannes de Bado Aureo, 12; and so others, whom it is needless to mention. Upton owns he dares not presume to ascertain all the various crosses used in arms, for that they are at present almost innumerable; and therefore he only takes notice of such as he had seen used in his own time.

Cross, in mining, two nicks cut on the superficies of the earth, thus +, which the miners make when they take the ground to dig for ore. This cross gives the miners three days liberty to make and set on stones. As many of these crosses as the miner makes, so many mears of ground he may have in the vein, provided he set on stones within three days after making his cross or crosses. But if he make but one cross, and a stander by makes the second, and a stranger makes the third, every one is served with the next mear, according as they have first or last, sooner or later, made their cross or crosses upon the ground.

Cross, in coins, a name given to the right side or face, the other being called the *pile* or *reverse*. It has been a common error, that the reverse was meant by the cross; because at this time, with us, it is marked with figures disposed in that form: but the stamping the head of the prince in these kingdoms on the right side of the coin, was preceded by a general custom of striking on that part the figure of a cross; while the other, called the *pile*, contained the arms or some other device.

Cross, instead of a signature to a deed, &c. is derived from the Saxon practice of affixing the sign of the cross, whether they could write or not.

Cross, in surveying, is an instrument which consists of a brass circle, divided into four equal parts by two lines crossing each other in the centre. At each extremity of the lines is fixed a perpendicular sight, with small

CROWNING, in *Architecture*, is understood, in the general, of any thing that terminates or finishes a member or decoration. Thus, a corniche, a pediment, &c. are called *crownings*. Thus also the abacus is said to crown the capital; and thus any member or moulding is said to be crowned when it has a fillet over it; and a niche is crowned when it is covered with a capital.

CROWNING, in sea-language, denotes the finishing part of a knot made at the end of a rope. It is performed by interweaving the ends of the different strands artfully amongst each other, so as that they may not become loosened or untwisted. They are useful in all kinds of stoppers.

CROWTH, or CRUTH. See CRUTH.

CROXAL, SAMUEL, an ingenious English divine, who in his youth wrote the celebrated poem entitled *The Fair Circassian*. He had the livings of Hampton in Middlesex, and the united parishes of St Mary Somerset, and St Mary Mounthaw, in London; both which he held till his death in 1751. He published many other poems and translations, with an entire English edition of Æsop's Fables. In consequence of his attachment to Whig principles, he enjoyed some other preferments, and was chaplain in ordinary to George II.

CROYDON, a town of Surry in England. Its situation is low, near the spring-head of the river Wandel, and it is the seat of the archbishop of Canterbury. It has a large handsome church, an hospital, and a free school. A canal, joining the grand Surry canal, was opened here in 1809. W. Long. 0. 5. N. Lat. 51. 22.

CRUCIAL INCISION, in *Surgery*, an incision made in the form of a cross.

CRUCIANELLA, PETTY MADDER; a genus of plants, belonging to the tetrandria class, and in the natural method ranking under the 47th order, *Stellatæ*. See BOTANY *Index*.

CRUCIBLE, a chemical vessel made of earth, and so tempered and baked as to endure the greatest heat. It is used to melt metals, and to flux minerals, ores, &c.

CRUCIFIX, a cross upon which the body of Christ is fastened in effigy, used by the Roman Catholics to excite in their minds a strong idea of our Saviour's passion.

They esteem it an essential circumstance of their religious worship performed at the altar; and on Good Friday they perform the ceremony of adoring it, which is done in these words, *O crux ave, spes unica*; "Hail, thou cross, our only hope." The officiating priest uncovers the crucifix, elevates it with both his hands, and says, *Ecce lignum crucis*; "Behold the wood of the cross." The people answer, *in quo salus mundi pependit*; "on which the Saviour of the world suffered death." Then the whole congregation bow with great reverence, and devoutly kiss the holy wood.

CRUCIFIXION, a capital punishment by nailing the criminal to a cross. See CROSS.

CRUCIFORM, in general, something disposed cross-ways; but more especially used by botanists, for flowers consisting of four petals disposed in the form of a cross.

CRUCITA, in *Botany*, a genus of the digynia order, belonging to the tetrandria class of plants; and in the natural method ranking with those the order of which is doubtful. The interior calyx is tetraphyllous, the exterior calyx triphyllous; there is no corolla, and only one seed.

CRUDE, an epithet given to something that has not passed the fire or had a proper degree of coction.

CRUDITY, among physicians, is applied to undigested substances in the stomach; to humours in the body which are unconcocted, and not prepared for expulsion; and to the excrements.

CRUISE, from the German *kruiss*, "across," signifies to cross to and fro, to sail up and down within a certain space of the sea, called the *cruising* latitude, in quest of vessels or fleets of an enemy, &c.

CRUISERS, in the navy, are small men of war made use of to and fro in the Channel, and elsewhere, to secure our merchant ships and vessels from the enemy's small frigates and privateers. They are generally such as sail well, and are commonly well manned: and indeed the safety of the trade in the Channel, and up and down the soundings, and other places, absolutely requires the constant keeping out such ships at sea.

CRUMENTATA, among zoologists, animals furnished with a pouch or bag, wherein to receive their young in time of danger; as the oppossum. See DIDELPHUS.

CRUOR, sometimes signifies the blood in general; sometimes only the venous blood; and sometimes extravasated or coagulated blood: but is most frequently used for the red globules of the blood; in contradistinction to the limpid or serous part.

CRUPPER, in the manege, the buttocks of a horse; the rump: also a thong of leather put under a horse's tail, and drawn up by thongs to the buckle behind the saddle, so as to keep him from casting the saddle forwards on his neck.

CRURÆUS, CRUREUS, *Musculus*, in *Anatomy*, a fleshy mass, covering almost all the foreside of the os femoris, between the two vasti, which likewise cover the edges of this muscle on each side. See ANATOMY, *Table of the Muscles*.

CRURAL, in *Anatomy*, an epithet given to the artery which conveys the blood to the crura or legs, and to the vein by which this blood returns towards the heart. See ANATOMY *Index*.

CRUS, in *Anatomy*, all that part of the body contained between the buttocks and the toes.

CRUSADE. See CROISADE.

CRUSADO, in commerce, a Portuguese coin, struck under Alphonsus V. about the year 1457, at the time when Pope Calixtus sent thither the bull for a croisade against the infidels. This coin has a cross on one side and the arms of Portugal on the other.

CRUSCA, an Italian term signifying *bran*, is in use amongst us to denote that celebrated academy called *Della Crusca*, established at Florence for purifying and perfecting the Tuscan language. See ACADEMY, N° 11. The academy took its name from its office, and the end proposed by it; which is, to refine the language, and as it were to separate the bran from it. Accordingly, its device is a sieve; and its motto, *Il piu bel fior ne coglie*; that is, "It gathers the finest flour thereof." In the hall or apartment where the academy

La Cruz. which hangs a fringe something more than half a quarter of a yard deep, of which the thread is regularly twisted.

The women give proofs of their modesty and decency by their dress. Their physiognomy is agreeable, their colour fresh, their cheeks vermilioned, and their hair long: they plait it together in one long tress. They wear a long robe of a smooth skin tied round the loins, like that of a nun; it covers them from the neck as low as the feet; the sleeves reach down to the wrists. Upon this robe they put divers skins of otters or other animals to defend themselves from the inclemency of the weather. All the married women have a large opening in the under lip, and this opening or orifice is filled up by a piece of wood cut in an oval shape, of which the smallest diameter is almost an inch: the more a woman is advanced in years the more this curious ornament is extended; it renders them frightful, the old women especially, whose lip, deprived of its wonted spring, and dragged by the weight of this extraordinary jewel, necessarily hangs in a very disagreeable manner. The girls wear only a copper needle, which crosses the lip in the place where the ornament is intended hereafter to be placed.

These Indians in war make use of cuirasses and shoulder-pieces of a manufacture like that of the whalebone stays among the Europeans. Narrow boards or scantlings form, in some sort, the woof of the texture, and threads are the warp: in this manner the whole is very flexible, and leaves a free use to the arms for the handling of weapons. They wear round the neck a coarse and large gorget which covers them as high as below the eyes, and their head is defended by a morion, or skull-piece, usually made of the head of some ferocious animal. From the waist downwards, they wear a kind of apron, of the same contexture as their cuirass. Lastly, a fine skin hangs from their shoulders down to the knee. With this armour, they are invulnerable to the arrows of their enemies; but thus armed, they cannot change position with so much agility as if they were less burdened.

Their offensive arms are arrows; bows, of which the strings are woven like the large cords of our best musical instruments; lances, four yards in length, tongued with iron; knives of the same metal, longer than European bayonets, a weapon however not very common among them; little axes of flint, or of a green stone, so hard that they cleave the most compact wood without injury to their edge.

The pronounciation of their language is extremely difficult; they speak from the throat, with a movement of the tongue against the palate. The little use the women make of their inferior lip greatly injures the distinctiveness of their language. The Spaniards could neither pronounce nor write the words which they heard.

From the vivacity of spirit in these Indians, and from their attention amply to furnish the market established in the harbour, it may be concluded that they are pretty laborious. They continually brought stuffs well woven and shaded with various colours, the skins of land and sea wolves, of otters, bears, and other smaller animals; of these some were raw, and others dressed. There were to be found at this market also coverlets of coarse cloth, shaded with white and brown colours, very well woven, but in small quantities; large ribbons of the same linen, which might match with that of the Spanish officers mattresses; skeins of thread such as this cloth was made of; wooden plates or bowls neatly worked; small boats, or canoes, painted in various colours, the figures of which represented heads with all their parts; frogs in wood, nicely imitated, which opened like tobacco boxes, and which they employed to keep their trinkets in; boxes made of small planks, of a cubical form, being three quarters of a yard on each side, with figures well drawn or carved on the outside, representing various animals; the covers fabricated like Flanders etwees, with rabbeted edges, formed so as to shut into the body of the box; animals in wood, as well those of the earth as of the air; figures of men of the same material, with skull-caps representing the heads of various fierce animals; snares and nets for fishing; copper collars for the neck, and bracelets of iron for the wrist, but which they would not part with except at a very high price; beak-like instruments, from which they drew sounds as from a German flute. The principal officers took such of these merchandises as were most agreeable to them, and left the remainder to the ships crews. La Cruz.

As the Indians discovered that the Spaniards were very dainty in their fish, they did not let them want for choice: the greatest abundance was in salmon, and a species of sole or turbot three yards and a quarter long, broad and thick in proportion; cod and pilchards were also brought to market, and fishes resembling trout. From all this it may be inferred, that this gulf is full of fish; the banks too are covered with shells.

The quantity of mother-of-pearl that these Indians cut to pieces for making ear-rings awakened the curiosity of the Spaniards: they tried to discover whether these people had not in their possession, or whether their country did not produce pearls, or some precious stones: their researches were fruitless, they only found some stones which they judged to be metallic, and which they carried on board, not having the necessary means for extracting the metal they might contain.

The inhabitants of La Cruz feed upon fish, fresh or dry, boiled or roasted; herbs and roots which their mountains yield them, and particularly that which in Spain is called sea parsley; and, lastly, upon the flesh of animals which they take in hunting: the productions of the chase are undoubtedly abundant, seeing the number of dogs they keep for this purpose.

They appeared to the Spaniards to worship the sun, the earliest and most natural of all idolatrous worship; and they paid a decent respect to the remains of their dead. Don Maurelle, one of the Spanish officers, in an expedition round the gulf, found in two islands three dead bodies laid in boxes of a similar form to those which have been described above, though considerably larger, and decked in their furs. These biers were placed in a little hut upon a platform, or raised floor, made of the branches of trees.

The country is very hilly; the mountains are lofty, and their slope extends almost everywhere to the sea. The soil is lime-stone; it is nevertheless covered with an impenetrable forest of tall fir trees, very large and very straight. As these trees cannot strike very deep into the earth, the violence of the wind often tears them up by the roots: they rot and become a light mould, upon which

Achard two crystals, one of the sparry kind, and the other as hard and transparent as rock crystal. The first he procured by means of calcareous earth, and the latter from the earth of alum, both dissolved in water impregnated with fixed air, the water filtrating very slowly through a porous bottom of baked clay. The apparatus is described by the author in the *Journal de Physique* for January 1778: but though the process was attempted by Mr Magellan, and afterwards a second time by Mr Achard himself, neither of them were able to succeed. Mr Morveau, however, in the first volume of the Dijon Memoirs for 1785, asserts that he has produced a very small artificial crystal; and gives the proper method for succeeding in the process.

Crystal is frequently cut; and lustres, vases, and toys, are made of it as of other beautiful stones. For this purpose it is to be chosen perfectly clear and transparent. It is to be tried by aquafortis, or by drawing it along a pane of glass. The genuine crystal will not be affected by the acid, and will cut glass almost like a diamond. When any piece of workmanship of natural crystal is become foul and dark, the following method is to be used for recovering its brightness without hurting the polish. Mix together six parts of common water and one part of brandy; boil these over a brisk fire, and let the crystal be kept in it, in a boiling state, a quarter of an hour; then take it out and rub it carefully over with a brush dipped in the same liquor; after this it is to be wiped with a napkin, and by that means its surface will be perfectly cleaned, and rendered as bright as at first, without any injury to the points of the cutting or the polish of the planes or faces, which would probably have happened had the cleaning been attempted by mere rubbing with a cloth.

Natural crystal may be reduced by calcination into a state proper for making glass with alkaline salts, and thus becomes a very valuable frit. The method of doing it is as follows: calcine natural crystal in a crucible; when it is red hot, throw it into cold water. Repeat this eight times, covering the crucible, that no dust or ashes may get in among the crystal. Dry this calcined mass, and reduce it to an impalpable powder.

Colouring CRYSTAL, for the imitation of gems. See DOUBLET.

CRYSTAL is also used for a factitious body, cast in glass-houses, called *crystal-glass*, being in fact no more than glass carried, in the composition and manufacture, to a greater perfection than the common glass.

The best kind of glass-crystal is that called *Venice-crystal*, made at Moran near Venice. See GLASS.

Island or *Iceland* CRYSTAL, a transparent fissile stone brought from Iceland, soft as talc, clear as rock crystal, and without colour, remarkable for its unusual refractions. It is a carbonate of lime.

It is there found in great abundance all over the country, but is particularly plentiful in a mountain, not far from the bay of Roezfiord, where the finest and most pellucid pieces are found on digging. The mountain lies in 65 degrees latitude, and has its whole outside made up of it; but though this makes a very bright and glittering appearance, it is not so fine as that which lies at a little depth, and is met with on opening the surface. This is generally taken up out of the earth in masses a foot long, and its corners very frequently are terminated in these large masses by a sort of crystals, very different in figure and qualities from the rest of the mass. The stone itself is of a parallelopiped figure; but these excrescences are either single pyramids, affixed to columns like common crystal, or double pyramids with or without columns between. The stone itself is soft; these are hard, and cut glass: the stone calcines to lime in the fire; these run into glass: in short, the stone itself is true spar, and these are true crystal. Beside these, there sometimes grows out of the end of the larger masses a pure fine asbestos. This likewise is the case sometimes in the spar found about Bareges in France, and shows how nearly together the formation of bodies, wholly different from one another, may happen. The general figure of the stone is parallelopiped; or, as some express it, rhomboid: and it retains this not only while whole, but also when broken to pieces; every fragment it naturally falls into, though ever so small, being truly of that shape. But it is remarkable, that in some places of this mountain the same sort of matter is found in form of triangular pyramids, all which have the same property of the double refraction with the parallelopipeds of the same substance; so that the original error of supposing its qualities owing to its shape, is refuted by this as well as by the trials made with other pellucid bodies of the same figure, which do not show this remarkable property.

The Iceland crystal is electrical, and when rubbed will attract straws, feathers, and other light substances, in the same manner that amber does.

The vast masses of white spar which are found in the lead mines of Derbyshire, though they are not externally of the parallelopiped figure of the Iceland crystal, nor have any thing of its brightness or transparence in the general lump; yet when they are broken they separate into rhomboidal fragments, and some of these are found to be tolerably pellucid: all those which are so have the property of the Iceland crystal; and being laid upon paper where a black line is drawn, they all show that line double, in the same manner as the real Iceland crystal does.

Iceland crystal bears a red heat without losing its transparency; and in a very intense heat calcines without fusion: steeped a day or two in water, it loses its natural polish. It is very soft and easily scratched with the point of a pin: it will not give fire on being struck against steel; and ferments and is perfectly dissolved in aquafortis. It is found in Iceland, from whence it has its name; and in France, Germany, and many other places. In England fragments of other spars are very often mistaken for it, many of them having in some degree the same property. It has none of the distinguishing characters of crystal; and is plainly a genus of spars, called from their figure *parallelopipedia*, which, as well as some other bodies of a different genus, have the same properties. Bartholine, Huygens, and Sir Isaac Newton, have described the body at large, but have accounted it either a crystal or a talc; errors which could not have happened, had the criterions of fossils been at that time fixed; since Sir Isaac Newton has recorded its property of effervescing with nitric acid, which alone must prove that it is neither talc

talc nor crystal, both those bodies being wholly unaffected by that menstruum. It is always found in form of an oblique parallelopiped, with six sides; and is found of various sizes, from a quarter of an inch to three inches or more in diameter. It is pellucid, and not much less bright than the purest crystal; and its planes are all tolerably smooth, though when nicely viewed they are found to be waved with crooked lines made by the edges of imperfect plates. What appears very singular in the structure of this body is, that all the surfaces are placed in the same manner, and consequently it will split off into thin plates, either horizontally or perpendicularly; but this is found, on a microscopic examination, to be owing to the regularity of figure, smoothness of surface, and nice joining of the several small parallelopiped concretions, of which the whole is composed; and to the same cause is probably owing its remarkable property in refraction.

The phenomena of this stone are very remarkable, were first suggested by Bartholin, and have been examined with great accuracy by Mr Huygens and Sir Isaac Newton.

1. Whereas in other pellucid bodies there is only one refraction, in this there are two; so that objects viewed through it appear double.

2. Whereas in other transparent bodies, a ray falling perpendicularly on the surface, passes straight through, without suffering any refraction, and an oblique ray is always divided; in Iceland crystal, every ray, whether perpendicular or oblique, becomes divided into two, by means of the double refraction. One of these refractions is, according to the ordinary rule, the sine of incidence out of air into crystal, being to the sine of refraction as five to three; but the other is perfectly new. The like double refraction is also observed in crystal of the rock, though much less sensibly. When an incident ray is thus divided, and each moiety arrives at the farther surface, that refracted in the first surface after the usual manner, is refracted entirely after the usual manner at the second; and that refracted in the unusual manner in the first is entirely refracted after the like manner in the second; so that each emerges out of the second surface parallel to the first incident ray. Again, if two pieces of this crystal be placed over each other, so that the surfaces of the one be parallel to the corresponding ones of the other; the rays refracted in the usual manner in the first surface of the first, are refracted after the usual manner in all the other surfaces; and the same uniformity appears in the rays refracted after the unusual manner; and this in any inclination of the surfaces, provided their planes of perpendicular refraction be parallel.

From these phenomena Sir Isaac Newton infers, that there is an original difference in the rays of light; by means whereof some are here constantly refracted after the usual manner; and others in the unusual manner. Were not the difference original, and did it arise from any new modifications impressed on the rays at their first refraction, it would be altered by new modifications in the three following ones; whereas, in fact, it suffers no alteration at all. Again, he hence takes occasion to suspect, that the rays of light have several sides, endued with several original properties: for it appears from the circumstances, that these are not two sorts of rays differing in their nature from each other, one constantly in all positions, refracted in the usual, and the other in the unusual manner; the difference in the experiment mentioned being only in the position of the sides of the rays to the plane of perpendicular refraction. For one and the same ray is refracted sometimes after the usual, and sometimes after the unusual manner, according to the position of its sides to the crystal: the refraction being alike in both, when the sides of the rays are posited the same way to both, but different when different. Every ray therefore may be considered as having four sides or quarters; two of which, opposite to each other, dispose the ray to be refracted after the unusual manner; and the other two in the usual. These dispositions, being in the rays before their incidence on the second, third, and fourth surfaces, and suffering no alteration; for what appears in their passage through them must be original and connate.

Father Beccaria corrects the observations of Huygens and Newton concerning the refraction of rock or mountain crystal. The double refraction of the latter happens when a ray passes through two sides that are inclined to each other, and consequently issues coloured: whereas that of the Iceland crystal is made by the passage of a ray through two parallel sides, and therefore it issues colourless. He suggests, that there may be other substances in which there is a manifold refraction. Gravesande had a prism of Brasil pebble, which had a double refraction at each angle, but of a different kind from one another. Mr B. Martin prepared several prisms of Iceland crystal, which exhibited not only a double but a multiple refraction. A single prism produced a six-fold refraction; and by combining several prisms, a number of refractions was obtained equal to the product of those of the single prisms; i. e. a prism which afforded two images applied to one of six, produced a prism of twelve images, &c. He farther observes, with respect to Iceland crystal, that though the sides of its plane of perpendicular refraction be parallel to one another, a beam of light transmitted through them will not be colourless; in which property it differs from all other known substances.

CRYSTALLINE, in general, something composed of or resembling crystal. See CRYSTAL.

CRYSTALLINE Heavens, in *Ancient Astronomy*, two spheres imagined between the primum mobile and the firmament, in the Ptolemaic system, which supposes the heavens solid, and only susceptible of a single motion. See ASTRONOMY.

CRYSTALLINE Humour. See ANATOMY *Index*.

CRYSTALLINÆ, or CRYSTALLINES, in *Medicine*, are pustules filled with water, and so called on account of their transparency. They are one of the worst symptoms attendant on a gonorrhœa. They are lodged on the prepuce, without pain; and though caused by coition, have nothing of infection attending them. The cause is supposed to be a contusion of the lymphatic vessels in the part affected. Dr Cockburn, who hath described this case, recommends for the cure a mixture of three parts of lime-water and two of rectified spirit of wine, to be used warm, as a lotion three times a-day.

CRYSTALLIZATION.

1 Definition. CRYSTALLIZATION is the symmetrical arrangement of the particles of a body when it passes from the liquid to the solid form. This arrangement is determined by the mutual action of the small solids of which the body is composed; and these solids are separated from the liquid by their force of cohesion. Crystallization is one of the most remarkable effects of cohesion. The qualities of a solid in which the force of cohesion is more easily overcome in one direction than another, its brittleness, elasticity, and ductility, depend on this arrangement of its particles.

2 Bodies which crystallise must be susceptible of

Solid bodies are found either in irregular masses, or exhibit certain determinate forms by the process of crystallization. Those substances which are capable of assuming regular figures, uniformly affect the same form; subject, however, to certain deviations, from the operation of particular circumstances. Those bodies only can assume the form of crystals which are susceptible of being reduced to the fluid state. This is the usual method of crystallizing saline substances. The substance to be crystallized is dissolved in a sufficient quantity of water to retain it in solution. This is slowly evaporated; and as the bulk of the fluid is diminished, the particles are brought nearer to each other; they combine together by the force of cohesion, and form crystals. Some saline bodies, which dissolve but in small proportion in cold water, are found to be very

3 Solution; soluble in hot water. But when this water cools, it is no longer capable of holding them in solution. The particles then gradually approach each other, and arrange themselves into certain determinate forms; or they crystallize. Many of the saline bodies which crystallize in this manner, combine with a considerable portion of water. This is called the *water of crystallisation*. Other saline substances are equally soluble in hot and cold water. These substances do not crystallize by cooling the fluid; they assume regular forms only by diminishing its quantity. This is effected by means of evaporation by the application of heat. In salts which are crystallized in these circumstances, the proportion of water which enters into combination is small.

4 or fusion.

There are some classes of bodies which assume regular forms, but are not soluble in any liquid. Such, for instance, are metallic substances, glass, and some other bodies. Substances of this nature are crystallized, by being previously subjected to fusion; and thus having combined with caloric, they are reduced to the liquid state, and the particles being separated from each other are left at liberty to arrange themselves into regular forms, or to crystallize, as the body cools.

5 Conjectures about the cause.

But what is the cause which operates in determining the regular arrangement of the particles of bodies in these circumstances? or what is the cause of the same bodies in the same circumstances assuming regular figures? The ancient philosophers supposed that the elements of bodies consisted of certain regular geometrical figures; but it does not appear that they applied this theory to explain crystallization. The schoolmen ascribed the regular figure of crystals to their substantial forms; and others supposed that it depended merely on the aggregation of the particles, but without explaining to what this aggregation was owing, or the reason of the regular figures thus produced. According to Sir Isaac Newton and the theory of Boscovich, 6 Newton's. the particles of bodies held in solution in a fluid, are arranged at regular distances, and in regular order; and when the force of cohesion between the particles and the fluid is diminished, it is increased between the particles themselves. Thus they separate from the fluid, and combine together in groups which are composed of the particles nearest to each other. If we suppose that the particles composing the same body have the same figure, the aggregation of any determinate number of such particles will produce similar figures. Bergman is of opinion that the particles of saline substances possess a double tendency: by the one they arrange themselves in the form of spiculæ; and by the other, these spiculæ arrange themselves at certain angles of inclination, and according to the difference of these angles, different forms of crystals are produced. These effects are ascribed by the ingenious author to the mutual attraction which exists between the particles, which, according to the peculiar figures of the atoms, at one time, arranges them in the form of spiculæ, and then combines the spiculæ thus formed under different angles of inclination. But this arrangement of the particles, or tendency to arrangement, assigned by Bergman as a 7 Bergman's. cause, is only explaining the phenomenon by itself; while the cause of the tendency is yet unexplained. Nor will Newton's hypothesis be more satisfactory; for if the particles of a body, after being equally diffused in a fluid, are brought together by a general attraction, it will follow that every saline body should crystallize in the same manner.

According to the ingenious theory which has been 8 Hauy's. proposed by Hauy, the integrant particles always combine in the same body in the same way; the same faces and the same edges are always attracted towards each other. But these faces and edges are different in different crystals; and hence originates that variety of forms which different bodies assuming regular figures by crystallization exhibit. But why are the same edges and the same faces attracted in the same way? This still wants explanation. If it be ascribed, as some have supposed, to a certain degree of polarity existing among the particles, it might enable us to account for the regular figures of bodies produced by the process of crystallization. For by the effects of this agent we might suppose that different parts of the particles of bodies are endowed with different forces; one an attractive, and another a repulsive force; and by the action of these two forces, the same arrangement of the particles will uniformly take place; for when one part of a particle is attracted, the other will be invariably repelled; and thus the same faces and edges will always be disposed in the same way. But it ought to be observed that the existence of this power, however satisfactorily

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which are confused and irregular, and which present no determined form except on those sides which are in contact with the liquid. If in this state the remaining liquid is poured off, it will yield another set of crystals, but in very small number; and there are some salts which continue to form crystals after being several times successively treated in this way, the number of the crystals still diminishing from the first degree of concentration. It will be found too that this will take place whether the process be carried on in the open air or in close vessels. It follows from this that the increase or the formation of crystals, in this case depends solely on the mutual attraction of the particles, or on the attraction between the particles and the crystal; an attraction or affinity which is not destroyed by the cooling of the fluid, but is probably regulated by the distance of the particles, and the degree of force or affinity which exists between the particles and the solvent. In some saline solutions the increase of the crystals goes on in this manner for a long time. It is only in the interval between the cooling of the liquid to the temperature of the atmosphere, and that period when its degree of concentration is so diminished that the increase of the crystals ceases, that the latter proceeds with that degree of perfection of which it is susceptible.

18
Some saline solutions attract moisture.

It is not a property peculiar to dry substances to absorb moisture from the atmosphere. Liquids saturated with certain salts seem also to possess this property; for in some saline solutions, the liquids assume a solvent power which never fails to attack the crystals, and not only to prevent their increase, but to diminish the bulk which they had acquired. This accident can only be obviated by regulating the state of the atmosphere in which the evaporating vessels are placed, and preserving it free from an excess of moisture. From causes which produce a contrary effect, the evaporation becomes too rapid; this circumstance also requires to be attended to and properly regulated, to insure the full success of the operation.

From the preceding observations it will appear, that solutions of salts which are susceptible of crystallization have certain degrees of concentration which are necessary for the formation of crystals; and that they must be reduced nearly to that degree in which they begin to yield crystals, before it can be expected that they afford proper results. It is therefore necessary to attend particularly to the degree of concentration which each salt requires for the regular formation of its crystals, and to obtain them with that degree of transparency of which they are susceptible. We have seen that in the formation of crystals they may be removed from one vessel to another, and from one solution to another; and that in proportion to the slowness of the process they become more beautiful and more perfect. These operations, it may be added, require much patience and attention, but at the same time the observer is fully compensated for his trouble, by perceiving the progress of the crystallization, and by the interest which is excited in all its stages.

It is essential to know that neither the crystals formed during the artificial evaporation, nor those which are produced during the cooling of the solution, are proper to be made choice of for being increased and brought forward to the most perfect crystals. When a solution has become cold, that is to say, when it has acquired the temperature of the atmosphere, and it is deprived of the excess of saline particles which it held in combination during its increase of temperature, it is still in a condition to yield crystals, and as long as the distances between the particles are not too great to allow of mutual attraction. A solution saturated to excess affords on cooling a confused mass of crystals; but after the fluid is poured off, it will still produce more crystals, but in smaller number. The degree of concentration of the solution before it yielded the last product, may be considered as the term of saturation most proper to be employed for the species of salt which is thus treated. But by the repetition of these operations, and the observation of their progress, it will not be difficult to discover the proper proportions between the salt and the solvent.

It seems to be a mistake to suppose, with some, that the crystals which are placed in favourable circumstances to become larger and more perfect, are injured by coming in contact with each other during their increase. It is undoubtedly better that they should be kept separate; but it does not appear that they are hurt by touching each other, if the number in the vessel be not too great, and they are not heaped or pressed together. In that crystallization which results from the cooling of a solution too much saturated, the crystals are always confused and interlaced with each other; and the molecules which are arranged in this kind of disorder experience a kind of irregular distribution; and it may be observed, that in this case the summits only of the crystals which are elevated from the kind of cake which is formed on the surfaces of the vessel containing the solution, present regular and determined forms. The mass in which these crystals are implanted is a confused heap.

No cavities have been observed on the faces of crystals excepting those which are formed on the surface of fluids. Those which are produced on that side of a crystal which rests on the bottom of the vessel are more common in other salts. This phenomenon seems to merit more attention than has yet been bestowed upon it; as it explains easily the introduction of extraneous bodies which are sometimes detected in the interior of crystals. For when a cavity of this 19
kind has acquired a certain depth, it is capable of re- Cavities on crystals.
ceiving part of any foreign substance, and to be filled up by the change of position of the same crystal, retaining at the same time the extraneous matter. By a little art and dexterity, these fortuitous circumstances may be favoured, so that phenomena exhibited by such occurrences may be traced and observed at the pleasure of the operator. Experiments have been made with the view of ascertaining whether an extraneous substance could be substituted as the nucleus of a crystal; but from the result of these experiments, it does not appear that the particles of any salt have a tendency to combine with any foreign matter, and to form regular crystals. The portions of the salt which were attached to the extraneous substance were always separate and independent crystals.

There are some saline substances which retain in their solution an excess of particles even after cooling, and which being strongly agitated instantly deposit a great number of small crystals which render the solution

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tion turbid. The introduction of crystals of the same salt, it is well known, as in the case of a solution of Glauber's salt, promotes this sudden crystallization or separation of the excess of the salt. If, in this state of the solution, crystals are immersed with the view of having them large and regular, they are certain of being spoiled by the accumulation of a great number of small crystals on their surface, unless the precaution of immediately washing them with pure water when this happens is observed.

It may be remarked also that when the solution is diminished below a certain degree of saturation, the crystals not only cease to increase, but are also again in some measure dissolved; the corners and angles reduced and rounded. And if the crystals in this state be introduced into a solution of sufficient strength to promote their increase, supernumerary faces and truncatures, as they are denominated in technical language, are formed on the rounded corners and angles. But these faces always disappear as the increase of the crystals proceeds, and are replaced by corners and angles, which become at last sharp and distinct.

By attention to preserve the solutions of salt in perfect purity, we shall be more certain of obtaining the most beautiful and transparent crystals. Some fluids, after a certain time, are observed to deposit substances which are foreign to the salt held in solution, and were dissolved along with it. These substances sometimes appear in the form of earthy matters, which precipitate to the bottom of the vessel; in other cases they are diffused in the form of flakes, and sometimes they rise and swim on the surface. In all these cases, the crystals whose formation and increase are going forward must be removed, and the liquor must be filtrated before they are replaced.

20 Variations in crystals from changes in the solution.

A saline substance, which is capable of crystallization, possesses, in the state of minute division in which it is in solution, or in the condition of the molecules which compose it, a determined property which is uniform and constant, in which resides essentially the power of uniting in a certain symmetrical manner, and thus constructing regular solids. The results also are uniform and constant when the process is carefully conducted; but it is necessary to distinguish with accuracy the circumstances which accompany the operation, and may occasion a deviation from this uniformity. The sulphate of iron, for instance, usually crystallizes in the form of rhomboids; but sometimes it has been found to assume that of an irregular octaedron. And although it may be true that an elongated octaedron may be classed with prismatic crystals, it does not on that account belong less to the octaedral form; but it seems probable that these different varieties, in the forms of crystals, depend on some changes which take place in the solutions themselves. The iron in the present case is constantly receiving new portions of oxygen from the atmosphere, and in this new combination it is precipitated in the fluid: this, therefore, occasions a change in the constituents of the salt.

Several sulphates are found to combine readily with each other: those of iron and copper are of this description; and the result of this compound crystal is always a rhomboid. It seems to be doubtful whether this should be considered as a case of simple interposition of one salt with the other.

When a liquid, which holds saline bodies in solution, is evaporated to a certain degree, a crust forms on the surface, acquires a certain thickness, and when this is removed, it is renewed. The point at which the liquid exhibits this appearance is known in chemistry, by the appellation of *evaporation to a pellicle*.

21 Formation of dendrites

When it has reached this point, the solution is in a state of complete saturation; and the smallest additional quantity of fluid cannot be withdrawn without a corresponding quantity of salt assuming the solid form. On this principle Robinet has attempted to account for the formation of *dendrites*, or the arborescent appearance and efflorescence of some salts. Almost all the different species of fucus or sea-weed, he observes, are covered, in drying, with an efflorescence of white matter. In some species, this white matter was observed to possess a saccharine quality. A number of large roots of the *fucus palmatus* was hung up in the shade, and ten days had elapsed without the appearance of any thing on the surface. After that period it became white, and it was soon covered with a light downy substance, the filaments of which gradually increased to a considerable length. When this downy matter was brushed off with a feather, it was renewed till the plants were completely dry. This substance, it appeared on examination, was of a saccharine nature, mixed with a small portion of common salt, and a great quantity of mucilaginous matter. By solution and crystallization, the sugar was separated from the other substances.

In comparing the circumstances of this efflorescence with those of the formation of the pellicle, in the progress of evaporation, the former seems to be a modification of the latter. In a vessel which contains a liquid saturated with a salt, the surface subjected to evaporation has no sooner assumed a solid form, than the surface immediately inferior is exposed to the action of the same causes, and produces the same effect; and this effect continues till this crust has become so thick, or so compact, as to prevent the contact of air, and then the evaporation ceases. But, on the contrary, in the fucus, the air acting only on the surface of the plant, the liquid which it contains cannot undergo the process of evaporation, without coming to the surface. The attraction of the matter of the plant tends to promote this motion; for as the liquid is equally diffused through its whole mass, it rises constantly to the surface, in proportion as this surface is dried by the surrounding air; and it would appear that this is the process in the desiccation of all thick and massy bodies. Now, the saline matter which, in the present case, is in the state of efflorescence, having the same power of attraction on the liquid, the rudiments of each filament constitute, at the instant of their formation, part of the whole mass or body of the plant. They participate, therefore, of the same degree of moisture as that of the plant, and it is on their surface that the evaporation and crystallization of saline matter chiefly take place.

The mechanism of the dendritical or arborescent form of saline bodies seems to be in this way capable of explanation. The whole saline mass, which extends to the edges of the vessel, and even redescends externally, is constantly in the humid state, as long as any liquid remains in the vessel. It may be supposed, that

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that the matter of the sides of the vessel determines, by its attraction, the external circle of the surface of the liquid to rise above the surface; a phenomenon which is sufficiently obvious, but especially in narrow vessels. This portion of liquid, which is more completely subjected to evaporation, gives origin to a circle of saline matter, which appears thus raised above the surface of the liquid, and which being the first rudiments of the dendrites, contributes afterwards to its increase, in the way which has been already explained. Thus the vegetation of salts bears a striking resemblance to the process of efflorescence, or the formation of the downy matter on the surface of the fucus.

22 Efflorescence.

There is yet another kind of crystallization which seems to depend on the same cause. This is the saline efflorescence, which occurs in different places on the surface of the globe, and is frequently in such quantity as to become an important object of manufacture. Without extending our observations to the efflorescence of soda on the surface of the soil in Egypt, or that of nitre in Asiatic countries, we may refer to the production of muriate of soda, or common salt, in different parts of Europe, in those places which are covered with the waters of the ocean during high tides. The waters of the sea, with which the sandy shores are twice periodically moistened in the course of a month, are far distant from the point of saturation which determines crystallization. They rarely contain more than 3 parts of salt in 100; and the sand at the degree of moisture, in which it is left by the sea, is not impregnated with a sufficient quantity of saline matter to be worthy the labour of manufacturing; but, during the interval between the tides, these circumstances are greatly changed. The dry air of summer, by evaporating the moisture on the surface, allows the matter of the sand to attract towards the surface a similar portion of water, which was in the lower part of the soil, and which always tends to diffuse itself equally through the whole mass. This liquid, carrying with it the salt, which it holds in solution, increases the quantity of saline matter which exists on the surface. This process continues without interruption, as long as there is no fall of rain. It reaches at last a certain point, at which the water subjected to evaporation is saturated with the salt; and this process cannot proceed farther without the deposition of crystals of the salt, which discover themselves by their shining appearance. After some days, the sand on the surface is collected, and about six times the quantity of saline matter is found in the same proportion of sand, when it was first moistened by the sea water (A).

23 Crust on the bottom of vessels.

Another phenomenon which takes place during the process of artificial evaporation, should not pass unnoticed. This is the formation of a saline crust at the bottom of the vessels in which the process is conducted. This seems to be the immediate effect of ebullition; for when the temperature of the liquid is kept under the boiling point, no such effect is produced. This crust is composed of all the saline substances which are held in solution in the liquid; and even these substances are found combined in the same proportion in which they actually exist in the solution. Whatever be the attraction of these substances for water, or even if they possess a deliquescent property, they are not less disposed to enter into combination during the formation of the solid crust on the bottom of vessels in which the process of evaporation is conducted with a temperature equal to the boiling point. A slight degree of attention will satisfy us, that the formation of this crust depends on the particular circumstances of the evaporation in the case of ebullition. It must be obvious, that in this case the stratum of liquid which is in immediate contact with the vessel, receives the caloric which penetrates its sides, is charged with it beyond its capacity, changes its state, and assumes the gaseous form, and by this change having entirely lost its solvent power, whatever saline matter is held in solution must assume the solid state in contact with the sides of the vessel, and consequently adhere to it. Thus it happens, according to a very judicious observation, that in different saline solutions, the results of which have been compared, these scales or crusts are more abundant in proportion as the degree of saturation is less †.

† *Jour. de Phys.* lviii. 124.

24 Microscopical crystals.

To these observations we shall only add a short account of the phenomena of crystallization, as they were observed with the assistance of a microscope, by Mr Baker, and of the appearances of different saline bodies which he hath described. This will not afford any scientific information to the philosopher, but it may perhaps be the source of amusement to some of our readers, and the means, by a minute observation of the phenomena, of leading to some useful discoveries. The method which he followed in conducting these experiments, is the following. The substance to be examined is to be dissolved in a quantity of pure water, so as to be completely saturated. For salts of easy solubility, cold water may be employed; but for salts which are dissolved with more difficulty, hot or boiling water may be found necessary. In preparing the solution, the same rule may be observed as in preparing solutions for obtaining large crystals, which has been given in the former part of this section. The solution should be allowed to remain at rest for some hours, so that the first crystallization, if too much saline matter has been added to the liquid, may be allowed to take place. Thus the solution will be always of the same strength, and the same appearances may be uniformly expected.

When the solution is thus prepared, a drop of it may be taken up with the point of a quill, cut in the form of a pen, and placed on a flat slip of glass, spreading it on the glass with the quill till the liquid is so shallow as to rise very little above its surface. It is then

(A) Common salt is manufactured in this way on the sandy shores of the Solway Frith, in Annandale in Scotland. These flat shores are covered with the waters of the ocean during spring tides; and in the interval of these tides the evaporation by the heat of the sun and the action of the air is so considerable, as to leave the sand impregnated with a quantity of salt, sufficient to defray the expence and trouble of manufacturing it by filtration and boiling.

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then to be held over the clear part of a moderate fire, or the flame of a candle, and such a degree of heat applied as is found from experience to produce the necessary evaporation. This will be known by observing the formation of saline particles at the edges of the drop of fluid. The microscope being previously adjusted, and a magnifier of a moderate power being fitted on, the slip of glass is to be placed immediately under the eye, and brought exactly to the focus of the magnifier. After running over the whole drop, the attention is to be directed to that side on which the process of crystallization first commences, and proceeds from the circumference towards the centre. The motion is at first slow, if too much heat has not been applied, but becomes quicker as the evaporation continues. In some crystallizations the configurations are produced towards the end of the process with great rapidity, and exhibit an elegance, order, and regularity, which imagination only can conceive. When this rapid action has once begun, the eye must be kept fixed on the object, till the whole process is completed, because new forms appear, quite different from those which were first produced, and which have been properly ascribed to a quantity of different salts mixed with the substance to be examined, when the precaution has not been used of having it in a state of purity. When the configurations are fully formed, and the water evaporated, such salts as are deliquescent, it is scarcely necessary to observe, are soon destroyed by attracting the moisture from the air; but those which are more permanent, and not disposed either to deliquesce or to be deprived of their water of crystallization, may be preserved, by being enclosed between glasses, for a long time, as amusing objects for the microscope. To make the liquid spread readily on the glass, the surface of it may be moistened with a little of it, and rubbed with the finger. In this way, the repulsion which sometimes is observed between the liquid and the glass is completely removed. During the evaporation, the object-glass of the microscope is sometimes obscured by the condensation of the water from the saline solution on the slip of glass, and the vision is thus rendered indistinct. When this happens, if the circumstance be recollected, the glass must be wiped and replaced. In examinations of saline solutions, and in observing the progress of crystallization, Mr Baker recommends the light of a candle in preference to the light of day, which latter being of a whiter colour and nearly the same with the transparent crystals, they are less distinctly seen than with the brown light of a candle.

Plate CLXV.

Fig. 1. is a representation of the microscopical crystals of *nitre* or *saltpetre*. They begin to shoot out from the edges with very moderate heat into flat figures of different lengths, with straight parallel sides, and exceedingly transparent. They appear in different states of their progress at the letters, *a*, *b*, *c*, *d*, and *e*; *a* exhibits the appearance when they first begin to form. When a number of crystals have made their appearance they sometimes dissolve under the eye, and disappear entirely: but, by continuing to watch the changes which go on, the process is frequently observed to recommence, and new shoots push out. The first crystals sometimes become larger without undergoing any change of figure; and sometimes form in the way which is represented in the figure. When the heat is too great, as might be expected, the process goes on with great rapidity, and numerous ramifications are formed. This arises no doubt from the confused crystallization.

Fig. 2. shews the microscopical crystals of *blue vitriol* (sulphate of copper), which appear first round the edges, short at the beginning, but gradually increasing, as they are represented at the letters *a*, *b*, *c*, which denote their difference of form, and the progress of their growth. These crystals, which are transparent, assume a solid regular form, and reflect the light from their polished sides and angles. As the evaporation proceeds, a great number of filaments as fine as hairs make their appearance, some crossing each other, as at *d*; and others exhibiting a stellated form with many radiations, as at *e e*. The crystallization of this salt proceeds slowly. Towards the end of the process the regular crystals appear, and are finely branched as at *f*.

Fig. 3. is a view of the crystals of distilled verdigrise, or acetate of copper. When it is immediately applied to the microscope, the regular figures 1, 2, 3, 4, 5, 6, 7, make their appearance; but if the solution is allowed to remain at rest for a few hours, and a drop of it is then heated on a slip of glass till it begins to concrete about the sides, sharp-pointed solid figures are formed, and shoot forwards. These crystals are often striated obliquely, frequently arise in clusters, or shoot from a centre. Sometimes, towards the end of the process, and in the middle of the drop, they assume a foliated form, and have the appearance of four leaves of fern united by their stems.

Fig. 4. shews the microscopical crystals of alum. These are more or less perfect according to the strength of the solution, and the temperature employed. To prepare this salt for examination, the saturated solution may remain for some days. In that time crystals will form, and if what remains liquid should be found too weak, heat may be applied, which will again dissolve the crystals.

In fig. 5. is a view of the crystals of borax, or the subborate of soda. The drop of this solution should not be held too long over the fire, as it hardens on the slip of glass, and no crystals appear. A brisk heat for about a second is recommended as the best method. It is then applied to the microscope, and the crystals will form as in the figure.

Fig. 6. shews the microscopical crystals of sal ammoniac, or muriate of ammonia. Great numbers of thick, sharp, and broad spiculæ shoot from the edges, and from their sides are protruded others of the same form, which are parallel to each other, but perpendicular to the main stem. The formation of these crystals, unless the heat employed be very moderate, is very rapid.

Fig. 7. exhibits the appearance of the crystals of acetate of lead (sugar of lead). After a little of this salt is dissolved in hot water, and allowed to remain at rest for a short time, it is fit for being examined with the microscope. A drop of it put on a slip of glass, and heat being applied, will be seen forming round the edge, a regular border of a clear and transparent substance, which with a strong heat runs over the whole of the drop, and hardens on the glass; but when the heat employed is moderate, bundles of lines, arranged

its inferior base, this base will correspond exactly with the square marked with the same letters in fig. 15. If in like manner a third lamina be applied to the second, which is composed only of 9 cubes, that is, 3 on each side, so that *v x y z* (fig. 18.) being the inferior base, shall correspond with the square marked with the same letters in fig. 15.; and if on the middle square *r* of the preceding lamina the small cube *r* (fig. 19.) be placed, this will represent the last lamina.

When this operation is completed, it will appear that there is formed on the face ABCD (fig. 15.) a four-sided pyramid, of which this face is the base, and the cube *r* (fig. 19.) is the summit. And if the same operation be continued on the other five sides of the cube, we shall have six four-sided pyramids, resting on the six faces of the nucleus, which is enveloped with them on all sides. But as the different rows of laminæ composing these pyramids project beyond each other for a certain way, as appears on fig. 20. where the parts raised above the planes BCD, BCG represent the two pyramids which rest on the faces ABCD, BCGH, (fig. 15.) the faces of the pyramids will not form continued planes; for they will be alternately re-entering and salient, in some measure imitating a stair with four sides.

Let us now suppose that the nucleus is composed of a number of almost imperceptible cubes incomparably greater, and that the laminæ applied on the different faces, which may be called the laminæ of superposition, continue to increase towards their four edges by subtractions of one range of cubes equal to those of the nucleus, the number of these laminæ will be incomparably greater than in the preceding hypothesis; and at the same time the cavities or furrows which they form, as they alternately become salient or re-entering, will be almost imperceptible; and indeed it might be supposed that the cubes of which the crystal is composed are so small as to become quite imperceptible to our senses, and the faces of the pyramids to be perfectly smooth.

Now DCBE (fig. 20.) being the pyramid which rests on the face ABCD (fig. 15.), and CBOG (fig. 20.) the pyramid applied to the face BCGH (fig. 15.), if we consider that every thing is uniform from E to O (fig. 20.) in the manner in which the laminæ of superposition mutually project beyond each other, we may readily conceive that the face CEB of the first pyramid ought to be exactly in the same plane as the face COB of the contiguous pyramid, so that the union of these two faces should form a rhombus ECOB. But we have, for the 6 pyramids, 24 triangles similar to CEB, which consequently will be reduced to 12 rhombuses, from which results a dodecahedron similar to what is represented in fig. 13. and 14.

The cube, before it arrives at the form of the dodecahedron, passes through a multitude of intermediate modifications, of which one is shown at fig. 21. The squares *p a e o*, *k l q u*, *m n t s*, &c. correspond to the squares ABCD, DCGF, CBHG, &c. (fig. 14.), and form the superior basis of as many pyramids, incomplete from the deficiency of the laminæ with which they ought to terminate. The rhombuses EDLC, ECOB (fig. 13°), by a necessary consequence, are reduced to simple hexagons *a e* C *i k* D, *e o* B *n m* C (fig. 21.), and the surface of the secondary crystal is composed of 12 of these hexagons and 6 squares. This is the case with the boracic spar (the borate of magnesia and lime), with the exception of some facets which surmount the solid angles, and which depend on a different law of decrement.

If the diminution of the laminæ of superposition proceeded in a more rapid ratio; for example, if each lamina had had on its circumference, two, three, or four rows of cubes less than the inferior lamina, the pyramids produced on the nucleus by this diminution being more depressed, and their contiguous faces being no longer on a level, the surface of the secondary solid would have been composed of 24 isosceles triangles, all inclined to each other. *Decrement on the edges*, is that which takes place parallel to the edges of the nucleus, and it ought to be distinguished from another kind of decrease to be afterwards mentioned.

2. Examples of Decrease on the Edges.

Martial Pyrites, or *Dodecahedral Sulphuret of Iron.*

Geometric Character.—Inclination of any one of the pentagons, as DPRFS (fig. 27.), to the pentagon CPRGL, which has the same base PR, 126° 56′ 8″. Angles of the pentagon CPRGL, L = 121° 35′ 17″; C or G = 106° 35′ 57″ 30‴; P or R = 102° 36′ 19″.

Let us conceive again a cubic nucleus, whose different edges are lines of departure to the same number of decrements which take place at the same time in two different ways; that is, by the subtraction of two rows parallel to the edges AB, CD (fig. 15.), and of one row parallel to the edges, AB, BC. Let it be supposed also that each lamina being only equal in thickness to a small cube of the side AB and CD, is on the contrary equal to double the thickness of the side AD and BC. Fig. 22. represents this disposition with regard to the decrements which proceed from the lines DC, BC, (fig. 15.). It is plain that on account of the more rapid decrease in proceeding from DC or AB, than from BC or AD, the faces produced in the first case will be more inclined to the plane ABCD, while the faces produced in the second will remain as it were behind, so that the pyramid will no longer be terminated by a single cube E, as in fig. 20. which on account of its minuteness seems to be only a point, but by the row of cubes MNST (fig. 22.) which, supposing these cubes to be infinitely small, will preseent the appearance of a simple ridge. By a necessary consequence, the pyramid will have for its faces two trapeziums, such as DMNC, resulting from the first decrement, and two isosceles triangles, such as CNB, which will be the effect of the second decrement (c).

Let

(c) Here the face which corresponds to ABCD (fig. 15.) has 25 squares on each side, as may be seen in fig. 22. The structure of this pyramid may be imitated artificially, by regulating the arrangement and number of the cubes represented in the same figure.

Let us suppose farther, that with regard to the laminæ of superposition, which arise on the face BCGH (fig. 15.), the decrements follow the same laws, but in cross directions; in such a way that the more rapid of the two may take place in proceeding from BC, or from GH, towards the vertex of the pyramid, and the slower decrement in proceeding from CG, or BH, towards the same vertex. The pyramid which results from these decrements will be placed in a direction opposite to that which rests on ABCD, and will have the position represented at fig. 25. where the edge KL, which terminates the pyramid, instead of being parallel to CD, like the edge MN, (fig. 22. and 23.) is on the contrary parallel to BC. We shall then conceive what is to be done, that the pyramid which will rest on DC, GF (fig. 15.) may be turned as it is represented in fig. 24. and may have its terminating edge PR parallel to CG (fig. 15.). The pyramids which will rest on three other faces of the cube, will stand like that which arises on the opposite face.

But as the decrements which produce the triangle CNB (fig. 23.) make a continuity with those from which results the trapezium CBKL (fig. 25.), these two figures will be in the same plane, and will form a pentagon CNBKL (fig. 26.). For the same reason the triangle DPC (fig. 24.) will be on a level with the trapezium DMNC (fig. 23.); and by applying the same reasoning to the other pyramids, it will be conceived that the six pyramids having for their whole faces 12 trapeziums and 12 triangles, the surface of the secondary solid will be composed of 12 pentagons, which will correspond to the 12 rhombuses of fig. 13. but with this difference, that they will have other inclinations. This solid is represented at fig. 27. and with its cubic nucleus at fig. 28. where it may be seen how to proceed in the extraction of this nucleus. If, for example, a section be made passing through the points D, C, G, F, the pyramid which rests on the face DCGF of the nucleus will be detached, and by this section the latter will be uncovered.

Among the crystals belonging to the sulphuret of iron, or the arseniate of cobalt, there is found a dodecahedron, having the faces equal and similar pentagons, and having for its nucleus a cube in the position above described. But there are an infinite number of possible dodecahedra, which may have for faces equal and similar pentagons, and will differ from each other by the respective inclinations of their faces. Of all these dodecahedra, the one whose structure would be subjected to these laws, gives 126° 56′ 8″, as the angle formed by the inclination of any two of its faces DPRFS, CPRGL (fig. 27.) at the edge of junction PR, as might be shewn by calculation. Some mineralogists, overlooking the use of geometry in the consideration of crystals, have confounded the dodecahedron of pyrites with the same regular geometrical figure in which all the sides and angles of each pentagon are equal; but there is a striking difference between these two dodecahedra. The regular dodecahedron gives only 116° 33′ 54″, as the inclination of its respective pentagons, making a difference of nearly $11\frac{1}{4}$° between it and the other. And indeed the regular dodecahedron cannot be produced by any law of decrement whatever, however compound it may be supposed, in regard to a cubic nucleus; and, as may be demonstrated generally, for a nucleus of any form. There are then two kinds of dodecahedra, one of whose faces are rhombuses, and another whose faces are pentagons, produced upon a cubical nucleus, in consequence of two simple and regular laws of decrement, in a direction parallel to the edges of the nucleus. By varying these laws in different other ways, a multitude of new polyhedra, having the same nucleus may be constructed.

Obtuse or Lenticular Calcareous Spar, (fig. 30.).

Geometric Character. Inclination of the rhombus $n\,a\,d'\,b'$, to the rhombus $a\,i\,f'\,d'$, 134° 25′ 36″. Angles of the rhombus $n\,a\,d\,b'$; a or $b' = 114°\ 18'\ 56''$; n or $d' = 65°\ 41'\ 4''$.

This variety arises from a decrement by a single row on both sides of the edges $a\,b$, $a\,g$, $a\,f$ (fig. 31.) and $e\,o$, $e\,d$, $e\,x$, contiguous to the summits a, e, of the nucleus. An idea may be formed of its structure, by comparing it with that of the dodecahedron whose planes form rhombuses (fig. 13. and 20.), originating from the cube, (fig. 15.); and by supposing that the laminæ, instead of decreasing at the same time on all the edges, decrease only to those contiguous, three by three, to the angle C and its opposite. The faces formed in that case will be reduced to six, which, by prolonging themselves, according to the law of continuity, so as to intersect each other, will compose the surface of a rhomboid analogous to the one which we are now treating of, excepting that it will have other angles, on account of the cubical form of its integral molecule.

From this it may be conceived, that the diagonals drawn from a to b' (fig. 30.), from a to g', from a to f', &c. on the secondary rhomboid, will be confounded with the edges $a\,b$, $a\,g$, $a\,f$, (fig. 31.) of the nucleus, which serve as lines of departure for the decrements: and hence to extract this nucleus, the planes of the sections must pass along these diagonals, as has been already remarked.

Common Topaz, (fig. 33.).

Geometric Character.—The inclination of the trapezoid $s\,r\,t\,m$ to the adjacent plane $r\,t\,e\,y$, 136°; of the same plane, to $k\,r\,y\,x$, 124° 26′; of the plane $t\,m\,g\,e$, to $m\,l\,i\,g$, 93°.

The primitive form of the topaz is that of a right-angled, four-sided prism $h\,y$ (fig. 32.) the bases of which are rhombuses, having the angle h or $r = 124°\ 26'$. According to theory, in regard to the integrant molecule, the height $r\,y$ is to the side $r\,n$ nearly in the ratio of 3 to 2. The pyramidal summit of the topaz results from a decrement by two rows of small prisms on the edges $x\,r$, $r\,n$, $n\,h$, $h\,x$ of the superior base of the primitive form. The planes $t\,m\,g\,e$, $l\,m\,g\,e$ (fig. 33.) on one side, and $b\,k\,z\,p$, $b\,u\,d\,p$, on the other, arise from a decrement by three rows on each side of the edges, $n\,v$ $x\,q$ (fig. 32.), which decrement remains suspended at a certain term, and leaves four rectangles $t\,r\,y\,e$, $k\,r\,y\,x$, $l\,h\,c\,i$, $u\,h\,c\,d$, (fig. 33.), parallel to the planes of the primitive form. The effect of this decrement is shewn at fig. 34. where the rhombus $h\,n\,r\,x$ is the same as fig. 32.; and all the small rhombs by which it is subdivided, or which are exterior to it, represent the bases of so many molecules. The lines $x\,d$, $x\,z$, $n\,i$, $n\,e$, are

are directed according to the law of decrement already explained, and the lines *c d*, *c i*, *y z*, *y e*, correspond to the planes of the prism, which are not subject to this law.

3. Decrement on the Angles.

This position of the rhomboidal nucleus inclosed in the regular hexahedral prism of the calcareous spar being discovered, did not directly lead to the determination of the laws of those decrements of secondary crystals. More simple intermediate steps were necessary. To conceive the method of investigating these new decrements, it may be remarked that the same substances which exhibit the dodocahedron with pentagonal planes originating from the cubes (fig. 27. and 28.), and which might assume the form of the dodecahedron whose planes are rhombuses (fig. 13. and 14.), are found also under that of the regular octahedron. But if the laminæ of superposition decrease only on the edges of the two opposite faces of this cube, as on those of the superior base ABCD (fig. 14.), and of the inferior base, we shall in general have two pyramids applied on these bases. And if we suppose the effect of the law of decrements continued in the space situated between the bases of the cube, we shall arrive at an octahedron, whose angles will vary as there is a greater or smaller number of rows subtracted. But no law, however complicated, can give equilateral triangles as the faces of this octahedron.

On the other hand, by dividing a regular octahedron originating from a cube, the cubic nucleus will appear to be so situated in this octahedron that each of its six solid angles corresponds to the centre of one of the faces of the octahedron; but this could not be the case by supposing a decrement on the edges. The law of decrement accomplishes its ends, in such cases, by a different progress from that which conducts to the forms already described.

Let ABCD (fig. 35.) be the superior or inferior surface of a lamina composed of small cubes, whose bases are represented by the squares which subdivide the whole square. The series of cubes to which the squares *a*, *b*, *c*, *d*, *e*, *f*, *g*, *h*, *i*, belong, are on the diagonal drawn from A to C; and they form one string, (fig. 36.) which will not differ from the string of the cubes *a*, *n*, *g*, *r'*, *s'*, *t'*, *u'*, *z'*, *x'*, (fig. 35.), lying in the direction of the edge AD, excepting that in the former the cubes touch only by one of their edges, and in the latter by one of their faces. There are also, throughout the whole extent of the lamina, strings of cubes parallel to the diagonal. The series of letters *q*, *v*, *k*, *u*, *x*, *y*, *z*, shews one, and the letters *n*, *t*, *l*, *m*, *p*, *o*, *r*, *s*, shew another string.

The laminæ of superposition, it may be conceived, project beyond each other one or more rows of cubes in a direction parallel to the diagonal. In like manner may be constructed around the cubic nucleus, solids of different figures, by placing successively above the different faces of this nucleus laminæ which may arise in the form of pyramids, and which will experience this kind of decrement. The faces of these solids will be roughened by an infinite number of salient angles formed by the exterior points of the composing cubes. This follows from the angular figure which is continually presented by the edges of the laminæ of superposition. But these points being on a level, the cubes may be supposed to be so small that the faces of the solid will appear smooth and continued planes.

Around the cube ABGF (fig. 37.), as a nucleus, let a secondary solid be constructed, in which the lamina of superposition shall decrease on all sides by a single row of cubes, in a direction parallel to the diagonals; and let ABCD (fig. 38.), the superior base of the nucleus, be subdivided in 81 small squares, representing the exterior faces of an equal number of molecules. Fig. 39. represents the superior surface of the first lamina which ought to be placed above ABCD (fig. 38.) in such a manner that the point *a'* may correspond to the point *a*, the point *b'* to the point *b*, the point *c'* to the point *c*, and the point *d'* to the point *d*. By this disposition the squares A*a*, B*b*, C*c*, D*d* (fig. 38.) remain uncovered, which will fulfil the above law of decrement; and the borders QV, ON, IL, GF (fig. 39.) project by one row beyond the borders AB, AD, CD, BC (fig. 37.), which is necessary that the nucleus may be enveloped towards these edges. For if the edges of the lamina represented (fig. 39.), as well as the following, coincided with the lines ST, EZ, YX, MU, on which supposition they would be on a level with AD, AB, CD, BC (fig. 38.), they would form re-entering angles towards the analogous parts of the crystal. Thus in the laminæ applied on ABCD (fig. 37.) all the edges answering to CD would be on a level with CDFG, of which they would form a prolongation; and in the laminæ applied on DCFG all the edges analogous to the same ridge CD would be on a level with ABCD, from which necessarily results a re-entering angle opposite to the salient angle formed by the two faces ABCD and CDFG. But by the laws which determine the formation of simple crystals, re-entering angles appear to be excluded. The solid will then increase in those parts to which the decrement does not extend. But this decrement alone being sufficient to determine the form of the secondary crystal, all the other variations which intervene only in a subsidiary manner may be set aside, excepting in the construction of artificial crystals, and in exhibiting the details relating to the structure.

The superior face of the second lamina will be like A'G'L'K' (fig. 40.), and this lamina must be placed above the preceding, in such a manner that the points *a''*, *b''*, *c''*, *d''*, may correspond with the points *a'*, *b'*, *c'*, *d'* (fig. 39.), which will leave uncovered the squares having their exterior angles situated in Q, S, E, O, V, T, M, G, &c. and continuing to produce the decrement by one row. The solid increases towards the analogous edges at AB, BC, CD, AD (fig. 38.), since between A' and L', for instance, (fig. 40.), there are 13 squares, but between QV and LI (fig. 39.) there are only eleven.

The large faces of the laminæ of superposition which were hitherto octagons QVGFILNO (fig. 39.) having arrived at the figure of the square A'G'L'K' (fig. 40.), will, after passing that term, decrease on all sides at the same time, and the following lamina will have for its superior face the square B'M'I'S (fig. 41.), less in every direction by one row than the square A'G'L'K' (fig. 40.). Let this square be disposed above the preceding, so that the points *c'*, *f'*, *g'*, *h'* (fig. 41.) may correspond with the

the points c, f, g, h, (fig. 40.). Fig. 42. 43. 44. and 45. represent the four laminæ which ought to rise successively above the preceding, the same letters being made to correspond. The last lamina is reduced to one cube z' (fig. 47.) which should correspond with the same letter (fig. 45.).

Thus it follows, that the laminæ of superposition applied on the base ABCD (fig. 37. and 38.) produce, by the total of their decreasing edges, four faces, which in proceeding from the points A, B, C, D, incline one to another in the form of a pyramidal summit. These edges, it may be remarked, have lengths which begin by increasing as in fig. 39. and 40. and which then proceed decreasing. Thus the faces produced by the same edges increase at first, and afterwards decrease in breadth, so that they become quadrilaterals. One of these is represented at fig. 47. in which the inferior angle C is confounded with the angle C (fig. 37.) of the nucleus; and the diagonal LQ represents the edge L′G′ of the lamina A′G′L′K′ (fig. 40.), which is the most extended in the direction of that edge. And the number of laminæ of superposition producing the triangle LCQ (fig. 47.) being less than that of the laminæ producing the triangle LZQ, since there is here only one lamina preceding the lamina A′G′L′K (fig. 40.), while there are six which follow it as far as the cube z (fig. 46.) inclusively, the triangle LZQ (fig. 47.) composed of the sum of the edges of these latter laminæ, will have a much greater height than the inferior triangle LCQ, as it is expressed in the figure.

The surface of the secondary solid, then, will be formed of 24 quadrilaterals, disposed three and three around each solid angle of the nucleus. But decreasing by one row, the three quadrilaterals belonging to each solid angle, such as C (fig. 37.) will be in the same plane, forming an equilateral triangle ZIN (fig. 48.). The 24 quadrilaterals, then, will produce eight equilateral triangles. One of these is represented at fig. 49. shewing the arrangement of the cubes that concur to form it; and the secondary solid will be a regular octahedron. This octahedron is represented at fig. 50. enclosing the cubic nucleus, so that each of its solid angles corresponds to the centre of one of the triangles IZN, IPN, PIS, SIZ, &c. of the octahedron. To extract this nucleus, it would be necessary to divide the octahedron in its eight solid angles, by sections parallel to the opposite edges. This is the structure of octahedral sulphuret of lead or galena.

Such then is an example of decrements on the angles which take place in a direction parallel to the diagonals. By this denomination may be expressed precisely the result of each decrement, by denoting the angle which serves it as a point of departure.

Acute calcareous Spar, (fig. 51.).

Geometric Character.—Inclination of $p\,z\,r\,y$ to $p\,u\,o\,y$, 78° 27′ 47″; and to $i\,r\,x\,s$, 101° 32′ 13″. Angles of the rhombus $p\,z\,r\,y$, p or r=75° 31′ 20″; z or y=104° 28′ 40″. Inclination of the oblique diagonal drawn from p to r with the edge $p\,u$, 71° 35′ 54″.

Geomet. Propert.—The angles of the rhombus are equal to the respective inclinations of the faces of the nucleus, and reciprocally. The angles of the principal quadrilateral, or that which passes through two opposite oblique diagonals $p\,r$, $u\,i$, and through the intermediate edges $p\,u$, $i\,r$, are the same as on the nucleus.

To conceive the structure of this rhomboid, suppose that $a\,b\,d\,f$ (fig. 52.) represents the face of the nucleus marked with the same letters, (fig. 12.) subdivided into a multitude of partial rhombuses, which are the exterior faces of so many molecules. Suppose farther, that the laminæ of superposition, applied on this face, decrease by one row towards the lateral angles $a\,b\,d$, $a\,f\,d$, in such a manner, that on the first the two rhombuses $b\,h\,k\,l$, $f\,m\,i\,n$ are uncovered; that on the second the uncovered rhombuses are those traversed by the diagonals $c\,o$, $u\,y$, on the third those traversed by the diagonals $s\,t$, $q\,z$, &c.; in which case the decreasing edges will successively correspond with these diagonals. By this law of decrement two faces will be produced; which, proceeding from the angles $b\,f$, will rise in the form of a roof above the rhombus $a\,b\,d\,f$, and will meet on a common edge situated immediately above the diagonal $a\,d$, and which will be parallel to it; and, as there are six rhombuses, which undergo like decrements on the primitive form, the faces produced will be 12 in number. But, by the law of decrement by one row, the two faces which have the same angle b, f, g, &c. (fig. 12.) for the point of departure will be in the same plane; thus reducing the 12 faces to six, and transforming the secondary crystal into an acute rhomboid $p\,i$ (fig. 51.). In this rhomboid the edges $p\,z$, $p\,y$, $p\,u$, are situated each as the oblique diagonals of the nucleus, or those which would be drawn from a to d, from a to x, from a to c, &c. (fig. 12.).

Crystals of this variety are found near Lyons in France; and the freestone of Fontainbleau, commonly called *crystallized freestone*, which is nothing else than calcareous spar, mixed with particles of quartz, exhibits the same form. The crystals of this stone yield to mechanical division, and have their natural joinings, like those of pure spar, situated in the planes parallel to the edges $p\,z$, $p\,y$, $p\,u$, &c. (fig. 51.), and which would pass at an equal distance from these edges.

Rhomboidal Iron ore, (fig. 53.).

Geometric Character.—Inclination of BCRP to BCOA or OCRS, 146° 26′ 33″; angles of the rhombus BCRP, C or P=117° 2′ 9″; B or R=62° 57′ 51″.

The laminæ composing this rhomboid decrease by two rows on the angles $b\,c\,r$, $o\,c\,r$, $b\,c\,o$, &c. (fig. 54.) which concur to the formation of the two solid angles $c\,n$, of a cubic nucleus. The faces produced, instead of being on a level, three and three, around these angles, as in the case of decrement by a single row, incline one to the other, and extend above the faces of the nucleus in such a manner that their diagonals are parallel to the horizontal diagonals of the same faces. The cube here answers the purpose of a rhomboid, which should have its summits in c and n, in which case there would be only one axis passing through the summits. In the dodecahedron, on the other hand, with pentagonal planes

Structure of Crystals.

planes (fig. 27.) the cube performs the functions of a rectangular parallelopipedon, and then three different axes may be conceived, each of which passes through the middle of the two opposite faces. When the cube begins to perform the one or the other, in regard to one species of mineral, it is observed to continue that function in all the varieties of that species.

The crystals of rhomboidal iron are found among those of the iron ore of the island of Elba. It is uncommon, however, for the law of decrement to attain to its boundary, and for the rhomboid not to be modified by facets parallel to the faces of the nucleus. If the decrement which produces the rhomboid took place at the same time on the eight solid angles of the cube, there would result a polyhedron of 24 facets, of which nature are the crystals found at the Calton hill, Edinburgh, which have been considered as zeolites.

4. Intermediate Decrements.

In some crystals the decrements on the angles do not take place in lines parallel to the diagonals, but parallel to lines situated between the diagonals and the edges. This happens when the subtractions are made by double, triple, &c. rows of molecules. In figure 55. which is an instance of these subtractions, the molecules composing the row represented by the figure, are so arranged as if, of two, only one was formed. To reduce this case under that of the common decrements on the angles, we have only to conceive the crystal composed of parallelopipeds, having their bases equal to the small rectangles *abcd*, *edfg*, *hgil*, &c. The name of intermediate decrement is given to this kind of diminution.

Syntactic Iron Ore, (fig. 50.).

Geometric Character.—Respective inclination of the trapeziums, *bego*, *nqgo* of the rising pyramids $=135°\ 34'\ 31''$; of the edges *cg*, *gq*, $129°\ 31'\ 16''$. Angles of the trapezium *bcgo*, *b* or $c=103°\ 48'\ 35''$; *o* or $g=76°\ 11'\ 25''$.

This variety of iron ore is found at Framont in Les Vosges. It commonly appears under the form of two opposite pyramids, and some groups reflect from the surface the prismatic colours. These crystals, classed by De L'Isle among the modifications of the dodecahedron with isosceles triangular planes, have for nucleus a cube performing the functions of the rhomboid. The two regular hexagons by which they are terminated, arise from a decrement by a single row of cubic molecules on the angles *c*, *n*, (fig. 54.) of the nucleus.

To comprehend the effect of this law, combined with the preceding, and which produces the lateral trapeziums, let it be supposed that *cbpr* (fig. 57.) represents the same square as fig. 54. subdivided into small squares, which are the external faces of so many molecules. Taking these molecules by pairs, so that they form rectangular parallelopipeds, having for bases the oblong squares *bngh*, *hgm*G, &c. and imagine, that the subtractions are made by two rows of these double molecules, the edges of the laminæ of superposition will be successively ranged in lines, as PG, TL, R*p*, S*p*, *kz*, *yz*, &c. and the sum of all these edges will produce two faces, which departing from the angles *b*, *r*, will converge, the one towards the other, and will unite themselves on a common ridge, situated above the diagonal *cp*, but inclined to that diagonal. The complete result of this decrement, then, is 12 faces; and it is shewn by calculation, that the six superior faces being prolonged to the point where they meet the six lower faces, will form with them the surface of a dodecahedron, composed of two right pyramids united at their bases. By the effect of the first law, these pyramids are here incomplete, which gives the hexagon *abcdru* (fig. 56.) and its opposite.

5. Mixed Decrements.

The decrements in other crystals, either on the edges, or on the angles, vary according to laws, the proportion of which can only be expressed by the fraction $\frac{2}{3}$ or $\frac{3}{2}$. It may happen, for instance, that each lamina exceeds the following by two rows parallel to the edges, and that it may, at the same time, have an altitude triple that of a simple molecule. A vertical geometrical section of one of the kinds of pyramids, resulting from this decrement, is represented at fig. 62. The effects of this decrement may be readily conceived by considering that AB is a horizontal line taken on the upper base of the nucleus *bazr*, the section of the first lamina of superposition, *gfen* that of the second. These are called *mixed decrements*, which exhibit this new kind of exception from the simplest laws. They, as well as the intermediary ones, rarely exist anywhere else, and they have been particularly discovered in certain metallic substances. The application of the ordinary laws, Hauy observes, to a variety of these substances, presented such errors in the value of the angles, as led him to believe that they were inconsistent with theory. But extending his theory, he arrived at results so correct as removed every doubt of the existence of the laws on which these results depended.

All the changes to which crystals are subjected depend on the laws of structure which have been explained, and others of a similar kind. The decrements sometimes take place at the same time on all the edges, as in the dodecahedron having rhombuses for its planes, or on all the angles, as in the octahedron originating from a cube. Sometimes they take place only on certain edges of certain angles. There is sometimes a uniformity between them, so that it is one single law by one, two, three rows, &c. which acts on the different edges, or the different angles. Sometimes the law varies from one edge to the other, or from one angle to the other. This happens, particularly, when the form of the nucleus is not symmetrical, as, for instance, when it is a parallelopiped, whose faces differ by their respective inclinations, or the measure of their angles. In some cases there is a concurrence of the decrements on the edges, with those on the angles, to produce the same form; and sometimes the same edge or the same angle is subjected to several laws of decrement succeeding each other. The secondary crystal, in some cases, has faces parallel to those of the primitive form, and which combine with the faces produced by the decrements to modify the figure of the crystal. Simple secondary forms are those which arise from a single law of decrement, the effect of which entirely conceals the nucleus. Compound secondary forms arise from several simultaneous laws of decrement, or from one single law not having attained to its extent; so that there remain

Structure of Crystals.

main faces parallel to those of the nucleus, which concur with the faces produced by the decrement, to diversify the form of the crystal. If, amidst this diversity of laws, sometimes insulated, sometimes united by more or less complicated combinations, the number of the rows subtracted were itself extremely variable; if, for instance, these decrements were by 12, 20, or 30 rows, or more, which is possible, the number of forms which might exist in each kind of mineral would be immense. But the power by which the subtractions are effected, seems to be very limited in its action. Its extent rarely exceeds 1 or 2 rows of molecules. Beyond four rows, only one variety of calcareous spar has been discovered. The structure of this variety depends on a decrement by six rows; but this seems to be a rare occurrence in nature. Yet, although the laws of crystallization are limited to two of the simplest, that is, those which produce subtractions by one or two rows, calcareous spar is susceptible of 2044 different forms, a number exceeding more than 50 times that of the forms at present known; and, admitting into the combination decrements by 3 and 4 rows, calculation will give 8,388,604 possible forms of the same substance, and by the operation of either mixed or intermediate decrements, this number will be greatly augmented.

The striæ observed on the surface of many crystals is another proof in favour of the theory; for they always have directions parallel to the projecting edges of the laminæ of superposition, which mutually go beyond each other, if the regularity of the process has not been disturbed. It must not, however, be supposed, that the inequalities arising from the decrements must be always sensible, if the form of the crystals be complete; for the molecules being extremely minute, the surface will appear finely polished, and no striæ would be perceptible. In some secondary crystals, therefore, they are not to be seen, while they are quite distinct in others of the same nature and form. In the latter case, the action of the causes producing crystallization, has not enjoyed all the necessary conditions; the operation has been interrupted; and the law of continuity not having been observed, there have remained on the surface of the crystal, perceptible vacancies. These deviations have this advantage, that they point out the direction, according to which the striæ are arranged in lines, and thus contribute to discover the real mechanism of the structure.

The small vacuities which the edges of the laminæ of superposition leave on the surface of even the most perfect secondary crystals, by their re-entering and salient angles, shew that the fragments obtained by division, whose external facets form part of the faces of the secondary crystal, are not like those drawn from the interior part. For this apparent diversity arises from these facets being composed of a multitude of small planes, really inclined to each other, but which being very minute, present the appearance of one plane. And if the division could reach its utmost bounds, these fragments would be resolved into molecules similar to each other, and to those situated towards the centre. It happens, too, that molecules of different figures arrange themselves in such a manner, as to produce similar polyhedra in different kinds of minerals. Thus the dodecahedron with rhombuses for its planes, which is obtained by combining cubic molecules, exists in granite, with a structure composed of small tetrahedra, having isosceles triangular faces. It exists also in sparry fluor, where there is also an assemblage of tetrahedra, but regular; that is to say, the faces of which are equilateral triangles.

Examples of Compound Secondary Forms.

Prismatic Calcareous Spar, (fig. 9.).

The bases of this prism are produced in consequence of a decrement, by a single row on the angles of the summits *b a f*, *g a f*, *b a g*, *d e x*, *d e c*, *c e x* (fig. 12.) of the primitive form. The six planes result from a decrement by two rows on the angles *b d f*, *f x g*, *b c g*, *d f x*, *d b c*, *c g x*, opposite to the preceding. Let *a b d f* (fig. 58.) be the same face of the nucleus, as fig. 12. The decreasing edges situated towards the angle of the summit *a* will successively correspond with the lines *h i*, *k l*, &c. and those which look towards the inferior angle *d*, will have the positions pointed out by *m n*, *o p*; but as the first decrement takes place by one row, it is proved, that the face which results from it is perpendicular to the axis; and calculation shews, in like manner, that the second decrement taking place by two rows, produces planes parallel to the axis, and thus the secondary solid is a regular hexahedral prism.

To develope farther the structure of this prism, it may be remarked, that in the production of any one *a b c n i h* (fig. 9.) of the two bases, the effect of one only of the three decrements which take place around the solid angle *a* (fig. 12.) may be considered, for example, of that which takes place on the angle *b a f*, supposing that the laminæ applied on the two other faces *f a g x*, *b a g c*, do not decrease, but to assist the result of the principal decrement which takes place in regard to the angle *b a f*. Here these auxiliary decrements are quite similar to that whose effect they are supposed to prolong.

The case will be totally different by applying the same observation to the decrements which are affected by two rows on the inferior angles *b d f*, *d f x*, *f x g*, &c. and which produce the six planes of the prism. If, for example, we consider the effect of the decrement on the angle *d f x*, it is necessary also that the laminæ applied on the faces *a f d b*, *a f x g* (fig. 12.) should experience, towards their lateral angles *a f d*, *a f x*, adjacent to the angle *d f x*, variations which second the effect of the generating decrement. Here, however, these variations are intermediary decrements by rows of double molecules.

Amphitrigonous Iron Ore. Fig. 59. shews this crystal in a horizontal projection, and fig. 60. in perspective.

Geometric Character.—Respective inclination of the triangles *g c n*, *g c d*, &c. from the same summit, 146° 26′ 33″; of the lateral triangles *b g u*, *b g q*, to the adjacent pentagons, such as *g u t m n*, 154° 45′ 39″.

This is the common form of the iron ore of the island of Elba. It results from a decrement by two rows on the angles *c*, *n* (fig. 54.) to the summits of a cubic nucleus, which produces the isosceles triangles *g c n*, *g c d*, *n c d* (fig. 59. and 60.), and of a second decrement by three rows on the lateral angles *c b q*, *c r p*, *c r s*, &c. which produce the triangles *m n r*, *r n k*, *u g b*, *g g b*, &c. These two decrements stop at a certain term, so that

that there remain faces parallel to those of the nucleus, viz. the pentagons *g u t m n*, *h d n k l*, &c. (fig. 59.). The first decrement is similar to that which produces the rhomboidal iron ore. The second has this property, that if its effects were complete, it would give a dodecahedron of isosceles triangles, or composed of two right pyramids united at their bases. The triangles of the summits are frequently furrowed by striæ parallel to the bases *g n*, *d n*, *g d*, of these triangles, and which point out the direction of the decrement.

Analogical Calcareous Spar, (HAUY), fig. 61.

Geometric Character.—Inclination of any one, *i m e h*, of the trapezoids of the summits to the corresponding vertical trapezoid *e c p g*, 116° 33′ 54″; angles of the same trapezoid $i=114°$ 18′ 56″; $e=75°$ 31′ 20″; *m* or $h=85°$ 4′ 52″. Angles of the trapezoid *e h o g*, $e=90°$; $o=127°$ 25′ 53″; $g=67°$ 47′ 44″; $h=74°$ 46′ 23″; of the trapezoid *c e g p*, $e=60°$; $p=98°$ 12′ 46″; *c* or $g=100°$ 53′ 37″.

Geomet. Propert.—1. In each vertical trapezoid, the triangle *c e g* is equilateral. 2. The height *e x* of this triangle is double the height *p x* of the opposite triangle *c p g*. 3. In the trapezoid *e h o g*, and the other similarly situated, the angle *h e g* is a right angle. 4. If the diagonal *g h* be drawn, the triangle *h e g* will be similar to any one *a o f* (fig. 12.) of those which would be produced by drawing in the primitive rhombus the two diagonals *b f*, *a d*. 5. If in the trapezoid *e m i h*, or any other situated at the summits, the diagonals *e i*, *m h* be drawn, the height *e l* of the inferior triangle *m e h* will be double the height *i l* of the superior triangle *m i h*. 6. The triangle *m i h* is similar to $\frac{1}{2}$ of the rhombus of every obtuse spar, divided by the horizontal diagonal, and the triangle *m e h* is similar to $\frac{1}{2}$ of the rhombus of the acute spar divided in the same manner.

The numerous analogies connecting this variety with different crystalline forms, whether considering certain angles formed by planes, or certain triangles obtained by drawing the diagonals of the trapezoids, led the author of this theory to give it the name of *analogical spar*. It is derived from three other varieties, viz. very obtuse spar, by the trapezoids *e m i h*, *f i h t*, &c.; metastatic spar, by the trapezoids *c m d c*, *e h o g*, *o h t z*, &c.; and the prismatic spar by the trapezoids *b a c k*, *c e g p*, &c. which are consequently parallel to the axis. The trapezoids *i m e h*, *f i h t*, &c. are often separated by an intermediary ridge from the vertical trapezoids *c e g p*, *g o z r*, &c. In that case the trapezoids *c d m e*, *g e h o*, &c. are changed into pentagons.

Icosahedral Sulphuret of Iron, (fig. 63.)

Geometric Character.—Respective inclinations of the isosceles triangles PLR, PSR, 126° 52′ 11″; of any one PNL of the equilateral triangles to each adjacent isosceles triangle, PLR, or LNK, 140° 46′ 17″. Angles of the isosceles triangle PLR, L=48° 11′ 20″; P or R=65° 54′ 20″.

This variety is the result of a combination of the law which produces the octahedron originating from a cube (fig. 50.) with that which takes place for the dodecahedron with pentagonal planes (fig. 27. and 28.) The first law produces the eight equilateral triangles which correspond with the solid angles of the nucleus; and the second produces twelve isosceles triangles, situated two and two above the six faces of the same nucleus. If a dodecahedron similar to that of fig. 28. were converted geometrically into this icosahedron, it would be sufficient to make the planes of eight sections pass through it in the following manner; viz. one through the angles P, N, L, (fig. 27.), another through the angles P, M, S; a third through the angles L, R, U, &c. By comparing the figures 27. and 63. the relation between the polyhedra will be seen by the correspondence of the letters; but this is merely an artificial operation; for it may be observed, that the nucleus of the icosahedra which would be obtained, would be much smaller than that of the dodecahedron, since the solid angles of the latter nucleus would be confounded with the angles D, C, G, &c. (fig. 28.) of the dodecahedron; but the other nucleus would have its solid angles situated in the middle of the equilateral triangles MPS, NPL, URL, (fig. 63.).

The icosahedron of the sulphuret of iron, which is not very common, has been confounded with the regular geometrical icosahedron which has all its angles equilateral. Theory shows that the existence of the latter icosahedron is equally impossible in mineralogy as the geometrical dodecahedron. Among the five regular polyhedra of geometry, viz. the cube, the tetrahedron, the octahedron, the dodecahedron, and the icosahedron, the three former can only exist among minerals according to the laws of crystallization.

Polynomous Petunze (HAUY), fig. 64.

Geometric Character.—Respective inclination of the narrow planes, *o n k m*, *c f h g*, to the adjacent planes on each side, 150°; of the planes *c t* F *g*, P *o m* N to those contiguous to them by the edges *t* F, PN, 120°; of the heptagon *p* G *c l d e z* to the enneagon B *z e b n o* P *r s*, 99° 41′ 8″; of the trapezium *d a f c* both to the plane *n b a f h i l k*, and to the heptagon *p* G *t c d e z*, 135°; of the facet *d e a b*, or AB *z p*, to the same pentagon, 124° 15′ 15″.

Hauy had not observed the petunze crystallized under its primitive form. This form, such as it is given by the mechanical division of secondary crystals, is that of an oblique prism of four planes (fig. 66.), two of which, such as GOAD, RBHN, are perpendicular to the bases ADNH, OGRB; the other two, viz. BOAH, RGDN, make with the former, angles of 120° at the ridges OA, RN, and angles of 60° towards the opposite ridges BH, GD. These planes are inclined to the bases at that place of the ridges GO, BR, 111° 29′ 43″, and at the opposite ridges 68° 30′ 17″. This form is at the same time that of the molecule. By theory, the two parallelograms GOAD, OGRB, as well as their parallels, are equal in extent; and the parallelogram BOAH, or its opposite, RGDN, is double each of the preceding. This may serve to explain the roughness of the sections made in the direction BOAH, when compared with those in the directions of the small parallelograms, the latter being always smooth and brilliant. If, however, the diagonal OR be drawn, it will be found perpendicular to OA and RN; or, it will be situated horizontally, cules which belong to these substances. It is observed, however, that the tetrahedron is always one of those solids which concur to the formation of small rhomboids or parallelopipeds that would be extracted from the crystal by a first division. But, on the other hand, there are substances which, being divided in every possible direction, resolve themselves only into tetrahedrons. Garnet, blendes, and tourmaline, belong to this number.

Several minerals are divisible into right triangular prisms. Such is the apatite, whose primitive form is a regular right hexahedral prism, divisible parallel to its bases and its planes, from which necessarily result right prisms with three planes. Fig. 76. represents one of the bases of the hexahedral prism, divided into small equilateral triangles, which are the bases of so many molecules, and which being taken two and two, form quadrilateral prisms, with rhombuses for their bases.

By adopting then the tetrahedron, in the doubtful cases already mentioned, all the forms of integral molecules may be in general reduced to three, which are remarkable for their simplicity, viz. the parallelopiped, the simplest of all the solids, having parallel faces two and two; the triangular prism, the simplest of all prisms; and the tetrahedron, which is the simplest of pyramids. This simplicity may furnish a reason for the preference given to the tetrahedron in fluor spar, and the other substances which have been mentioned as examples. But the ingenious author of the theory cautiously declines to speak decisively on the subject, as the want of direct and precise observations, he observes, leaves to theory only conjectures and probabilities.

But the essential object is, that the different forms to which these mixed structures lead, are arranged in such a manner, that their assemblage is equivalent to a sum of small parallelopipeds, as has been seen to be the case in regard to fluor spar: and that the laminæ of superposition applied on the nucleus, decrease by subtractions of one or more rows of these parallelopipeds. The basis of the theory exists, therefore, independently of the choice which might be made of any of the forms obtained by the mechanical division.

With the help of this result the decrements to which crystals are subject, whatever be their primitive forms, are found reducible to those which take place in substances, where this form, as well as that of the molecules, are indivisible parallelopipeds; and the theory has this advantage of being able to generalise its object, by connecting with one fact, that multitude of facts which, on account of their diversity, seem to be little susceptible of being brought to one common point. But what has been said, will be still more illustrated by examples of the manner in which we may reduce to the theory of the parallelopiped, that of the forms which are different from that solid.

Crystals whose Molecules are Tetrahedrons, with Isosceles Triangular Faces.

Garnet.

1. *Primitive Garnet* (fig. 76.)

Geometric Character.—Respective inclinations of any two of the faces of the dodecahedron, 120°. Angles of the rhombus CLGH, C or G=109° 28′ 16″; L or H=78° 31′ 44″.

Notwithstanding the vitreous appearance in general exhibited on the fractures of garnets of the primitive form, laminæ may be perceived on them, situated parallel to the rhombuses which compose their surface. Let us suppose the dodecahedron divided in the direction of its laminæ, and, for the greater simplicity, let us suppose the sections to pass through the centre. One of these sections, viz. that which will be parallel to the two rhombuses DLFN, BHOR, will concur with a hexagon, which would pass through the points E, C, G, P, I, A, by making the tour of the crystal. A second section parallel to the two rhombuses GLPF, BEAR, will coincide with another hexagon shewn by the points D, C, H, O, I, N. And if the division be continued parallel to the other eight rhombuses, taken two and two, it will be found that the planes of the sections will be confounded with four new hexagons analogous to the preceding. But by resuming all these hexagons, it will appear that their sides correspond, some of them with the small diagonals of the rhombuses of the dodecahedron, viz. those which would be drawn from C to G, from A to I, from C to B, &c. and others would correspond with the different ridges EC, GP, PI, EA, &c.

1. The planes then of the sections passing through the sides and through the small diagonals of the twelve rhombuses, will subdivide the whole surface into 24 isosceles triangles, which will be the halves of these rhombuses. 2. Since the planes of the sections pass also through the centre of the crystal, they will detach 24 pyramids with three faces; the bases of which, if we choose, will be the external triangles that make part of the surface of the dodecahedron, and of which the summits will be united in the centre.

Besides, if we take, for example, the six tetrahedrons, which have for external faces the halves of the three rhombuses CEDL, CLGH, CEBH, these six tetrahedrons will form a rhomboid represented by fig. 77. and in which the three inferior rhombuses DLGS, GHBS, DEBS, result from three divisions which pass, one through the hexagon DLGORA, (fig. 76.); the second through the hexagon GHBANF; and the third through the hexagon BEDFPO. Fig. 77. also represents the two tetrahedrons, the bases of which make part of the rhombus CLGH. One of these is marked with the letters L, C, G, S, and the other with the letters H, C, G, S. And by applying what has been said to the other nine rhombuses, which are united, three and three, around the points F, A, H, (fig. 77.), we shall have three new rhomboids; from which it follows, that the 24 tetrahedrons, considered six and six, form four rhomboids; so that the dodecahedron may be conceived as being itself immediately composed of these four rhomboids, and in the last analysis of 24 tetrahedrons.

It may be observed, that the dodecahedron having eight solid angles, each formed with three planes, they might have been considered as the assemblage of the four rhomboids, which would have for exterior summits the four angles G, B, D, A; from which it follows that any one of the faces, such as CLGO, is common to two rhomboids, one of which would have its

its summit in C, and the other in G, and which would themselves have a common part in the interior of the crystal.

We may remark farther, that a line GS (fig. 77.) drawn from any one G (fig. 76.) of the solid angles composed of three planes, as far as the centre of the dodecahedron, is at the same time the axis of the rhomboid, which would have its summit in C (fig. 76. and 77.). The composing rhomboids then have this property, that their axis is equal to the sides of the rhombus. From which, with a little attention, we may conclude, that in each tetrahedron, such as CLGS (fig. 77.), all the faces are equal and similar isosceles triangles.

If the division of the dodecahedron be continued by sections passing between those which we have supposed to be directed towards the centre, and which should be parallel to them, we should obtain tetrahedrons always smaller, and arranged in such a manner, that taking them in groups of six, they would form rhomboids of a bulk proportioned to their own.

The tetrahedrons, which would be the term of the division, were it possible to reach it, ought to be considered as the real molecules of the garnet. But it will be seen, that in the passage to the secondary forms, the laminæ of superposition, which envelope the nucleus, really decrease by rows of small rhomboids, each of which is the assemblage of these tetrahedrons.

The sulphuret of zinc, or blende, has the same structure as the garnet. Hauy informs us that he has divided fragments of this substance by very clean sections, in such a manner as to obtain successively the dodecahedron, the rhomboid and the tetrahedron.

2. *Trapezoidal Garnet*, (fig. 78.).

Geomet. Character.—Respective inclination of the trapezoids, united three and three around the same solid angle D, C, G, &c. $131° 48' 33''$; of the trapezoids united four and four around the same solid angle *u*, *x*, *r*, &c. $131° 48' 36''$. Angles of any one of the trapezoids *m* D *u* L, $L=78° 27' 46''$; $D=117° 2' 8''$; *m* or $u=82° 15' 3''$. The value of the angle L is the same as that of the acute angle of the nucleus of calcareous spar.

This variety is the result of a series of laminæ, decreasing at the four edges, on all the faces of the primitive dodecahedron. For the more simplicity, let us first consider the effect of this decrement in regard to the rhombus CLGH (fig. 76.). We have just seen that this rhombus was supposed to belong in common to two rhomboids, which should have for summits, one the point C, and the other the point G. Let us suppose that the laminæ applied on this rhombus decrease towards their four edges by subtractions of a single row of small rhomboids, in such a manner that in regard to the two edges CL, CH, circumstances are the same as if the rhombus belonged to the rhomboid which has its summit in C; and that in regard to the other two edges GL, GH, the effect is the same as if the rhombus belonged to the rhomboid, which has its summit in G. This disposition is admissible here in consequence of the particular structure of the dodecahedron, which permits us to obtain small rhomboids; some of which have their faces parallel to the faces of that with its summit in C, and the rest to that having its summit in G (D).

The results of the four decrements being thus quite similar to each other, the laminæ of superposition, applied on the rhombus CLGH, and on each of the other rhombuses of the dodecahedron, will form as many right quadrangular pyramids, which will have for bases these same rhombuses. Fig. 79. represents the pyramids which rest on the three rhombuses CLDE, CEBH, CGHB (fig. 76.), and which have for summits the points *m*, *e*, *s*, (fig. 76.); but on account of the decrement by a simple row, the adjacent triangular faces, such as E *m* C, E *s* C of the two pyramids that belong to the rhombuses CLDE, CEBH, are on a level, and form a quadrilateral E *m* C *s*. But we had 12 pyramids, and consequently 48 triangles. These divided by two give 24 quadrilaterals, which will compose the surface of the secondary crystal. But because the rhomboidal bases of the two pyramids extend more, in proceeding from L to E, or from H to E, than in proceeding from D to C, or from B to C, the sides *m* E, E *s* of the quadrilateral will be longer than the sides C *m*, C *s*. And besides *m* E will be equal to E *s*, and C *m* equal to C *s*. Thus the quadrilaterals will be trapezoids which have their sides equal two and two. There is no crystalline form in which the striæ, when they do exist, shew in a more sensible manner, the mechanism of the structure than in this variety of garnet. We may here see the series of decreasing rhombuses which form each of the pyramids CLDE *m*, CEBH *s*, &c. (fig. 79.), and sometimes the furrows are so deep that they produce a kind of stair, the steps of which have a more particular polish and brilliancy than those of the facets, which are parallel to the faces CEDL, CHBE, of the nucleus.

If the decrements stop abruptly at a certain term, so that the pyramids are not terminated, the 24 trapezoids will be reduced to elongated hexagons, which will intercept 12 rhombuses parallel to the faces of the nucleus. To this variety Hauy has given the name of *intermediary garnet*.

In the sulphuret of zinc the regular octahedron is the result of a decrement by a row around the eight solid angles, composed of three planes, viz. C, B, O, G, F, D, A, I, (fig. 76.). The same substance also assumes the form of a regular tetrahedron, by the help of a decrement by one row on four only of the eight solid angles before mentioned, such as C, O, F, A. The structure of this tetrahedoon is remarkable, as it presents an assemblage of other tetrahedrons with isosceles faces.

Crystals

(D) Theory, the author observes, has conducted him to another result, which is, that the sum of the nucleus and laminæ of superposition, taken together in proportion as the latter are applied one upon the other, is always equal to a sum of rhomboids; though at first view it does not appear that this should be the case, according to the figure of these laminæ, which represent rising pyramids.

Crystals whose Molecules are Triangular Prisms.

Oriental.

Hauy has thus denominated the gem which is known under the different names of *ruby*, *sapphire*, *oriental topaz*, according as the colour is red, blue, or yellow. The different varieties of this gem have not been accurately described, and the nature of the particular angles of each has not been precisely indicated, on account of the rare occurrence of regularly formed crystals, or when such have been found, on account of their being defaced by being water-worn, or otherwise injured. But from some crystals which were sufficiently characterised, Hauy obtained the following results.

1. *Primitive Oriental.*

This mineral crystallizes in the form of a regular hexahedral prism, which is divisible parallel to its bases. According to theory, which points out other joinings parallel to the planes, the molecule is an equilateral triangular prism. The height of this prism, calculated by theory, is a little less than three times the height of the triangle of the base.

2. *Elongated Oriental*, (fig. 80.).

Geometric Character.—Respective inclinations of the triangles IAS, IBS, 139° 54′. Angles of the triangle IAS, A=22° 54′. I or S=78° 47′.

This form is the result of a decrement by a simple row of small quadrangular prisms on all the edges of the bases of the nucleus. Let *q d* (fig. 75.) be the superior base, subdivided into small triangles, which represent the analogous bases of so many molecules. The edges of the laminæ of superposition will correspond successively to the hexagons *h i l m n r*, *c k u x y v*, &c.; from which it follows that the subtractions take place by rows of small parallelopipeds of quadrangular prisms composed each of two triangular prisms.

3. *Minor Oriental.*

Geometric Character.—Dodecahedron formed of two right pyramids less elongated than those of the preceding variety. The triangles corresponding to IAS, IBS, are inclined to each other 122° 36′. In each of these triangles the angle of the summit is 31°, and each of the angles at the base is 74° 30′.

The law of which this variety is the result, differs from that which produces the preceding, as it determines a mixed decrement by three rows in breadth and two rows in height.

4. *Enneagonal Oriental*, (fig. 81.)

Geometric Character.—Inclination of each small triangle, such as *c q i*, to the adjacent base *a c i p l b g e d*, 122° 18′.

This is the elongated oriental, whose summits are replaced by two faces parallel to the bases of the nucleus, with the addition of six small isosceles triangles *c q i*, *l b f*, *v z m*, &c. the three superior of which are alternate in position with the three inferior. These triangles are the result of a decrement, by three rows of small quadrangular prisms on the three angles of the superior base of the nucleus, such as *b*, *d*, *g* (fig. 75.), and on the intermediate angles of the inferior base. It may be readily conceived, that in the decrement which takes place, for example, on the angle *g*, the three rows which remain unoccupied between that angle and the corresponding edge of the first lamina of superposition, are, 1. the small rhombus *g o i p*, which alone forms the first row; 2. the two rhombuses *o s t i*, *p z d i*; 3. the three rhombuses situated on the same line behind the two preceding.

Crystals of this gem are chiefly found in the kingdom of Pegu. Some have been found in France, which have received the name of sapphires of Puy. They have been also found at a little distance from Velay, on the banks of a rivulet near the village of Expailly, where they are mixed with garnets and hyacinths. These have all the characters of the stone which is denominated *oriental sapphire*.

V. Difference between Structure and Increment.

In what has been said respecting the decrements to which the laminæ of superposition are subjected, the author observes, that it was his view only to unfold the laws of structure; and he adds, that he is far from believing that in the formation of a dodecahedral crystal, or one of any other form, having a cube for a nucleus, the crystallization has originally produced that nucleus such as it is extracted from the dodecahedron, by the successive application of all the laminæ of superposition with which it is covered. It seems proved, on the contrary, that from the first moment the crystal is already a very small dodecahedron, containing a cubical nucleus proportioned to its small size, and that the crystal afterwards increases by degrees without changing its form, by new layers which envelope it on all sides, so that the nucleus increases also, preserving always the same relation with the whole dodecahedron.

An example taken from a plane figure will make this more striking; and what is said respecting this figure may be easily applied to a solid, since a plane figure may be always conceived as a section of a solid. Let ERFN (fig. 82.) be an arrangement of small squares, in which the square ABCD, composed of 49 partial squares, represents a section of the nucleus, and the extreme squares R, S, G, A, I, L, &c. that of the kind of stair formed by the laminæ of superposition. It may be readily conceived, that the arrangement began with the square ABCD; and that different files of small squares were afterwards applied on each of the sides of the central square: for example, on the side AB, first the five squares comprehended between I and M, next the three squares comprehended between L and O, and then the square E. This increment corresponds with that which would take place if the dodecahedron began by being a cube proportioned to its bulk, and which increased afterwards with the addition of continually decreasing laminæ.

But, on the other hand, the arrangement may be conceived to be such as is represented in fig. 84. in which the square *a b c d* is composed of only nine molecules, and bears upon each of its sides only one square

Fig. 1. Nitre or Salt Petre.

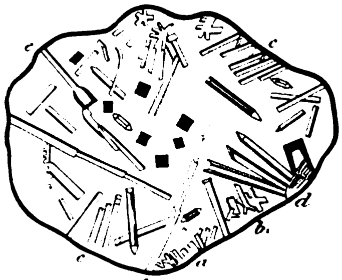


Fig. 2. Blue Vitriol.

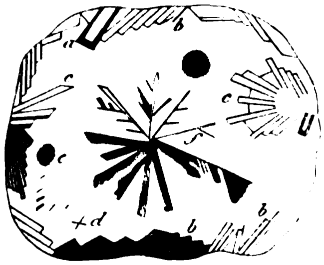


Fig. 3. Verdigrease distilled.

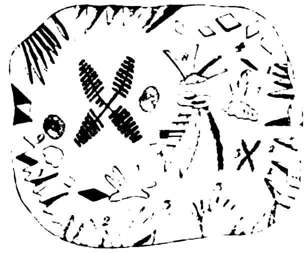


Fig. 4. Alum.

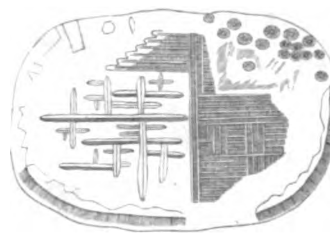


Fig. 5. Borax.

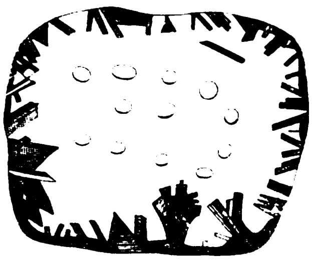


Fig. 6. Sal Ammoniac.

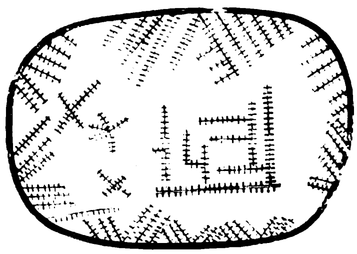


Fig. 7. Salt of Lead.

Fig. 8. Glaubers Salt.

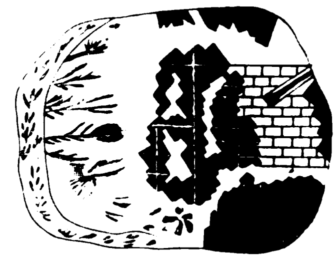
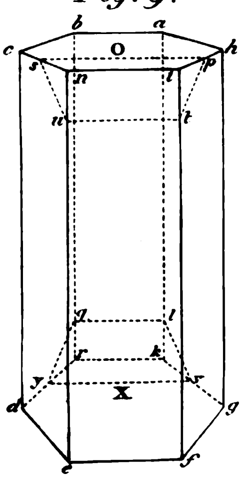


Fig. 9.



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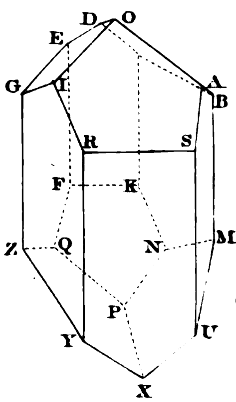

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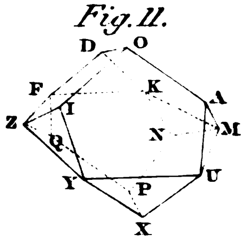

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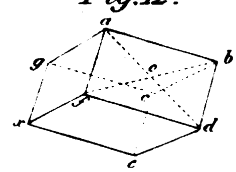

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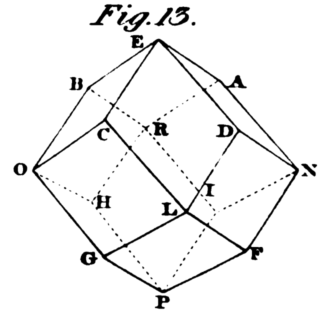

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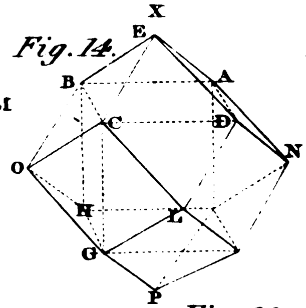


Fig. 15.

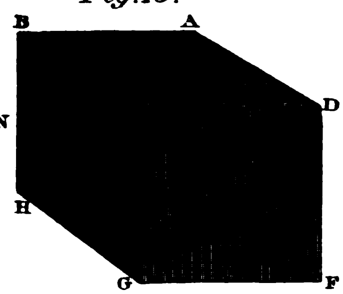


Fig. 16.

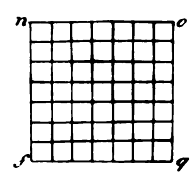


Fig. 18.

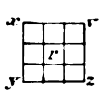
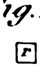


Fig. 19.



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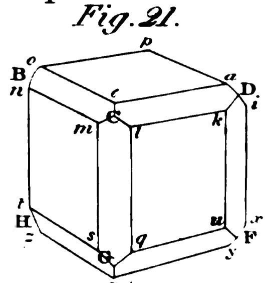

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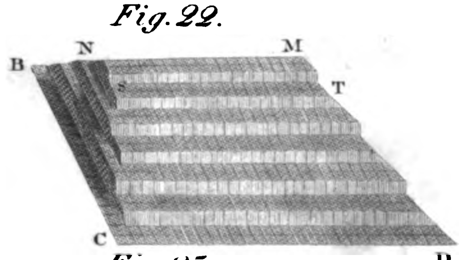

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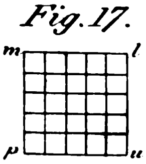

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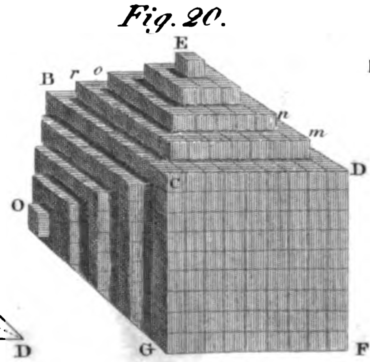

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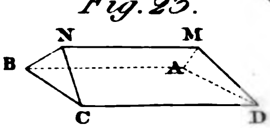

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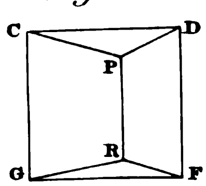

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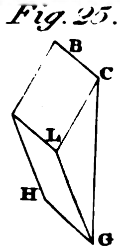

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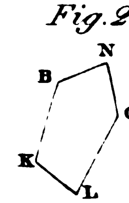
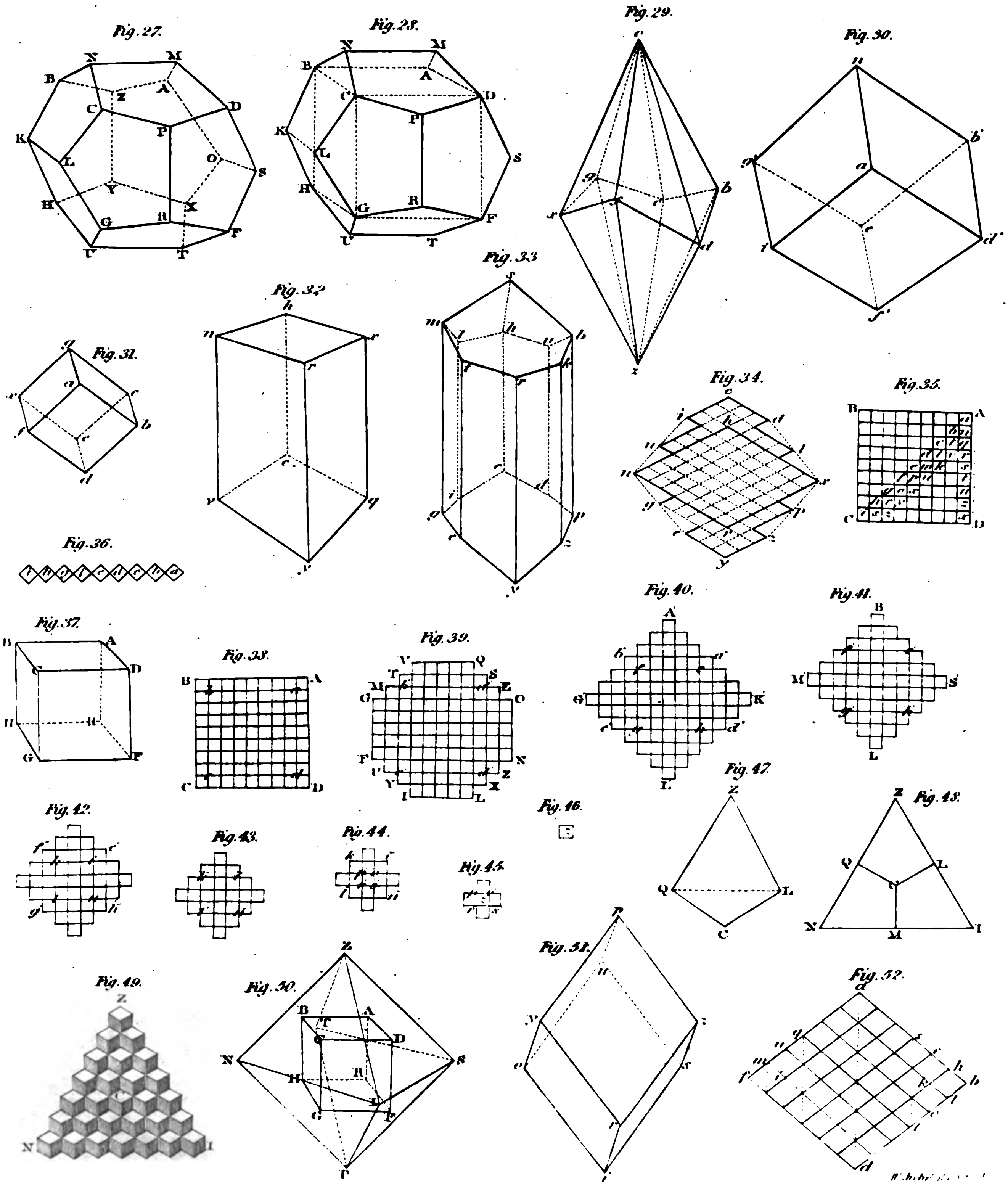


E. Mitchell sculpt.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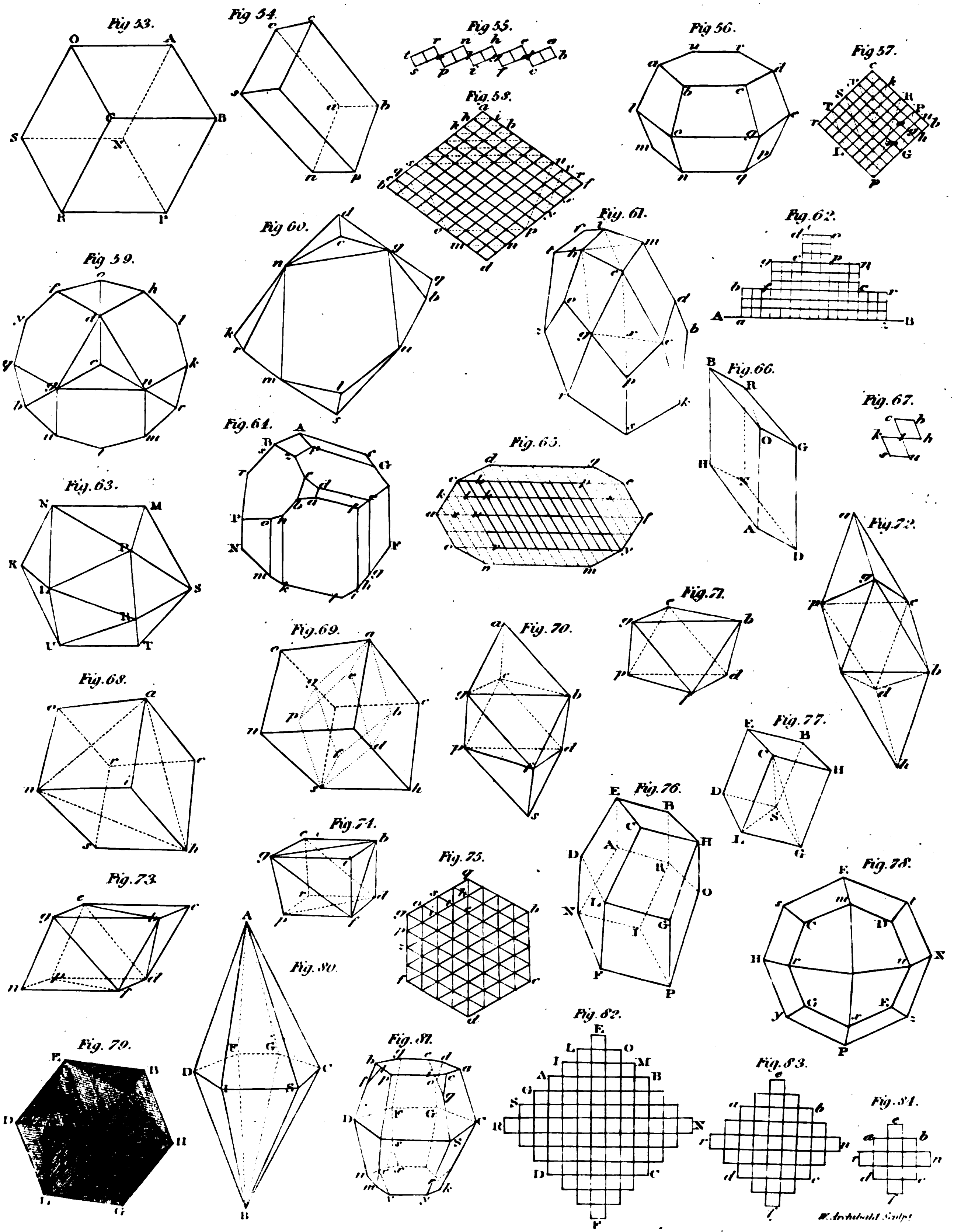
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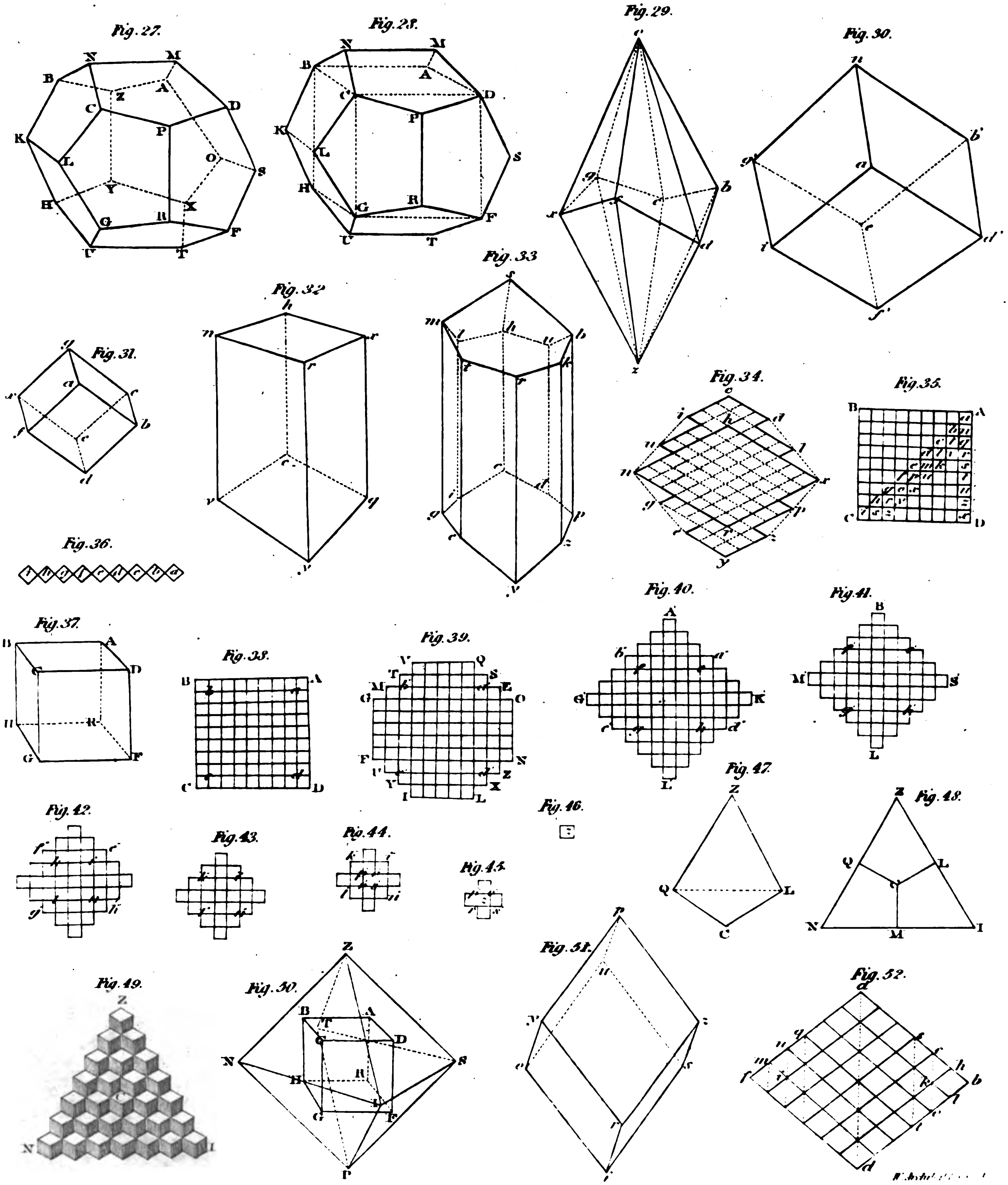
W. Archibald Sculpt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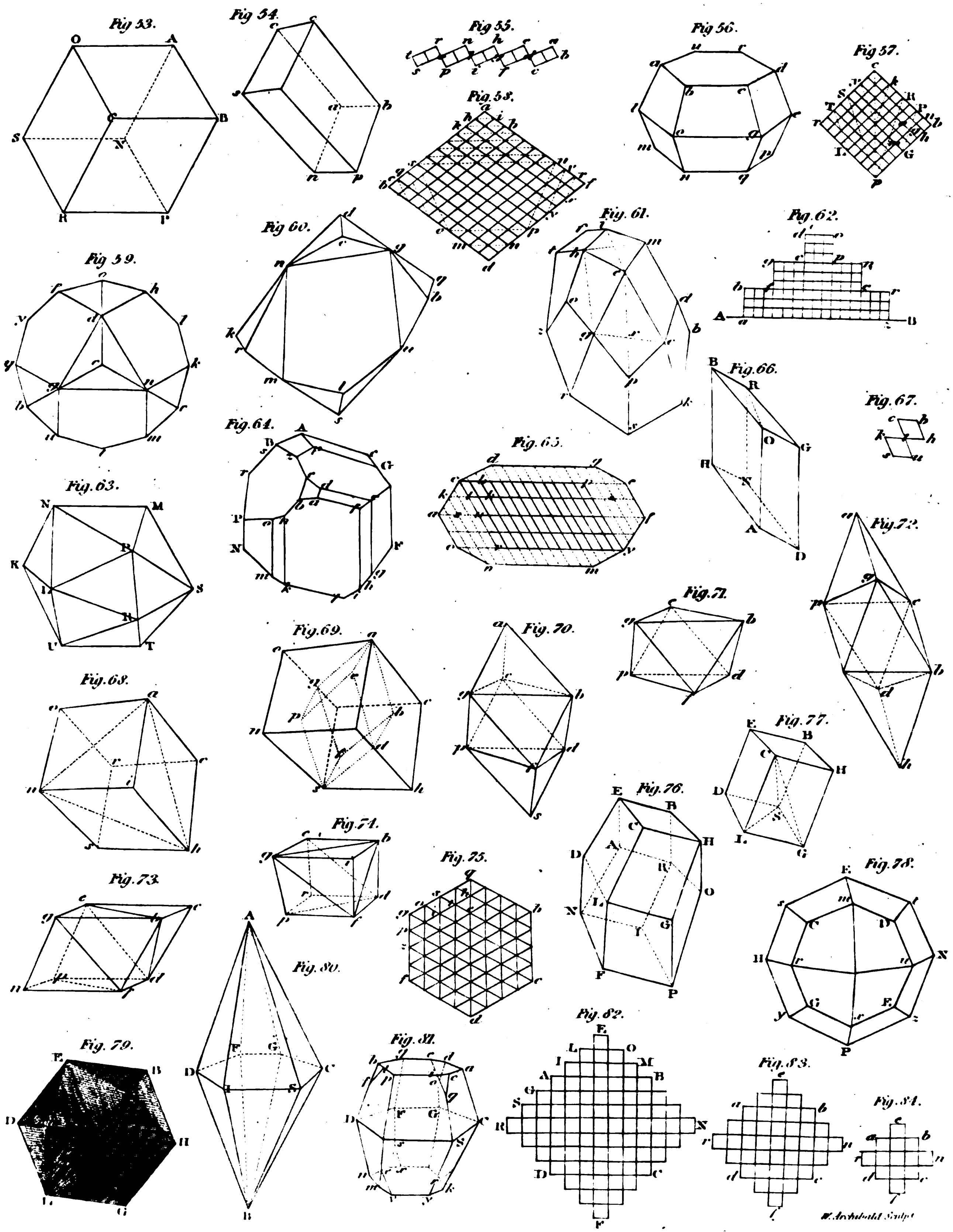

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