HARVEY WITH THE TWO CHILDREN OF CHARLES I.

AT THE BATTLE OF EDGE HILL 1642.

THE

HARVEIAN ORATION,

1880.

DELIVERED JUNE 25TH.

BY

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(WITH ADDITIONAL NOTES AND AN APPENDIX.)

LITERÆ, PRAXIS, SCIENTIA.

LONDON.

1881.

Multum egerunt qui ante nos fuerunt, sed non peregerunt.—Seneca.

Interpretatio Naturæ, regnum Hominis.—Bacon.

Medicus Naturæ minister, non magister est.—Ibid.

Νούσων φύσιες ἰητροί.—Hippoc. Epid. vi. 5. 1.

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*** The figures introduced into the text in brackets refer to Notes in the Appendix.

THE HARVEIAN ORATION,

1880.

MR. PRESIDENT AND FELLOWS, COURTEOUS AND LEARNED VISITORS,—This is the great feast of our medical year, as it were our Asclepieia, formerly observed by us on the day sacred to the St. Luke of our Gospels—the "beloved physician"—October 18, but now kept on the anniversary of the opening of the building* in which we are now assembled.

We are here gathered amidst "those monuments of vanished minds," the effigies, the books, relics, and memorials of our ancestors, "kindred spirits who rule us even from the tomb," in obedience to the will of one whose name is, and ever will remain, a household word, not only with men of our profession, but with all men of true science, and with all in the world who have at heart the welfare of the great body of Humanity. We meet, each and all, to add a leaf to the laurel chaplet on the brow of the venerable and illustrious Harvey—still the chief honour and ornament of our College, as his friend Dr. Ent called him—to cast sweet incense upon his altar-fire, to do hearty and peculiar homage to his undying memory, and to the grand work and method which for all time he has set before us his disciples as biologists and as practical physicians—"engaging in the sacred things of Apollo,"† to

* By the President, Sir Henry Halford, June 25, 1825.

† Possibly in saying this Harvey had in mind the following words put into Apollo's mouth by Ovid (see Metam., lib. i., 517, when describing the transformation of Daphne into a laurel) :—

> ". . . Per me, quod eritque, fuitque,
> Estque, patet : per me concordant carmina nervis.
> Certa quidem nostra est, nostra tamen una sagitta
> certior, in vacuo quæ vulnera pectore fecit.
> *Inventum medicina meum est, opiferque per orbem*
> *dicor, et harbarum subjecta potentia nobis.*"

quote from Harvey. For a short space of time we this day retreat, and disengage ourselves, from the absorbing and eventful current and turmoil of our daily life, the *fumum et opes strepitumque Romæ*, and strive to call to our recollection the character and aims and labours of Harvey, who has earned the eternal gratitude of mankind and of all in this College who have followed in his footsteps, and to gather hence inspiration, guidance, and encouragement.

When I acceded, Mr. President, to your kind and flattering desire that, after I had gratefully offered up the cock to Æsculapius, I should occupy the place in which I now stand, I did so out of unfeigned regard to yourself (to whom I owe much) and to your exalted office; out of staunch loyalty and allegiance to the College, of whose ancient dignity we must needs all be proud, and out of respect to the existing Fellows, Members, and Licentiates. But it was not without much hesitation; nor was my diffidence diminished when I came to review the efforts of my distinguished predecessors in this place, whether I regarded the substance and intrinsic value of their productions, the propriety and ornament of their style, their variety and copiousness of illustration, or their *curiosa felicitas* of expression; and when, penetrated with a sense of my own incompetence, I considered how difficult they had made the task for those who were to succeed them in their office.

Whilst reviewing, however, the scope and purport of the various former Harveian Orations, I found that the plan, which for the most part had been adopted in earlier times, had in late years been departed from, in that the work of our ancestors has of late received but inadequate notice and a somewhat too faint acknowledgment. No doubt there are some whose tendencies are ever to depreciate the present, and who, *laudatores temporis acti*, see good only in times gone by. But our temptation is in an opposite direction; and engrossed and fascinated by the rapid strides and the real progress which are being made in all branches of Natural Science, and by the marvellous assistance which the practice of our art is receiving from collateral and dependent studies, we are chiefly

tempted, as I think, to be too narrow and unsympathising in our retrospect, too regardless of the beneficent influence of tradition, and too neglectful of those—to whom we owe "the debt immense of endless gratitude"—who laid the deep and solid foundation on which we have built and are yet building, and who left us, as in trust for posterity, the precious legacies of their knowledge and experience, fully confident that they would be candidly and generously interpreted and faithfully transmitted. "Rich with the spoils of time," we are a little unmindful of the tedious paths which have been trodden by our forefathers in the attainment of our present position.

Basking in the glorious and transcendent splendour of modern Science, and with a future before us so full of possibilities, we somewhat ungratefully forget the gloomy night and obscure dawn through which the good and true workers of times past have painfully toiled.*

I propose, therefore, in the first place, according to my poor measure of ability, and by your permission, to draw attention in a rapid and cursory manner to our forerunners and earlier benefactors; remembering how honourable and useful an observance it is to pay tribute to the memory of those illustrious dead who in their generation have handed down to us the torch by which we are illumined, and trusting that our example may in turn benefit those who come into our inheritance, not forgetting the Arab proverb, "Honour to the beginner, even if his successor does better" (1).

Aristotle has said, "If Timotheus had not existed we should have lost much music. Yet if Phrynis had not been we should have had no Timotheus. For we have received some opinions from certain philosophers, yet were there others to whom these owed their existence" (Metaphy. ii. 1).

An obvious illustration of this process may be drawn from the more recent history of other arts. Thus Raphael was the

* Coleridge observes, "The dwarf sees farther than the giant when he has the giant's shoulders to mount on;" and Dr. Johnson remarked that it is not uncommon "for those who have grown wise by the labours of others to add a little of their own, and overlook their masters."

successor of Perugino, even as Perugino was of Giotto and the monastic painters.*

Any one approaching this room in which we are assembled may have seen on the wall above, and at the head of, the first flight of stairs the emblazoned arms borne by our College. The arms were presented by Christopher Barker, Garter King of Arms, September 20, 1546, twenty-eight years after the College was founded by Henry VIII., and, as all our Fellows know, appear at the upper part of the letters by which we are bidden to our committee meetings. Therein are depicted a hand (that *organum organorum*, as Harvey calls it) feeling the pulse in an outstretched arm, and beneath, the pomegranate fruit, both most fitting emblems of our craft. The hand and pulse typify that which is the central truth of all in our profession that we know and act upon—viz., *the circulation of the blood.* The pomegranate, gaping that the included fruit may find an exit,† no doubt typifies the mysterious powers of what we call NATURE.

May we not suppose that the form of the human head which

* There is the rare instance of the principles of painting, of perspective, of anatomical drawing having all been absolutely lost, and recovered by slow degrees; and the same is true of the more specific rules of pointed architecture and of stained glass, which had to be most laboriously recovered step by step in modern times, and all by successive students and workers.

D'Israeli, in "The Literary Character," dedicated to Southey, observes: "Before Homer there were other epic poets; a catalogue of their names and their works has come down to us. Corneille could not have been the chief dramatist of France had not the founders of the French drama preceded him, and Pope could not have preceded Dryden. It was in the nature of things that a Giotto and a Cimabue should have preceded a Raphael and a Michael Angelo;" and "had Ramus not shaken the authority of the *Organon* of Aristotle we might not have had the *Novum Organon* of Bacon." "Ages revolve till a Newton and a Locke accomplish what an Aristotle and a Descartes began."

Again, it has been said that Aristotle prefigured the coagulation of the blood, and Democritus asserted the "milky way" to be a cluster of stars.

† Harvey has this expression when speaking of the loosening of the ossa pubis and the enlargement of the whole hypogastric region, which occurs, as he says, "in a most miraculous manner," during labour, "that the fœtus may come into the world like the ripe fruit of a tree;" "ut fructus maturi excludendis suis seminibus solent hiscere."

Le Gallois, in his work on the Principle of Life, has a note on the remarkable relaxation of the symphysis pubis in guinea-pigs, *àpropos* of the discussion regarding the section of the symphysis in certain cases of laborious parturition.

also appears in our letters of invitation above mentioned, encircled by emanating rays of light, is that of Apollo,

"the lord of the unerring bow,
The God of life, and poesy, and light,"

whose bright irradiating beams carry so many beneficent and mysteriously vivifying influences?* (2).

Familiar in some degree with the history of medicine in times gone by, and reflecting how all knowledge is gradually evolved, and has its roots firmly and deeply implanted in the past, so that no science, as Harvey says, "can flow save from pre-existing knowledge of more obvious things," permit me, passing over the most ancient epochs,† to give a glance, of necessity sketchy and superficial, at the general history of our art, especially as regards such particulars as bear on the subject which I have chiefly in hand—viz., the Works and Method of Harvey.

Referring to the teaching of the Greeks in provinces of knowledge cognate to the medicine of the present, let us dwell for a short time on the glimpses which Homer gives us into the rough-and-ready method of the time when disease and death were in a great measure referred directly to the anger and interposition of the gods,‡ and the modes of their prevention traced to a celestial origin (3).

* How admirably is this action of the sun expressed by the following: "In sole posuit tabernaculum suum, et ipse tanquam sponsus procedens de thalamo suo. Exultavit ut gigas ad currendam viam, a summo cœlo egressio ejus; et occursus ejus usque ad summum ejus, nec est qui se abscondat a calore ejus" (Ps. xix. 5-7. Vulg.).

† Dr. Dickinson, of Liverpool, in an interesting address (1875) on the "Medicine of the Ancients," after alluding to the Assyrians, Chaldees, Persians, Hindoos, and Chinese, mentioned extant copies of a Chinese work on Pharmacology of very great antiquity, containing an account of numerous articles of materia medica.

‡ Thus Herodotus describes the Scythians as suffering a grievous and loathsome disease inflicted by Venus in consequence of their having pillaged the Temple at Ascalon (see Adams's Translation of the Works of Hippocrates, vol. i., pp. 105, 217): and Hippocrates, in his treatise on Airs, Waters, and Places, alludes to this condition among the Scythians. We know that in much more recent times a connection has been thought to exist between special diseases and certain spiritual agencies. Thus the patron saints of dancing mania were St. John and St. Vitus; of puerperal women, St. Margaret; of small-pox, St. Martin of Tours; of erysipelas, St. Antony. The personal history of St. Vitus as to his supposed relation with disease is given by Hecker in his work on the Epidemics of the Middle Ages.

Homer, the prince of poets, who is said to have lived about the end of the tenth century B.C., must be acknowledged to have been, as well by necessity as by choice, a strenuous and curious watcher of Nature and her operations. His works show that the most ancient Greeks had their physicians, in addition to their soothsayers and magicians, and he speaks of the art of medicine as well as of chariot-driving, prophecy, and navigation; and both the Iliad and Odyssey indicate that in the times to which they refer mankind had positive notions respecting the functions of the blood and the action of the atmosphere. They had theories as to certain principles of animal and vegetable life, and considerable knowledge of the character, treatment, and varied consequences of different kinds of wounds, and of the process of embalming the dead—knowledge gathered, no doubt, from observation in the sacred temples, and their schools of medicine and gymnasia.

It is of much interest to note that Homer records the arterial jet observed in wounds. He was also doubtless aware of the dependence of fevers upon the influence of the hot sun on marsh-land, exemplified in his allegory of the action of Apollo's darts on the Grecian soldiery; and he mentions the salutary use of sulphur as a disinfectant in epidemic disease. We are told that venesection was first resorted to among the Greeks in the Trojan war.*

We may pass over a period of four hundred years, in the literature of which time are to be found imbedded in the fanciful cosmogony of philosophers, poets, and dramatists, allusions to theory and practice connected with our art; but

* It may be noticed that Homer describes a case of lesion to the brain followed by a remarkable tendency to rolling around the arena shown by the injured person —a phenomenon connected with certain forms of cerebral mischief, which, I need hardly say to this audience, has of late years attracted much attention. It appears also that he was acquainted with hydrophobia. All his readers will remember that he mentions the Papaver somniferum, and probably the Cannabis Indica, under the name of Nepenthe. We must also not forget that many of the anatomical words and designations which we meet with in the Homeric Hymns are in use amongst us at the present day, and in connection with this fact the story of Achilles with his vulnerable heel will not be forgotten.

in this time, although medical schools of renown, as well as sacred temples to which the sick resorted, had been established in Greece, nothing of any real significance was written. Then we come to the celebrated multifarious collection of medical writings with which the name of Hippocrates —that "divine old man," to whom the same honours were accorded as to Hercules—was especially associated.

Hippocrates, living at a period (B.C. 460–357) of unprecedented intellectual and ideal development, contemporary with Pericles, Herodotus, Xenophon, Thucydides, Sophocles, Æschylus, Euripides, Pindar, Phidias, Democritus, Plato, and Socrates, and coming of a family connected with the study and practice of Medicine (said to be the eighteenth by his father from Æsculapius), appears to have accumulated all that had been written by his ancestors on the subject. He seems to have striven to detach Medicine from Theology, and, in what people often call the true Baconian spirit, to base his general views and principles upon what appeared to be well-ascertained and established facts. Without seeking to explain phenomena, being gifted with great powers of observation,* he specially directed his mind to the investigation of what we now term the natural history of disease. Hence it was that he was able to say that the medical art consisted entirely in Observation, and that he was led to consider Pathology as merely perverted and degraded Physiology. To quote from an admirer, Dr. Daremberg, "Hippocrates cast such a splendour on Medicine that it was immediately exalted into the rank of a positive and independent Science, of an Art liberal and submitted to precise rules." Our own practical Sydenham had called him "the Romulus of medicine, whose heaven was the empyrean of the art."

Being unable to gain information by dissection of man, though he had some knowledge of Comparative Anatomy

* A quality well defined by Mr. Erichsen in his work on Concussion of the Spine (p. 283), as "nothing more than the application of the senses, tempered, modified, and improved by the judgment" (4). This corresponds with the statement in Mill's Essay on Poetry, "The investigation of nature requires no habits or qualities of mind but such as are acquired by industry and mental activity."

—forasmuch as, like the pupils of Pythagoras, who preceded him, he was in the habit of examining the bodies of lower animals,*—it was impossible that he should have more than a slender and imperfect acquaintance with Human Anatomy. He thought that the arteries, being found empty after death, contained only air during life ; that the heart was the seat of the soul and the source of the heat of the body, kept cool by the action of the surrounding lungs. He observed sudden death to follow a wound of the heart. He considered that the veins were vessels carrying the nourishing blood to the body, and that the right ventricle of the heart and what we call the pulmonary artery supplied blood to the lungs solely for their nourishment. He was ignorant of the use of the nerves, and did not attribute to the brain any other function than that of a spongy gland.

Hippocrates recognised what is often termed a "vital principle," and though he has various meanings for it in his writings, he uses the word which we interpret Nature as indicating a Power, or Being, or Intelligent Action which superintends and regulates, and, so to say, co-ordinates the various functions of the organs, whether healthy and natural, or disturbed and altered.

Though he admitted and adopted many fanciful and unpruned conceits and hypotheses, and ascribed diseases to alteration of the fundamental humours of the body (in which he was partly correct), he was a most studious and consummate observer and historian of morbid processes. Not being content

* Alcmæon, a noted astrologist and physician and a disciple of Pythagoras, and one who much concerned himself with the development of the embryo, was believed by mythologists to have been the first person who dissected animals. Alcmæon also explained sleep by supposing a *fulness* of the blood-vessels, and wakefulness by their *emptiness*.

Rufus, who lived about the end of the first century, and dissected lower animals, especially apes, explained the reason of the term carotid or carotic (from καρος—sopor cum gravidine, heavy sleep—and that from καρα, caput, the head) being applied by the ancients to the arteries of the neck, "because they imagined that, when these arteries were strongly compressed, the animal was inclined to sleep and lost the use of its voice." See Hamilton's History of Medicine, p. 120.

with merely collecting and storing up facts, he "smoothed and squared and fitted" them to their places; and this habit, co-operating with the influences of the Pythagorean doctrine of numbers, guided him to the recognition of crises and critical days, and to the use of fires for the prevention of the spread of epidemics in the sewerless cities of Greece.* In addition to the use of remedies, many of which we ourselves now use, Hippocrates laid great stress on bodily exercise, dietetics, and what we call hygienic treatment, using various forms of blood-letting freely, directing that the blood should be taken from a place as far as possible from the painful part, and cauterising with the moxa in cases of gout.

I will close this short notice of Hippocrates by quoting the following summary of his work and manner.

M. Daremberg observes:—"No one since Hippocrates has had a higher idea of the dignity of Medicine; no one has shown more respect for the sick, and more care for their cure—or, at the least, for their comfort and consolation. No one has shown more admiration for useful discoveries, more care to complete them; more deference for conscientious physicians who apply their intelligence to every part of the art, however insignificant it may be; more indulgence for the errors inseparable from all science and art—inasmuch as a consummate skill is seldom seen, and even in the case of good physicians resemblances cause mistakes and embarrassments; more aversion for such physicians as, altogether occupied by their fortune and reputation, make display of their learning, fondle the prejudices of the vulgar, and govern their conduct by the profit that they can draw from them; no one, in fine,

* In the preliminary discourse to the Life of Hippocrates, published by the Sydenham Society, allusion is made to the established practice of the medical profession in the time of Hippocrates of kindling large fires as disinfectants and deodorisers. Mitford is quoted as remarking on the want of sewers in ancient times, and as citing Strabo's observation that the Romans were the first people who constructed them. The question of the cause of the epidemics (chiefly remittent and intermittent fevers) described by Hippocrates, and of the use of fires in extinguishing them, is fully noticed by Adams also in his translation of the works of Paulus Ægineta (Syd. Soc., vol. i., p. 274).

who has given proof of so much experience and good judgment in the daily relations which the medical profession establishes between the physician, the patient, and the rest of the world" * (5).

Passing to the immediate followers of Hippocrates, I will only allude to the writings of the mighty thinker and naturalist Aristotle (322 B.C.), the son of a physician and the disciple of Plato, whose power of procuring all kinds of objects of interest, through the means placed at his disposal by his royal master (6) (whose mind he may be said to have moulded), was almost unlimited.† Aristotle owed much of his physiology to Hippocrates. He made remarkable advances in Comparative Anatomy, and it was he who first gave the name of aorta to the large vessel which we know by that name. He also first described the large vessels as arising from the heart, though he did not see the distinction between veins and pulsating arteries, as did his contemporary Praxagoras, who was the first to use the word 'pulse' (σφυγμός), but who, however, thought, like Hippocrates, that the arteries only contained air, partly because after death they were empty, and partly because in the lungs they were thought to communicate with the bronchi.

Aristotle had clearer notions about the use of the nerves than his predecessors, but supposed that they had their origin from the heart, which organ he considered to be the seat of the affections of the mind. The brain was, in his opinion, for the purpose of the control and regulation of the heat of the heart. He held that during waking and sleeping there was a flux and reflux of blood like that of the Euripus. His

* Adams in the preliminary discourse to his Translation of Hippocrates, remarks of him, "I need scarcely say that, as a medical author, the name of Hippocrates stands pre-eminently illustrious. In this way he has left monuments of his genius more durable than the marble statues of Phidias, his contemporary, and as enduring as the tragedies of Sophocles, or the Olympiac odes of Pindar." Adams quotes the following from Macrobius, vol. i., p. 423 : "Hippocrates qui tam fallere quam falli nescit."

† It has been supposed that many of the renderings of the Septuagint translators connected with natural history were not a little accommodated to the teachings of Aristotle.

erroneous hypothesis guided all the views of physiologists, and was the source of incalculable mischief until the time of Harvey (7).

In the school of Alexandria, the famous library of which* was superintended by Aristotle (alluded to by Livy as "*Elegantiæ regum curæque egregium opus*"), Anatomy made great advances. Human dissection was encouraged by the Ptolomies; and the discoveries of Herophilus and Erasistratus, who belonged to the library, were manifold and most important. The former of these two observers described with wonderful accuracy and ingenuity many parts of the brain, and the latter in a great degree recognised the difference between motor and sensory nerves, tracing the nerves up to their connection with the brain and spinal cord, and recognising to some extent the dependence of the action of muscle upon the integrity of nerve; and both noticed the lacteal vessels, though they were unacquainted with their use. They carefully described the valves of the heart, but still, like others before them, they looked on the arteries when in a healthy state as conveying only air, and they considered the veins to arise from the liver—ideas which, no doubt, as has been said, retarded for centuries the discovery of the circulation of the blood.

From Herophilus† we have the name "trachea," and from him arose the false idea that the air (which in the philosophy of the time was looked on as the origin of life, the "spiritus") conveyed by it was carried by the pulmonary veins to the left side of the heart, and thence by the aorta through the entire body. He also thought that the arterial pulse was transmitted from the heart by the walls of that vessel.

The Medical School of Alexandria considerably departed, however, from the teaching of the great Hippocrates, though

* Destroyed by fire, along with the city, under Amrou, the general of the Saracen, Omar.

† Herophilus and Erasistratus were said by Tertullian and Celsus to have dissected six hundred criminals in the amphitheatre of Alexandria. (See the article "Physiologia" in Smith's Dictionary of Greek and Roman Antiquities by Dr. Greenhill, who, however, supposes that the bodies were those of dead criminals.)

it inculcated his theories of the "humours;" but it was a noted school for surgery, and some have tried to show that the operation of lithotrity was practised there.

Leaving now the consideration of what we can gather from the teaching of the Greeks in connection with the matter I have in hand, I will pass to the introduction into Rome of the cultus of Æsculapius, the god of medicine, the fabled son of Apollo, and pupil of Chiron, killed, as it was held, by Zeus, with a flash of lightning, out of jealousy of his power to heal disease, and restore the dead to life.* The inhabitants of this city, overwhelmed by pestilence, sought advice, as we are told, from the temple of this divinity at Epidaurus, in the Peloponnese. One of the sacred snakes, it is asserted, was sent from the temple, and on its journey to Rome escaped and found its way to an island in the Tiber (B.C. 292), and on this island a temple was erected in which the god was in future worshipped (8). That serpent, as we know, became henceforth the symbol of our art :† and Physicians in Rome eventually attained to great honours and privileges (9).

Italy having been colonised in part by the Greeks, Greek physicians and their practices were gradually introduced into Rome, a distinct physician being allotted to the treatment of each part of the body.‡ Subsequently, as we read, the Romans, in accordance with their habits of personifying the phenomena of external nature, worshipped various deities consecrated to Health, Fever, Midwifery, Malaria,§ to the

* Æsculapius was said, in ancient mythology, to have been so killed when in the act of restoring Orion to life. Is was feigned that, owing to the success of this physician, Zeus was afraid that mortals might altogether escape death, and that Hades' kingdom had begun to be depopulated. See too the Alcestis of Euripides. Pantalus, we are told, suffered for making men immortal.

† Harvey's crest on his coat of arms consisted of a torch surrounded by two twisted serpents. This may be seen on the plan of the property which he left to the College, hanging upon the wall of the Bedells room. Sir H. Halford's coat of arms contained, by augmentation granted by Royal warrant (owing to his attention to the Duke of York), a staff entwined with a serpent proper.

‡ A friend has suggested that the coming of the Greek Physicians into Rome scarcely depended on the Greek colonies in Italy, but on larger causes —the Roman Wars and Conquests in the East.

§ And even to the "Itch."

various viscera of the body, and also to the bones; and the votaries of Medicine were divided into numerous controversial sects, wrangling with each other as to points, the nature of which precluded all possibility of agreement, such as hidden and final causes, and other philosophical and metaphysical questions.

In course of time the knowledge of Human was greatly advanced by that of Comparative Anatomy, and notably by the dissection of apes; and the nervous system was considerably studied.

Aretæus, who was probably a contemporary of Galen and lived in the time of Nero, thought, like Hippocrates, that the heart contained the essence of the soul and life of man, and was the immediate cause of the breathing in animals, by its action on the lungs; he also taught that the portal system in the substance of the liver anastomosed with the branches of the vena cava.

We now come to the time of the learned and ingenious and reverent Galen (10), who lived in the first century of our era, the friend of Marcus Aurelius (of whom in England we have heard so much of late*), whose philosophico-medical system prevailed, notwithstanding the discovery of the circulation of the blood, until the middle of the eighteenth century.

Galen was a close and astute observer of material objects and operations. He was the first to practise reliable experiments, and he was for the most part an ardent supporter and expounder of the doctrines of Hippocrates, greatly mixed up as they were with fantastic and hypothetical systems of Medicine (so-called), and founded on the Philosophy of Plato and Aristotle.

He adopted the current theories as to humours and the four elements, and believed in the three kinds of spirits—the vital, the animal, and the natural—all flowing from the one great cause, Nature; and he was a vigorous opponent of

* From the lips of M. Rénan.

Epicureanism and "Chance."* With him Heat was the potent principle which everywhere operates. He studied Comparative Anatomy to a considerable extent, and also certain departments of Experimental Physiology.

Some assert that he would have dissected the baboon, had he not thought the comparison with man might provoke opposition to such a procedure (an objection which certainly would not be offered in the present day);† whilst others declare that he studied the internal anatomy of man, having opportunities of dissecting the bodies of criminals, victims of war, gladiators, and exposed children. At any rate, whether as a result of human necropsy, or of analogy from the study of the lower animals, he advanced anatomy in a remarkable way, especially as regards osteology, the nervous system, the functions of nerves and of the vascular systems, and has bequeathed to us a good proportion of our anatomical nomenclature. Much of his physiology was of course mistaken. Thus, for example, whilst he was correct in considering the faculties of sensation and motion to be connected with the brain, he attributed this connection to the presence of an ethereal vital spirit, which he supposed to reside in that organ, and to be transmitted thence along the nerves.

Respecting Galen's views on the nature and circulation of the blood, he looked on this fluid as being elaborated and produced by the liver, the veins of which he considered to be the roots, so to say, of the general venous system. The heart, the seat of the greatest heat, and, as he terms it, the

* Galen's work "De Usu Partium" has been described by Spedding as, in effect, a treatise on the doctrine of final causes, as exemplified in animal physiology.

† Sir C. Bell has remarked that the peculiar form of head met with in the sculpture of the antique was adopted with a view to magnify and exaggerate those features and proportions which are peculiar to the human countenance, and thus to remove it as far as possible from a resemblance to the lower animals. Homer, it will be remembered, speaks of one utterly shameless as having the face or eyes of a dog. Of the physiognomical method of Aristotle, Spedding observes that it consists chiefly in tracing the resemblances which exist between different kinds of animals and different individuals of the human species; a method followed by later writers, particularly G. B. Porta and Lebrun, whose illustrations of his theory are well known.

'acropolis' of the body, was recognised by him as being muscular and not under the dominion of the will, and unprovided with nerves. He saw, by opening the thorax of living animals, and of those killed in sacrifice, that the auricles and ventricles contracted and dilated alternately, but he did not perceive that the blood was propelled by this contraction. He knew that the contact of cold water with an exposed heart would arrest its movements. He had had the opportunity of seeing the contraction of the heart in the case of a boy who, by means of an accident at a gymnasium, had lost a portion of the sternum, an opportunity also enjoyed, as we know, by Harvey.

He thought that the blood, which was the origin of all the tissues of the body, was sucked in by the heart at its diastole just as the air is by a pair of bellows, or as steel, as he said, is drawn by the magnet; and then was distributed to the various parts of the body by a kind of attraction or selection acting upon it. He demonstrated pretty accurately the mechanical arrangements and use of the valves of the heart, described the foramen ovale—known subsequently as Botalli's duct—as also its closure after birth, and was conversant with the "ductus arteriosus."

He knew experimentally that the arteries contained blood, and not air, for, as he said, if we ligature a portion of an artery of any animal in two places, and open it between the two threads, blood is found in the vessel; and he is stated to have practised arteriotomy for the relief of pain.

It was his opinion that the vena cava and pulmonary artery were for the purpose of carrying the blood (containing a limited amount of a rare and subtle spirit, which it obtained from the left ventricle by means of small openings through the septum of the ventricles), to the mass of the body and the abdominal viscera; but that it was the province of the pulmonary veins and of the aorta to transmit a large portion of this spirit with a limited amount of blood to the more important organs of the lungs and brain. He was thus *the first to appreciate a difference between arterial and venous*

blood, the one being for the purpose of development and nutrition, the other for vital warmth. The passage of the spirit above mentioned to the lungs by the pulmonary veins, he thought was permitted by the condition of the valves on the left side of the heart. He failed to discriminate between respiration and the pulse. Looking upon the heart as an organ of respiration, he thought that the thinner portions of the blood passed, from the right to the left ventricles, *through the orifices in the septum above mentioned*, by virtue of the forcible dilatation of the latter, although he confessed that he had never actually seen these apertures in the dead and rigid human body.

He concluded also that, as the pulmonary artery carries far more blood to the lungs than these organs require for their nutrition, the surplus must find its way to the left side of the heart by way of the pulmonary veins. He considered that a species of anastosmosis existed between the arteries and veins of the body. He combated the idea of Erasistratus that the inhaled atmospheric air, as such, passed from the lungs to the pulmonary veins and the left side of the heart, and supposed that its only use was for cooling the blood.*

The view above mentioned as to the passage of the spirit and blood through the septum of the ventricles may, I would suggest, have possibly originated from, or at any rate been supported by, the examination of the hearts of certain lower animals, in which foramina in the septa of the ventricles exist (11). For example, I find that my friend the late Dr. John Davy, in his Physiological Researches (1863), p. 534, describes the heart of an alligator from Ceylon, in which several small openings were found in the ventricular septum, some of which would admit a probe.

* Adams, referring to Galen, in his translation of the works of Hippocrates, vol. i., p. 145, remarks that "his ideas regarding respiration are wonderfully accurate, and not very different from those now entertained by the profession. Thus he compares the process of respiration to combustion, and says it produces the same change upon atmospheric air. He further agrees with modern physiologists in considering it as the vital operation by which the innate (or animal) heat is preserved."

Dr. Bell Pettigrew has described the existence of an opening between the ventricles in some of the snakes, and has figured it in a paper, "On the Valves of the Vascular System;"* and Professor Owen informs me that the Chelonian reptiles are instances of intercommunicating foramina, or passages in the substance of the ventricles of a four-cavitied heart.†

There is also in the museum of the Royal College of Surgeons a preparation of the heart of a serpent (*Python Tigris*), showing the incomplete character of the wall dividing the aortic from the pulmonary chamber of the ventricle, and these intercommunicate by several apertures of different sizes near the apex of the ventricle.‡

Galen's therapeutical and anatomical views held sway through the middle ages, amidst all the conflicting teaching and philosophical controversy of the different schools of Medicine and Philosophy, and through all the social and national fluctuations which the world experienced and (in spite of the fact that at the end of the thirteenth century human dissection was permitted), until the time of Vesalius, the founder of Descriptive Anatomy, and Servetus, in the middle of the sixteenth century. In the meantime, however, it may be mentioned that the word "*capillaries*" had been applied to the small vessels of the liver by a teacher of the famous Benedictine school of Salerno (12), the 'civitas Hippo-

* See *Trans. Royal Soc. of Edinburgh*, 1864.

† This structure is figured in Owen's "Anat. of Vertebrates," vol. i., p. 510, fig. 337.

On the same page is a figure of the heart of a more active, though cold-blooded reptile, the crocodile, in which, though the septum ventriculorum is imperfect, that between the beginnings of the aorta and pulmonary artery is perforated, allowing circulation of mixed blood when the animal chooses to remain submerged. In a letter to myself Professor Owen observes of it: "When actually respiring air the semilunar valves are so disposed as temporarily to close the inter-arterial orifice, and the crocodile has the advantage of the cardiac character of the mammal."

All will be familiar with instances of like conditions of the chambers of the heart in man as a result of malformation, &c. We are indebted to our Fellow Dr. Peacock for much information regarding such.

‡ Preparation described in catalogue as 917 B.

cratica,' and *the valves of different veins had been noticed* by Cannanus, Sylvius, and St. Estienne.

Jacobus Sylvius, born towards the end of the fifteenth century, was the first to use injections for the purpose of demonstrating the course of the blood-vessels, and he observed the part played by the foramen ovale in the fœtal circulation.

Following him must be mentioned Winter (Johannes Guinterus), of Andernach, the master of Vesalius and Servetus. He asserted that the *air inhaled by the lungs became altered within them,* an idea which no doubt had its fruit in the course of time.

Andrea Vesalius, eventually physician to Charles V. and Philip II., breaking from authoritative teaching, differed greatly from Galen in many points of anatomy, but followed him pretty closely regarding his erroneous views of the physiology of the lungs and heart, considering, for example, that the heart was the origin of the heat of the body, and the dwelling-place of the affections of the mind. He recognised the valves of the veins as well as of the heart, but failed, as repects the veins, to see that they prevent the reflux of blood towards the heart; and, like Galen, he thought the veins as well as the arteries carried blood from the heart. *He pointed out that intercommunicating openings do not exist in the septum of the two ventricles of the heart; and the establishment of this fact was, no doubt, the first very decided step towards the grand discovery of the general circulation of the blood.*

Vesalius was aware of the influence of artificial respiration. He recognised that Aristotle was wrong in supposing that the nerves took their origin from the heart.

We now come to the name of a man who had the greatest possible influence on the true and proper theory of the blood's circulation, Michael Servetus, the militant, vain, sceptical, versatile, and metaphysical Spaniard. Endowed with a large measure of that imaginative or hypothetical faculty and constructive genius which now and then is so useful in science, Servetus by means of vivisections and varied experimental

researches, made great advances in the physiology of the circulation and respiration, though the subject was in his hands entirely subsidiary to his views as to the function of a vital spirit, and explanatory of certain metaphysical and transcendental speculations. In fact, Servetus may be considered, as he has been termed, the inaugurator of practical Physiology. Reflecting on the size of the pulmonary artery, he showed that the quantity of blood contained in this vessel was too much for the mere purpose of nourishing the lungs, and he recognised the fact that in the fœtus, although the lungs required nourishment, no blood whatever is sent to them through this vessel before birth. Considering these facts, and seeing, as did Vesalius, that blood did not pass through the septum of the ventricles, he concluded that the blood must pass beyond the lungs, and must find its way from the right to the left ventricle through them, mixing in its transit with air, and by virtue of the *ex*piration freeing itself from what he terms fuliginous vapours. In this way the blood became adapted to be the dwelling-place of the vital spirit, which was formed by a union of the inspired air with the most subtle part of the blood, and substantially composed of water, air, and fire.

In fact, from the structure of the organs, Servetus inferred the mechanism of the smaller or pulmonary circulation as we hold it at the present day.

Servetus also taught that the blood underwent a change of character, acquiring a crimson colour and a "fiery potency" whilst passing through the lungs, and that so changed it found its way by the pulmonary veins to the left ventricle. He also taught that it was the mesentery which gave rise to the veins of the body.

The above views were committed to writing, but remained unpublished* until about 150 years after the time that he

* See the interesting work by Dr. Willis on the Life of Servetus. The "Restitutio Christianismi," printed at Vienne in Dauphiny, 1553, containing his views, was brought to light by Wotton, in his "Reflections on Learning," 1694. It is said (see Art. "Servetus" in Biogr. Universelle) that only two copies are in existence.

was shockingly and cruelly murdered by being burnt alive at the hands of the Protestant Calvin.

Servetus clearly and incontestably saw and accurately described the smaller or pulmonary circulation, and in this way contributed a most important link to the chain of evidence of the general circulation. This was about the year 1553. Still, for him, as it had been for his predecessors, the movement of the blood in the general arteries and veins remained of a to-and-fro, a flux-and-reflux, and not of a circular character. The arteries were the seat of a double—an oscillating—current. The systemic or larger circulation was unrecognised.

Like others, Servetus thought that the venous blood originating in the liver was for the purpose of nourishment, and the arterial blood for the production of heat and other special purposes.

Dr. Willis points out that Servetus does not speak of an intermediate system of vessels between arteries and veins of the body. Still, he may have had an indistinct notion of the systemic circulation, as he speaks of "the natural spirits being communicated from the arteries to the veins by their anastosmoses;" but he did not think out his thought. When he speaks of the cerebral arteries ending in the cerebral membranes, or communicating the vital spirit with the tubes of the nerves, we may suppose that he had no accurate knowledge of the connection between the arteries and veins of the body by means of capillaries.

About the same period as Servetus, Realdus Columbus of Padua, relying on the results of vivisection, even more decidedly and emphatically established the same position (13).

Cæsalpinus of Arezzo followed. He was the first to use the word "circulation," but of necessity he failed to see the communication between the arteries and veins of the body by means of the capillaries, and for him the pulmonary veins supplied a double current of blood—the one for the passage of air and blood *to* the left side of the heart, the other for the escape of fuliginosities *from* the left side of the heart. He, however, proved

by the anatomy of the veins, and by the effects of the ligature on them, that the blood did not flow along them in a direction from the heart. This was, of course, a most significant fact in the history of the circulation theory.

Cæsalpinus describes also the blood as being carried to the heart as to a heat-manufactory, and then propelled along the arteries to the entire body. He, however, traced the nerves, as well as the veins, to the heart, as did some of his ancestors.

The learned and excellent pupil and successor of Gabriel Fallopius, Fabricius, of romantic and picturesque Acquapendente, the master and friend of Harvey, at Padua, in 1574, gave a most complete and accurate demonstration of the structure, position, and uses of the valves of the veins, and doubtless communicated a happy and prolific impulse to his pupil.*

Such, given very roughly and briefly, and in a very condensed manner, is the course of the general progress of our approaches towards the full and proper discovery and presentation of the circulation of the blood.

One step led on to another, as is the case with all truth and all science, each the inevitable and irresistible result of the former.

Summarising in chronological order the paramount and most salient anatomical facts which had been established respecting the circulation, we may regard—

1st. The distinction between arteries and veins as demonstrated by Galen.

2nd. The non-communication between the two ventricles of the heart in man as demonstrated by Vesalius.

3rd. The true nature of the valves of the veins as arrived at by Sylvius, St. Estienne, Fabricius, and others.

4th. The pulmonary or smaller circulation as determined by Servetus.

These great facts, these "scattered limbs of truth," being

* Fabricius held his professorship at Padua for about half a century, until his death at the age of eighty-two, three years older than Harvey at the time of his death.

recognised, the wonder surely is, not that they led up to anything further, but that the goal and consummation was not earlier reached, and that the world should still have had to wait for fifty years after Fabricius had published his views on the valves. The tree of knowledge at length fructified.

At last appeared the master-mind, the interpreting and commanding genius, the glory of his generation and century,

"THE IMMORTAL HARVEY,"*

Decus et desiderium nostrum,

the bright unclouded constellation standing out in relief from the dark firmament behind, never to be extinguished, he to whom is due the reverent homage of to-day and of all time to come. Well says Daremberg, "As at the dawn of creation chaos cleared up, the light separated from the darkness. Harvey considers a long time, and he finishes by seeing; he makes few experiments, but they are decisive; he uses arguments, but they are conclusive."

Renouncing the to-and-fro, or, as it may be termed, the tidal theory of the circulation, and reasoning upon already ascertained facts, and upon his own observations, and direct, varied, and reiterated experiments on living and dead animals, fœtal and adult, Harvey, like a true Master of Science, changed everything. With a fertile and well-poised mind trained by the study of Physics and Classics (14), for he was essentially a ripe scholar,† he was enabled, by a wise and critical insight, and by his powers of analysis and com-

* Born 1578, at Folkestone, in the twenty-first year of Elizabeth. Took the M.D. Degree at Cambridge when twenty-four years of age. Elected Fellow of College of Physicians and Physician to St. Bartholomew's Hospital when thirty years old, in the first year of James I.'s reign, and appointed the king's physician when forty-five years old. Made physician to Charles I. in the first year of his reign, and President of College of Physic in 1654, the first year of Cromwell's time. Died 1657, one year before Cromwell. He declined the honour of the Presidency of the College.

† The history of his life and his correspondence show that he fulfilled the characters given by Dr. Johnson of a true scholar: "To talk in private, to think in solitude, to inquire and to answer inquiries, is the business of a scholar. He wanders about the world without pomp or terror, and is neither known nor valued but by men like himself."

parison, to trace a new route for the blood, to establish by precise demonstration its general circulation as we now know and understand it, and thus in revealing "the most prolific truth ever disclosed by inquirer into the mechanism of the human frame,"* to establish a foundation for rational Physiology, and, experimenting in a new spirit, to achieve for both theoretical and practical Medicine an entire transformation.

But the greatest, perhaps the chief, support of his theory is obtained from his accurate observation and demonstration on the mechanism and use of the movements of the heart itself and the large vessels.†

The ulterior demonstration by Harvey of the circular movement of the blood rests, as Daremberg points out, on the following three arguments:—In the *first* place, the blood arrives under the impulsion of the heart in such quantity and in so continuous a manner from the vena cava into the arteries that it is impossible it can be furnished by the food, and in such a manner that it should pass as a whole in a short time from the veins into the arteries. In the *second* place, the blood, constantly and uniformly propelled by the arteries into the limbs and other parts, enters them in much greater quantity than is necessary for nutrition. *Finally*, from each limb the veins are constantly returning the blood to the heart; proving that the arteries receive nothing from the veins, but that, on the contrary, the veins receive blood from the arteries.

His predecessors had well-nigh reached the point which he attained, but they were all hampered, fettered, and prepossessed by false theories and assumptions, and were thus

* See Sir J. Alderson's Harveian Oration, 1867.

† Mr. Wharton Jones (see *Lancet*, 1879, October 25, pp. 514 and 602) remarks that "Harvey denied that arteries have any innate pulsific faculty. This was supposed by the editor of his works in 1766 to be a mistake; but he was right in the main. The blood vessels do *not* act as auxiliary hearts to propel blood, as declared by Schiff and Virchow." W. Jones observes that Harvey established that blood conveys heat as well as nourishment, and does not, as was thought previously, exercise a cooling influence. Before Harvey's time the act of respiration was considered to be that alone which caused the Blood to move.

so blinded to the full import of their own discoveries that they failed to solve the grand and hitherto inscrutable enigma of Anatomy. They had hewn and polished the materials, and to some extent had constructed the building, but to Harvey it was reserved to crown the edifice. "The true inventor," it has been well observed, "is he who definitely places the world in full possession of knowledge and of facts of which one can every day and at will verify the reality and accuracy. Let us not confuse the works of chance, which, finding some of the wheelworks of a machine, leave them, not knowing what to do with them, in a state of isolation. Let us not confound them with the works of a genius who searches, discovers, gathers, mates, and binds together all the parts of the machine and puts it in motion. Chance shows the chyliferous ducts to Aselli, but leaves them at the entrance of the liver. Chance shows to Pecquet the receptaculum chyli, but it was experimental research which conducted this skilful anatomist to the left subclavian vein, and permitted him to dispossess the liver of its functions."

It has been said by Dr. Willis, who has written the Life of Harvey in so able and interesting a manner, that the discovery of the circulation of the blood came from him as did Minerva from the brain of Jupiter, fully formed. This view cannot be held. The discovery was like all other scientific discoveries: it was the result of the growth of germs sown long before (15). It was not the work of one mind.*

In many cases, no doubt, discoveries appear to have been anticipated when indeed there has been no real anticipation of them, only happy and sagacious guesses at the truth, just as the Atomic theory of Dalton may be said to have been anticipated by Epicurus or Leucippus, and, as has been pointed out, the discoveries of Newton, the mode in which he made them, may almost be said to have been predicted by Bacon. That is, things may, so to say, be known before they are discovered.

But, in the case of Harvey, the discovery was not merely

* "He alone *invents* who *proves*." Again, "To perfect is to invent."

adumbrated or divined ; it was led up to in a proper scientific sense ; just as, in the case of Lavoisier's chemical theories, he was duly and properly preceded by Becker, by Jean Rey, Robert Boyle,* and by John Mayow (physician at Bath, born 1645); and as, a century before Priestley, Mayow was aware of the existence of oxygen in the air, in nitre, and in nitric acid, and knew that combustion is supported by the oxygen of the air, and that this gas is absorbed in the lungs by the blood, and is absolutely necessary for muscular activity.†

In fact, all inventors inherit from their ancestors, and all Scientific, like Political knowledge (16), like Civilisation itself, is the result of cultivation and growth, and has its roots far back in the world's history. "Truth is the daughter of Time." It has been well said that the most important inventions of Art, the most brilliant discoveries of Science, the achievements of Archimedes and Newton themselves, were only successful applications of kinds of evidence formerly used, or happy generalisations of principles previously known in detail.‡ Thus Laennec's name is the one inseparably and pre-eminently associated with the use of the Stethoscope. But Professor Tyndall, in his work "On Sound,"§ showed, in a most interesting passage, that Dr. Robert Hooke, towards the close of the seventeenth century, had enunciated the philosophy of this instrument, being quite familiar with the Sounds of the Heart and of the lungs and intestines. And Hooke himself was, in some degree, anticipated by Harvey, who had heard the Passage of the Blood by applying his ear to the cardiac region.

Daremberg points out that Plantus was aware that spitting of blood arose from rupture of the vessels of the lungs, and

* Whose discoveries seemed to Buckle as only second to those of Newton himself, though he considered Boyle to be inferior to Newton as an original thinker.

† See Bence Jones's Croonian Lecture on Matter and Force, p. 137.

‡ Sir A. Grant remarks as follows: "The guesses or intuitions of the ancient Greeks in Aristotle's time, or soon afterwards, hit upon something very like an anticipation of the Copernican system. And this was especially the case with Aristarchus of Samos, who announced the double movement of the earth round its own axis and round the sun" (17).

§ Third edition, p. 40.

that *in order to judge of the respiration it was necessary to apply the ear to the chest.* Eck von Sulzbach proved experimentally that metals when they oxidise increase in weight, and attributed this augmentation of weight to a spirit, which is united with the metal, and is disengaged afterwards by distillation. In this, of course, as Draper observes, he nearly anticipates by 300 years Lavoisier (18) and Priestley in their discoveries as to oxygen.

It is interesting here to notice also that Harvey, like other discoverers and benefactors of the human race, had his unscrupulous detractors and ignorant objectors, who wished to deprive him of the merit of his discovery, and the literature on the question of priority is very voluminous.* The question has been handled by Flourens, by Huxley,† and by very many others. Some professed that Harvey was entirely mistaken. Others said the thing was true, but it was so simple and self-evident that no praise attached to the discovery; but, as Biot observed, quoted by Daremberg, "Rien n'est plus clair que ce qu'on a trouvé hier; rien n'est plus difficile à voir que ce qu'on trouvera demain." Others unamiably again asserted that he had been anticipated, and had pilfered‡ and palmed off the wares of others as his own.§

In any case it appears that Harvey's contemporaries in the practice of his profession, as we say, fought shy of him in consequence of what they thought to be his quixotic, visionary, and unpractical views, and thought as little of his teaching as people did of Franklin's discovery of the identity between

* And Bacon, whose contemporaries could not accept his method of philosophising, described himself as "the servant of Posterity."

† See *Fortnightly Review* for 1877.

‡ If Harvey stole, it must be in the way alluded to by Garth when defending Dryden from the charge of theft. "But how did he steal? no otherwise than like those that steal children, only to clothe them better."

§ I am sorry to find Hecker, the Historian of the Middle Ages, so anxious, as he seems to be, to diminish the fame of Harvey. See a pamphlet of his, but little known, "Die Lehre vom Kreislauf vor Harvey, eine historische Abhandlung;" Berlin, 1831 (T. H. Herbig). He considers Galen to be the true discoverer of the circulation.

electricity and lightning;* but Harvey, a name to be henceforth "eternised" among us, at last triumphed, as did Jenner, the subject of ingratitude and neglect, and in a measure Sydenham,† and Lavoisier after him; and, like them, he lived to see, though late, the entire and generous acceptance by his professional brethren of his clear and consistent teaching.‡

Of the full revolutionary and inevitable effect and of the manifold applications of Harvey's cardinal discovery, the time at my command will only permit a very superficial glance. It was no lying wonder, 'no frothy flimsy fancy,' no 'airy scheme, or idle speculation.' It was a new power; it afforded a point of new departure, becoming the central idea dominating, and enshrined by, medical knowledge for all time; a canon, of universal application.§ It "worked within men, begot new ideas and new trains of thought," as Virchow has said

* We know that Christopher Columbus's discovery was long slighted. Thus he wrote to Ferdinand and Isabella in 1503: "I was seven years at your Court, and for seven years I was told that my plan was an absurdity; and now the very tailors ask leave to go to discover new countries."

† It seems singular to us of the present day that the first Harveian Orator that mentioned Sydenham (who died 1689, and who has been called, though no philosopher, the British Hippocrates), was Arbuthnnot, in the year 1727.

‡ May we not endorse the remarks of Sir J. Alderson, when referring in his Harveian Oration (1867) to Harvey's losing popularity by the promulgation of his views: "And society is scarcely more able now than in the time of Harvey to decide justly whether they are crushing a meritorious practitioner by their censure, or bolstering up a quack by their encomiums" (19). "Yet," he remarks, in reference to the obstructions and neglect which Harvey met with, "it may be questioned whether difficulties in the establishment of any new truth ought to be esteemed a hardship. New knowledge must be proved; and too facile acceptation can be wished for only by promulgators of error." Sir James might aptly have quoted the following lines in the Georgics:—

"... Pater ipse colendi
Haud facilem esse viam voluit, primusque per artem
Movit agros, curis acuens mortalia corda:" &c.

§ Since the above was written a Tercentenary Memorial Statue of Harvey, executed by Mr. Bruce Joy in bronze, has been erected at the top of Castle Hill Avenue, Folkestone, the birthplace of Harvey. It was unveiled, August, 1881, by Professor Owen, in the presence of a concourse of people, including representatives of the medical profession from all parts of the globe, who were then in England on occasion of the International Medical Congress.

that every new fragment of real knowledge does; and leaving an "endless power of semination," it paved the way for other knowledge, by which it was in turn corroborated; and upon Harvey's discovery, as a new "primum mobile," rests, in fine, all our knowledge of pathology, and much of our knowledge of the action of remedies.*

The work of Harvey, which inaugurated the era of rational medicine,† and reconstituted the face of Physiology (as the teaching of Dalton did Chemistry, and that of Sydenham Practical Therapeutics, and that of John Hunter Surgery), had yet to find its completion.

After his discovery followed that of the lymphatic and chylous system, the result of direct observation and experiments by Aselli and by Pecquet; then, as a direct result, the observations on nutrition by the two friends Wharton and Glisson (the latter our Anatomy Reader at this College, described as "omnium anatomicorum exactissimus").

But the brightest corollary to Harvey's teaching came with the era of Descriptive Anatomy, in which the names of Malpighi, a Fellow of our Royal Society, who first had ocular demonstration of the circulation of the blood,‡ of Ruysch, and of Leeuwenhœck appear; when, by means of the microscope,§ and of injections of the blood-vessels, the characteristics

* Referring to such consequences, Harvey himself observes (see chapter xvi. of his work on the action of the heart and blood) :—"Finally, reflecting on every part of medicine, Physiology, Pathology, Therapeutics, when I see how many questions can be answered, how many doubts resolved, how much obscurity illustrated by the truth we have declared, the light we have made to shine, I see a field of such vast extent, in which I might proceed so far, and expatiate so widely, that this my tractate would actually swell into a volume, which was beyond my purpose, but my whole life, perchance, would not suffice for its completion."

† See inscription below Sheemaker's bust formerly in the College of Physicians in Warwick Lane, presented by Dr. Mead.

‡ Malpighi's observations on the circulation of the blood in the frog's lungs appeared about thirty years after Harvey had published his treatise on the motion of the heart and blood. His more advanced observations on the circulation (frog's mesentery) were published in 1697. Malpighi was born at Crevalcuore, Bologna, in the year when Harvey's work on the Heart was published.

§ Harvey in his inquiries of course used an ordinary magnifying-glass; as he remarks, "Ope perspicilii ad res minimas discernendas."

of the various textures of the body and the nature of the blood, of the minute vessels, and of the capillary circulation in the substance of the tissues, were recognised.

Harvey had demonstrated the direct communication between arteries and veins in three situations—viz., the choroïd plexus, the spermatic vessels, and the umbilical vessels. But the capillary circulation of course Harvey had never witnessed, and this could not have been seen until the *microscope* was invented.

Later on, and following the discovery of Hales* as to the nature of the alkalis, showing the importance of the relations of quantity in explanation of chemical facts, came the grand discovery by Black, of Edinburgh, who explained the source of animal heat; the isolation of oxygen in 1774 by Priestley; and the discovery of Lavoisier on the theory of respiration and the process of combustion. The latter, by observation of the *rôle* played by the air in combustion and decomposition, overthrew the phlogistic theory, became the author of a new doctrine and the originator of a new and the only true method in chemical research, viz., that of adapting the balance to the elucidation of chemical phenomena. All these theories could only have followed upon the discovery of the minute circulation of the blood, and upon these discoveries our knowledge and treatment of so many affections of the lungs depend.

To show in anything like a complete manner what practical and therapeutical benefits have grown out of Harvey's great discovery, or to attempt to inquire what still is in the future, would require much time. Suffice it to say that our knowledge of diseases of the lungs and heart, and of the use of the stethoscope; our acquaintance with embolism and its effects; our knowledge of the subcutaneous use of remedies; of the in-

* The Rev. G. Hales was celebrated, among other reasons, for his experiments on pressure in the blood-vessels of their contents, and the rapidity with which the blood passes along them; researches carried on by Ludwig and Poiseuille, and Marey, &c., and still more lately by our Fellows, Burdon Sanderson, and Dr. Stone. (See Croonian Lectures for 1879.)

halation of anæsthetics ; of transfusion of blood and milk (20), are due to, and centre round, this discovery.

What would Harvey have thought could he have foreseen the cardiac physiology and pathology of the present day and our actual knowledge of the relation of the heart to other organs, the use of the sphygmograph and the cardiograph, and the corroboration afforded by their use to his teaching, and the possible service they may supply to the physician—the knowledge of the vasa vasorum, of arterial tension, of the relation of the nervous system to the smaller blood-vessels and capillaries (and consequently of secretion) first apparently noticed by Nicholls about one hundred years ago,* the consequent neuro-dynamic medicine, and the now universally necessary use of the thermometer ?

I need hardly say to any one here present that although Harvey's name is more particularly associated with the doctrine of the circulation of the blood and the heart's movements, his work on Generation is one of equal originality and of overwhelming interest, notwithstanding that since his time observation has shown that his proposition "omne vivum ex ovo" is, though of general, yet not of absolute and universal application. The subject and the merits of that work have been put before this College in a very graphic and instructive manner by Dr. Arthur Farre in his Harveian Oration for 1872. I can therefore do no more than allude to it, nor can I deal in greater detail with the other published products of Harvey's mind.

We are left to conjecture the loss which both he and the whole world sustained in the destruction of other of his writings. Our College edition of his works (1766) shows that he wrote on several subjects, including the generation of insects, besides those treated of in his works, and we know that he had put materials together under the heading of Medical Observations and Pathology. As it was with Galen, who bitterly regretted the loss by fire of some of his valuable Observations (21), Harvey had reason to complain of the loss of

* See Dr. Munk's Roll of the Royal College of Physicians, ii. 126.

these writings by the fury of a revolutionary mob. Whether he lost the Medical Observations and Pathology in this way, or whether he bequeathed them to the College, and they were afterwards burnt in the fire of London, or dispersed, is uncertain. The matter has been discussed by Professor Paget, of Cambridge, in his pamphlet on the MSS. of Harvey.* It is, of course, impossible to ascertain what was contained in his lost "Observations;" but it has occurred to me that it would be interesting and instructive to adduce any indications of knowledge of practical medicine which may be found to exist in his extant works. This may be the more profitable, as during his life he had, as we know, enemies who impeached his credit, and declared that his professional skill was most scanty, and by no means equal to his knowledge of anatomy.† It is very clear, from what is recorded of his *clientèle*, that he must at one time have had considerable private practice. We learn that Hobbes, Descartes, Cowley, Boyle and Dryden, were amongst his patients. There is a portrait of him attributed to Vandyke (22), and he might have known "the Swan of Avon,"‡ Ben Jonson, Raleigh, Rubens, Ashmole, Kenelm

* In addition to the great works on the motion of the heart and blood, generation, conception, parturition, uterine membranes, umbilical cord, and letters to various people, he wrote papers or treatises on the following several subjects, but these are not known to be extant. Observationes de usû lienis, Observationes de motû locali, Tractatum Physiologicum, De Amore, libidine et coitû animalium.

† Fuller, *op. cit.*, vol. ii., p. 504, observes that his doctrine of the circulation of the blood "entered into the world with very great disadvantage. For first none will be acquainted with strangers at first sight, as persons generally suspected; as if to be unknown were part of being guilty. Secondly, the grandeur of the profession were of the opposite judgment, and heavy enough without any argument to overlay (and to stifle) any infant opinion and partly consent thereto. But truth, though it may be questioned for a vagrant, carries a passport along with it for its own vindication. Such have since shaken friendly hands with Dr. Harvey, which at first tilted pens at him."

‡ It does not appear from any of Shakespeare's writings that he was conversant with Harvey's doctrines. The following line would rather, though not necessarily, militate against it:—"Nimble spirits in the arteries." ("Love's Labour's Lost," iv. 3.) Shakespeare died in 1616, the year when Harvey began to lecture at the College, as Willis points out, who also shows from quotations that Shakespeare, in common with others who preceded him, recognised the blood as being in motion.

Digby, Sir T. Browne, Hales, Milton, &c.* He must have had a certain amount of practice amongst the poor whilst occupying the office of Physician to St. Bartholomew's Hospital, and had to do with Lazarus as well as Dives (23). Still, the Hospital was very small at that time, and, moreover, as there was no medical teaching in those days—an element so useful in perfecting the knowledge of the teacher (24),—he might or might not have been as perfect and successful in his art as were his colleagues.

The first practical matters to which I will ask your attention as being referred to in his published works, are of a surgical nature; for Harvey did not disdain to practise surgery and also midwifery as well as his own special branch of the profession, and he was Professor, as we know, to this College both of Surgery and Anatomy. He describes cases in which he removed tumours, having first ligatured the main artery, and thus cut off the nourishment or "spirit," in order to facilitate the removal, especially one of the scrotum of enormous size—a procedure which modern skill still adopts.

We may in some degree picture to ourselves the delight and enthusiastic pride with which, after determining experimentally the true nature of an artery, and to a certain degree of arterial blood, he first availed himself practically of that knowledge, and applied it for the relief of his patients.

With respect to tumours—illustrating the principle of the difference between the papillæ of the ovary, and *à propos* of the existence of a vital principle, Harvey observes that we frequently meet with cancers, sarcoses, melicerides, and other tumours of the same description, "which increase as it were by their own inherent vegetation, taking up nourishment to themselves, and defrauding other parts of the body of their nutritive juices." Whence the ancient terms phagedæna and lupus.

With regard to blood-letting, he tells us that daily experience satisfies us that it has a most salutary effect in many diseases,

* Bishop Andrews, George Herbert, Izaak Walton, Seldon, Evelyn, Dugdale, Herrick, were his contemporaries.

and is indeed the foremost among all the general remedial measures, and in practising it we imitate nature, which, in indolent high-living people, by critical discharges of blood from the nostrils, hæmorrhoïds, and in shape of menstrual flux, delivers us from serious disease—from fever, small-pox, head-ache, &c.

He notices the death from hæmorrhage, in a short time, of animals after division of the vessels of the neck, and the occasional occurrence of rapid death from the same cause after amputation in man; these facts being adduced in support of his doctrine of the blood flowing in a circle. He notices that oftentimes in divisions of arteries during operations the blood does not spurt out from the vessel, *per saltum*, because the smaller arteries do not pulsate, especially if a tourniquet has been applied; and that in fainting fits or alarm, when the heart beats more languidly, there is a diminution or arrest of hæmorrhage.

He observes that impediment or perversion or excessive excitement of the blood's circulation in the veins leads to varices, abscesses, pain, hæmorrhage; in the arteries, to enlargements, excruciating pains, aneurysms, sarcoses, fluxion, asthma, stupor, apoplexies, and other affections, many of which are often remedied and dispelled as if by enchantment. He notices the interesting fact that when an extremity has been so ligatured that it has become swollen, cold, and livid, especially if it be cooled by snow or cold water, and the fillet be unbound, the person becomes aware at once of a feeling of cold rising along with the return of blood towards the trunk, and this cold blood returning to the heart he looks upon as the probable cause of the fainting which often occurs after blood-letting. This also, he thinks, may account for the deaths which occur in travelling over snowy mountains.

He mentions the case of a man with aneurysm at the lower part of the neck on one side, in whom the pulse in the corresponding arm was very small, owing, as he thought, to the greater part of the blood being directed to the tumour and thus intercepted. He records the case of a gentleman who

had been the subject of pain in the chest, dyspnœa, and dropsy, in whom after death the wall of the left ventricle of the heart was found extensively ruptured, although the wall was sufficiently thick and strong. This laceration he attributed to an impediment to the passage of the blood from the left ventricle to the artery.

He notices the absorption of pus and blood from the cavity of the pleura, and the discharge by expectoration of liquids thrown into the cavity of the thorax.

As illustrations of his allusions to therapeutics, speaking of the effects of the action of remedies applied endermically, he says that colocynth and aloes used externally move the bowels, cantharides excites the urine, garlic applied to the soles of the feet arrests expectoration, and cordials give strength* (25).

He comments on the relief obtained in dangerous states of asthma by the application of cupping-glasses and of cold water affusion on the chest (I refrain from quoting his physiological views as to the action of respiration, in proof of which these facts are adduced); and in speaking of the functions of the diaphragm he alludes to the possibility of the heart and lungs being invaded by distention of the stomach and intestines by food and flatus, life itself, as he says, being oppressed in its citadel.

These suggestive observations recall to our mind certain cases of disease in which the diaphragm does not suffice to protect the contents of the thorax, and indicate how fatal such cases may prove unless promptly and timely relieved by puncture (26).

In Harvey's works I fail to meet with much material bearing on what was termed by Aubrey, when hinting at his supposed inability as a practical physician, his "therapeutique way." He mentions a curious case of one suffer-

* These illustrations occur in a passage demonstrating the circulation of the blood. In the same chapter his pathological knowledge induces him to describe the morbific cause of tertian ague as seeking the heart in the first instance, and hanging about the heart and lungs, thus rendering the patient short-winded and disposed to sigh—the vital principle being oppressed, and the blood rendered thick and forced into the lungs.

ing from oppression and pain of the heart and breast, whose jugular arteries were large and like aneurysms, who only found relief when the whole of his chest was pummelled or kneaded by a strong man as a baker kneads dough, and in whom arteriotomy was performed, but without good result. He notices pains of the head and shoulders as a result of syphilis.

His treatment of himself in illness on one or two occasions was somewhat noteworthy. Thus he states that in attacks of gout (from which he eventually died) he was in the habit of applying *cold water* to the affected limb. "He would then sitt," we are told, "with his legges bare, tho' it were frost, on the leads of Cockaine House, putt them into a payle of water till he was almost dead with cold, and betake himself to his stone and so 't was gone." When he could not sleep, he would "rise from his bed and walk about his chamber in his shirt, till he was pretty cool, and then return to his bed and sleep very comfortably." Again, in his fatal illness from the effects of gout, when aged—seventy-nine; "*annorum et famæ satur*"—he found on the day of his death that he had lost the power of utterance, that in the language of the vulgar he had the "dead palsy" in his tongue. He did not lose his faculties; but knowing that his end was approaching, and having made disposition of certain of his effects, he made signs to Sambroke, his apothecary, "to let him blood in the tongue."* He died in the evening, "like ripe fruit seasonably gathered," "the palsy," as Aubrey has it, "giving him an easy passport."

Professor Paget, of Cambridge, in his notice of an unpublished MS. of Harvey's (1850), in the British Museum, refers to some notes on the physiology of the muscles, in which he groups together mania and somnambulism, seeming to indicate that he recognised the resemblance between the states of dreamland and insanity. Dr. Paget also points out passages in Harvey's writings showing that he had assiduously investi-

* Opening the veins of the tongue in Quinsey had been prescribed by Aretæus, and was directed by Sydenham. (See vol. i., p. 264, of the Syd. Soc. Trans.)

gated the physiology of the lungs, and had obtained a glimpse at least of one of the true uses of air in respiration. The chemistry of the day Harvey did not value, and, as Willis says, he showed his wisdom in despising the opinions of his age on the office of the lungs; but he well knew the vivifying force of heat, and saw in it the immediate indispensable agent in the reproduction of a living, sentient being.

As an investigator of the processes of generation and parturition, Harvey naturally was much interested in obstetrics, and in connection with this subject he alludes to several highly instructive cases. Thus he cites the use of the "uterine speculum," an instrument used not for the better inspection of the parts, but for assisting labour, and by which, as he says, the business of distention is effected by force. It was Harvey who invented the dilater of the cervix uteri and first used stimulating uterine injections.

He speaks of the "labour stool" used by parturient women (27), and of delivery in a state of coma produced by means of powerful sternutatories, and also of labour effected after the death of the mother—cases cited for the purpose of proving how much the fœtus contributes to its own birth. He states that he has often seen the fœtus extracted alive from the uterus when the mother had been dead some hours, and has known the rabbit and hare survive when extracted from the uterus of a dead mother, a subject of great interest in a medico-legal point of view. To show the power of the uterus in delivery, he cites the case of a poor washerwoman who was pregnant, with a uterus greatly prolapsed and projecting from the vagina, at first like the scrotum of a bull, and afterwards of the size of a man's head. He at first mistook it for a case of cancer, and thought of using the ligature or the knife, but unexpectedly a dead fœtus was expelled.

He also mentions cases of ulcer of the womb and of sterility treated by uterine injections, and alludes to their use in cases of occlusion of the uterus, requiring opening of the os uteri.

As regards the influence of affections of the uterus on the general health, and the sympathy of the whole body with it,

he observes, "No one of the least experience can be ignorant what grievous symptoms arise when the uterus either rises up or falls down, or is in any way put out of place, or is seized with spasms—how dreadful then are the mental aberrations, the delirium, the melancholy, the paroxysms of frenzy, as if the affected person were under the dominion of spells, and all arising from unnatural states of the uterus," and he shows the evil influence which retained and decomposing contents of this organ may occasion. He describes in a most practical manner the changes which take place in the female, corresponding with those of the uterus at different periods of life. He remarks on the long and creeping motion which the uterus exhibits directly after death in animals, surmising whether it may not be so in the case of hysterical women, and also whether it may not be so with the brain, in its actions and conceptions, and he sharply animadverts on the evils apt to arise from mothers not suckling their own children. The following references I find to *the chemistry of the urine.* After speaking of the serum of the blood being charged with mucus on being exposed to heat, he says that the watery portion of the urine when lightly *boiled* does *occasionally* run into a mucus which swims through the fluid. Again he alludes to thick and turbid urine becoming clear and transparent when heated, and also to the urine becoming altered in colour by certain articles of food, as figs, rhubarb, asparagus, &c. He describes experiments showing the effect of animal poisons on the body, and the communication of diseases like pestilence, leprosy, &c., by a zymotic element contained in articles of clothing, and furniture, even the walls of a house, cement, rubbish, &c. He notices the fact that the pupils of the eyes are apt to be contracted during anger.

Many illustrations he adduces of hereditary transmission, both physiological and pathological. To a certain extent he anticipates the use of auscultation, when he describes the distinct noise made by articles in the stomach of birds, rubbing against each other, and which may be heard by applying their bodies to the ear.

In Dr. Aveling's "Memorials of Harvey" (1875), alluding to the contemporary estimate of Harvey's practice, is quoted a hitherto unpublished entry from the Books of the Barbers' and Surgeons' Company, containing a complaint of Harvey's malpractice, overlooking a fracture of the skull and mistaking the vomiting caused by it for a symptom of "fouleness of the stomacke." Again, our Harvey is quoted (from "Gideon Harvey's Art of Curing by Expectation") as having mistaken an affection of the mesenteric glands for an abdominal aneurysm. On the other hand, his skill and acuteness are illustrated and mentioned with high approval by his contemporary Dr. Hall (in his "Select Observations on English Bodies of Eminent Persons in Desperate Diseases").

Dr. Aveling points out that however lightly he was estimated by physicians and surgeons, he was highly appreciated and admired by obstetricians, and that his was the first book on midwifery written in the English language.

The above references and quotations will suffice to show Harvey's knowledge of disease and of the offices of a physician, and will amply vindicate him from unjust allegations and from the reproach of ignorance on these points.

I will now pass on from the *objects* of Harvey's teaching to say a few words on his *method of thought*. Harvey's method was essentially what is often termed the "Baconian" method—that of the then coming age—the *experimental* and observational one—the age in which, to quote my friend Sir Alexander Grant, "modern philosophy took a splendid start in Bacon and Descartes, while modern science commenced its glorious career with Galileo and Newton"—a philosophy in which analysis or induction plays a great part, which has for its main objects the physical enjoyment and social well-being of man and the propagation of human power, and which had for its great prophet the illustrious Francis Bacon. Of Bacon, Macaulay has finely said that to make man perfect was no part of his plan. "His great characteristic was the persuasion that nothing was too insignificant for the attention of

the wisest, which is not too insignificant to give pleasure or pain to the meanest. His peculiar aim was to make imperfect man comfortable. The beneficence of his philosophy resembled the beneficence of the common Father, whose sun rises on the evil and the good, whose rain descends for the just and the unjust."

To quote Bacon's own words, "*Usui et commodis hominum consulimus.*"

Of this method I will quote the words of the venerable and learned Cardinal Newman, who, in his "Idea of a University," remarks of Bacon, "His is simply a method whereby bodily discomfort and temporal anxieties are to be most effectually removed from the greatest number; and already, before it has shown any signs of exhaustion, the gifts of nature, in their most artificial shape and luxurious profusion and diversity, from all quarters of the earth, are, it is undeniable, by its means, brought even to our doors, and we rejoice in them."

To Bacon, the populariser of the study of Nature, Harvey was at once friend and physician. Still he does not appear to have much valued his philosophy, since though, as Aubrey says, he "esteemed him much for his witt and style," yet he said of him, "He writes like a Lord Chancellor"—speaking in derision. How far Harvey thought this scorn was due to Bacon for not receiving the Copernican system—the greatest of all scientific doctrines (28)—and for being wholly ignorant of any branch of mathematics (as has been suggested), I do not pretend to affirm.*

* That Harvey was not indebted to Bacon for his philosophy is shown by the fact that Bacon's "Novum Organum" was published in 1620, whilst Harvey's researches, though his work was not published till 1628, had been promulgated in 1616. Bacon does not appear anywhere in his works to allude to Harvey's views on the circulation. Spedding observes that "with contemporary scientific writers Bacon seldom appears to be acquainted."

Dr. Draper, in his "Intellectual Development of Europe," sums up Bacon's character somewhat hastily and harshly as follows: "It is time the sacred name of philosophy should be severed from its long connection with that of one who was a pretender in science, a time-serving politician, an insidious lawyer, a corrupt judge, a treacherous friend, a bad man," falling in with Pope's con-

Much has been said and written about the prominent excellences of the modern philosophy, there has been much conventional talking and confused thinking about it, and consequently very much bewilderment has arisen; but, after all, it is the philosophy and method of common work-a-day sense (a sense thought by some to be by no means common), the gathering by observation or experiment of particular facts, the generalising of these facts, the induction or drawing out from them a knowledge of general laws or principles, under the guidance of which inferences may be made. That is, the method is at once inductive and deductive, for, as Sir A. Grant says, men reason, and always have reasoned, deductively. "During a great part of life we are employed, not in finding out new laws of nature, but in applying what we knew before, in appealing to general beliefs or supposed classes of facts, and in drawing our positive or negative conclusions accordingly."

By the natural instincts of our own minds, and by the influence of our surroundings, affected as we are by the teaching of former ages, though unconscious of our debt to master minds of the past, we reason correctly without any knowledge of scholastic logic, without any proper logical teaching (29).

This method and doctrine was not new even in the time of Aristotle, to whom, more than to any single person, the scientific education of the world is due. He had already said that in any science, art, or province of knowledge, "you must study facts." Great principles can only be gained from experience; and when investigation of what is called nature is complete, demonstration will then, and only then, be possible. To quote Sir A. Grant again, "Aristotle only taught what had been taught before him. He did not invent the process of reasoning any more than the grammarian who first distinguished nouns from verbs and gave them their

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ception of him. But, as Profesor Fowler has observed, Spedding has recently done much to remove these misapprehensions, and no one ought now to venture to pronounce an opinion on Bacon's character who has not at least acquainted himself with Mr. Spedding's work, "An Account of the Life and Times of Francis Bacon," 1878.

names invented nouns and verbs; he only clearly pointed out a process which had always, though unconsciously, been carried out."

As Macaulay puts it, "The inductive method has been practised ever since the beginning of the world by every human being. It is constantly practised by the most ignorant clown, by the most thoughtless schoolboy, by the very child at the breast. That method leads the clown to the conclusion that if he sows barley he shall not reap wheat. By that method the schoolboy learns that a cloudy day is the best for catching trout. The very infant, we imagine, is led by induction to expect milk from his mother or nurse, and not from his father" (30).

Harvey, then, was of this spirit and this school, and only effected what he did by virtue of its teaching. To this method, though acknowledged to be fraught with such practical and beneficial results, exception has been taken, inasmuch as it professes, contrary to the Platonic teaching,* to exclude the search *for truth* as *truth* and for its own sake. However true this may be of the method generally, it cannot be said of our Harvey, whose books teem with expressions and sentiments showing that his one great object was none other than the truth—"veritati studens magis quam gloriæ"†—though not of course unmindful of the contingent material advantages of his researches.

I have, in the short *résumé* which I have just given of the teaching and method of Harvey and his predecessors, laid some stress upon the use that has been made of dissection of the lower animals, both in a dead and also in a living state, and I have done so with a special purpose in view, as I think it is not unseasonable nor beneath the dignity of an occasion like the present to give attention for a few minutes (as it were parenthetically) to a subject which has lately been much under discussion, not only among medical

* The celebration of Plato's birthday continued, it is said, until A.D. 270, and was revived by Lorenzo di Medici.

† See the copper tablet in the Lecture Theatre of our College.

men, but by the public in general, and has, in fact, become one of the foremost questions of the day. I mean the subject of *vivisection* for the purposes of experimental physiology. It is only within the last few years that a cry has been raised against practices which *we* know to have existed for centuries, and which we have every reason to suppose have led to important discoveries, and to results which have tended greatly to benefit mankind.* I should ADMIT, first, that the practice has really been very much abused, and has naturally caused recoil ; secondly, that the motive with many opponents is a very natural and right feeling of humanity. But, admitting this, the objections, I feel persuaded and make bold to affirm, have been most exaggerated and unreasonable, and many of them altogether unfounded.

The anti-vivisectionists confine themselves chiefly, as far as I can find by reading their numerous letters and pamphlets, and the proceedings of their public meetings, to three assertions :—

1st. That man has no *right* to use animals for purposes of scientific research, or to put them to suffering in order to save himself pain, or to acquire knowledge which may be used for his benefit.

2nd. They assert that *no valuable knowledge* has been gained by experiments on animals, and that those who have added the most to our stock of information have not practised vivisection. They confidently assert this with respect to Harvey.

3rd. They assert that vivisection (or any experiments on living animals) is so *demoralising* in its tendency that such practices should in every way be discountenanced, and should be entirely forbidden under *any* circumstances whatever.

With regard to the first of these assertions, *as it is upon*

* Many must remember the crowded audiences which met in the early days of the use of chloroform to witness its effects on rabbits and other animals at the Royal Institution ; and I may direct attention to the interesting picture by Joseph Wright in the National Gallery (No. 725) of an experimenter showing the effects upon a parrot of exhausting the air from the receiver of the air-pump to an audience who seem quite unconscious of any impropriety in the exhibition.

this ground that the anti-vivisectionists found their invective, it is necessary that we should take a cursory glance at what we are told in Holy Writ of the power which it seems God's will should be given to man over the brute creation, and of the manner in which this power has, throughout all ages, been exercised by man. Of creation we read, "Let us make man in our image, and let him have *dominion* over every living thing that moveth on the earth." After the flood, when Noah came forth from the ark, this power to man is given in still stronger terms: "And the *fear* of you and the *dread* of you shall be upon every beast of the field and upon all that moveth on the earth; into your hands they are delivered."* That God intended animals to serve in every way for the good of man is shown by His clothing Adam (immediately after the fall) with the skins of beasts, afterwards commanding that beasts should be slain and eaten for food, and that they should be compelled to share in man's labour and take the hardest portion of it, and that they should be brought into subjection and trained for that labour. That this must only be through considerable inconvenience, and even suffering, cannot be questioned; indeed, much has been lately said about the "barbarities of our civilisation," the cruelty, for example, exercised over horses, not only in their training, but when they are employed in working for their masters, even masters of a class and education which ought to be ashamed of countenancing such cruelty. We may also, I think, with all due reverence, mention that as soon as man sinned it was ordained by God that animals should be offered in sacrifice (until the time of the grand Redemptive Act when the One Great Continuously-prevailing Sacrifice for sin was offered), so that for many centuries animals were daily slain, that by their suffering and death man might be freed from the penalty of his transgressions.

We may, I think, look carefully through both the Old and

* Or, as the Royal Psalmist, writing of the dignity of Man, says, ". . . constituisti eum super opera manuum tuarum. Omnia subjecisti sub pedibus ejus, oves et boves universas: insuper et pecora campi. Volucres cœli, et pisces maris: qui perambulant semitas maris" (Psa. iii. 6-9).

New Testaments, and fail to find any command against using the brute creation for any good service to man, and it seems to me that the anti-vivisectionists are driven into a corner when they quote Balaam's ass's speech as a protest against cruelty to animals! We have only to read St. Peter's comment upon the incident to see that "the dumb beast speaking rebuked the madness of the prophet" in disobeying God's commands in order to gain the wages of iniquity, and that he was not protesting against the blows. The hunter urges his right to the chase by quoting the example of Esau, who was not condemned for being a hunter and for going out to seek for savoury meat to tempt the palate of the aged Isaac, though he had, as we learn from the context, no occasion to resort to the chase to satisfy the ordinary requirements of life. We cannot, I think, find any direct prohibition against using the brutes for any purpose which may really conduce to the welfare of man; and there is direct and august sanction for their destruction in order to supply man with clothing and food, and for causing them to suffer in training for our service, and for slaying them for religious purposes. Do the anti-vivisectionists know that, with very few exceptions, every horse they see in the streets, in addition to the pain and distress incident to "breaking," has at one time undergone a process, and that often a cruel one, of vivisection?—not to mention the mutilation of tails and ears of domesticated animals which is universally carried on, and this for our advantage as well as for that of the animals themselves.* It is needless here to say that I am far from wishing to countenance the practice of any cruelty,† or of giving any unnecessary pain in operations upon living animals;

* Dr. R. McDonnell, of Dublin, in an address (to which I shall allude later on) delivered before the Surgical Society of Ireland, November 23, 1877, and entitled. "What has Experimental Physiology done for the Advancement of the Practice of Surgery?" observes: "It would be utterly unjustifiable to lash our horses through the streets of our great cities unless the advantage to mankind were enormously great in proportion to the labour and suffering thus inflicted on the brute creation."

† I can unreservedly speak well and approve of the Society for the Prevention of Cruelty to Animals, which seeks to attain its end by means of the formation of a sound public opinion and the influence of example, by enforcing the law, by promoting legislation, and by seeking to imbue the young with proper views on the matter.

but I simply affirm that, *for man's good*, man has the right given him to use the beasts, under certain circumstances, and to cause them to suffer, and to take their lives.* And what greater good can be gained for mankind, I may ask, than the enlightenment and instruction of those to whom is entrusted the care of the sick and the alleviation of all those ills of body and mind to which flesh is heir?

Not even the most vehement of the anti-vivisectionists will, I think, assert that the life of a man is not of infinitely greater value than that of a beast. To put the question to the test, is there any father who, seeing a child in imminent danger, would scruple to inflict any amount of prolonged torture upon even a domesticated animal, if by so doing he could save the life or suffering of the child? We can imagine a parent being placed in such circumstances, but can hardly imagine an anti-vivisectionist acting up to his principles, having the courage of his opinions, and urging at such a moment "that a man has no right to cause a beast to suffer, whatever good may be gained to man by so doing."

Their second assertion is, "that not one scientific point has been discovered, nor any curative agent more successfully applied, by means of vivisection."

To confute this very foolish, "magnificently unscrupulous," declaration—one which has been publicly made only a few days ago at a meeting in Willis's Rooms (31)—one need only glance over the most important surgical and biological discoveries which have been made, and it will be found that in most, if not all of them, there is mention of the practice and value of vivisection.

I will first allude to the subject which especially claims our attention to-day—viz., the Circulation of the Blood. It is unnecessary to remind my audience of the constant practice of vivisection by those who threw light on this subject. We find

* Trench, when referring to the Miracle of Healing the Lunatic of Gadara and the destruction of the herd of swine, has a passage to the effect that it were well that all the brute creation should perish if one great moral lesson were taught thereby.

Galen describing minutely his experiments on living animals, as dividing arteries, laying open their chests, &c., and Harvey treats it as a matter of course that all his conjectures should be verified by (as he says) "experiments on a great variety of animals;" and the benefits to mankind can hardly be estimated which have been derived from the labours of those vivisectionists who have followed in the lead of these great men, in studying the mechanism of the circulation alone. The labours of Dr. Hope, in conjunction with Sir Benjamin Brodie, of Stokes, a much honoured name, of C. J. B. Williams,* and others, solved the mystery which had previously attended the different sounds of the heart in disease and health, by experiments upon animals, brought under the influence of the woorara poison, and operated upon. One of the first outcomes of Harvey's discovery was the tourniquet, and I think we may estimate that that simple instrument alone has probably saved more human lives than have been lost by the lower animals that have been experimented on in connection with the subject. Again, much was gained in the treatment of aneurysm, the operation for which is no doubt one of the most important and critical in the whole of surgery, by the experiments of Hunter and Sir Astley Cooper.

The procedure of transfusion of blood, as before alluded to, was entirely ascertained from vivisection, as also the torsion of arteries and the use of the ligature and carbolised cat-gut which has recently followed,† and other modes of

* Whose experiments upon animals on the contractility of the air-tubes are also of great practical interest. See the "Pathology and Diagnosis of Diseases of the Chest," Fourth and last Edition, 1840.

† With which the names of Lister, Humphrey, and Bryant are specially associated. The sight of hæmorrhage, the inevitable attendant on operative surgery, which impresses mankind with a sentiment of horror, and which is inevitable in most of the alarming and dangerous accidents which surgery is called on to relieve, is thus spoken of by Morand, as quoted by Dr. Jones: "Un sentiment naturel attache a l'idèe de perdre son sang, une terreur machinale, dont l'enfant qui commence a parler et l'homme le plus decidé sont egalement susceptibles. On ne peut point dire que cette peur soit chimerique Si l'on comptoit ceux qui perdent la vie dans une bataille, on verroit que les trois quarts ont peri par quelque hemorrhagie; et dans les grandes operations de chirurgie, cet accident est presque toujours le plus formidable."

surgical treatment all bearing upon Harvey's great discovery.

Concerning the nervous system, we have the well-known experiments of Le Gallois,* of Sir Charles Bell (32), and Majendie, followed up by those of Dr. Marshall Hall, whose discoveries have been ranked by many as only second to those of Harvey himself; and later by Dr. Brown-Séquard, whose experiments on the nervous system of animals have led to very important results. That Jenner experimented upon animals in his investigations concerning vaccination is a fact too well known to need insisting upon.

The great cry of the anti-vivisectionists is that, if animals are operated upon at all, it must be when under the influence of an anæsthetic; but we may well retort, *How were the influences of anæsthetics discovered but by experimenting upon animals?* We find that Sir J. Simpson sought long for an anæsthetic, and tried many and various drugs on the lower animals before he discovered chloroform, and our own reason would tell us that every sensible experimenter would fear to try the effects of such powerful agents on human subjects, until they had been proved upon the lower animals, be the suffering caused whatever it might. The knowledge which the world has derived from experiments on animals regarding the mode of action and various uses of this anæsthetic may be ascertained from the Report of a Committee appointed by the Royal Medical and Chirurgical Society for inquiry "into the uses, and the physiological, therapeutical, and toxical effects of chloroform, as well as into the best mode of administering it, and of obviating any ill consequences resulting from its administration." (See vol. lxviii. p. 323 of the Transactions.) Surely no anti-vivisectionist ought recklessly to dispute the value of this discovery, which, as Sir James Paget so ably puts it in his paper upon Anæsthetics in the *Nineteenth Century*, has, more than any other, added to the sum of human

* In his "Experiences sur la Principle de la Vie, notamment sur celui des mouvements du Cœur et sur la Siège de ce Principe."—Paris, 1812. Dedicated to Laplace.

happiness. "Past all counting," says that skilful surgeon and admirable master of language, "is the sum of happiness enjoyed by the millions who in the last thirty-three years have escaped the pains that were inevitable in surgical operations—pains made more terrible by apprehension, more keen by close attention; sometimes awful in a swift agony; sometimes prolonged beyond even the most patient endurance, and then renewed in memory or in terrible dreams. These will never be felt again." I need hardly call to the mind of my hearers the use of anæsthetics in the *diagnosis* of certain tumours, of conditions of muscle, and of morbid states apt to be masked by muscular spasm, and as a means of counteracting convulsive action.

We must remember that Aloysio Galvani, of Pisa, made his first discovery (in galvanism) by means of his experiments on frogs, which experiments have led to all we know about those dynamical energies, current electricity, electromagnetism, magnetic electricity, with all their manifold applications of ever-widening and boundless possibilities, not more to telegraphy, plating, illumination, &c., than to Therapeutics, and we must not forget what a part electricity played in the reduction of the alkalis in the hands of the imaginative Davy* (32). It is not necessary that I should here explain the immense importance of galvanism and electricity, both in diagnosis and in the treatment of disease. We know also that experiments on animals were made by Fontana, Hunter, and Brodie as to the effects of lightning, with happy results as to the treatment of those affected by this agent.

I will next touch upon a subject which is at present claiming our serious attention—viz., contagion, infection, induction and transmission of disease. *It seems absolutely necessary that in researches of this kind experiments on animals should be performed.*

If the hands of skilful operators are tied and shackled, most important results must be lost. I may mention that Dr. Burdon Sanderson, Dr. Wilson Fox, and Dr. Andrew Clark,

* Sir Walter Scott said of Sir Humphrey Davy that if he had not chanced to be the greatest philosopher he might have become the greatest poet of the age.

among our Fellows, and Villemin, Cohnheim, and Solomonson among foreigners, have performed most interesting experiments on animals as to the artificial induction of tubercle, the carriers of contagion being probably parasitic organisms. Attempts have been made to show an analogy between tuberculosis and syphilis. Toussaint communicated to the Academy of Sciences of Paris (March 29, 1880) a paper on the Transmission of Tuberculosis as ascertained by experiments on pigs and bovine species. He arrived at the following conclusions. The tuberculosis is transmissible with the greatest facility by (1) injection of tubercular matter, (2) by heredity and lactation (34), (3) by inoculation with tubercular matter and blood, (4) simple cohabitation. And recently my friend Dr. H. V. Carter, in Bombay, has been making some interesting experiments on the communication of the Spirillum or relapsing fever to monkeys, with the object of elucidating the pathology of the disease, the mode and place of origin of the blood Spirillum. Subcutaneous injection of the blood and saliva was resorted to. (See the Transactions of Medico.-Chir. Soc. for February 4, 1880.) (35)

The action of various animal and vegetable poisons is also receiving much attention, and their antidotes are being carefully searched for. And under this head we may class that terrible affliction known as rabies or hydrophobia (36). At present no satisfactory treatment has been discovered for it, though there is reason to hope that we may eventually find such; but how can it be discovered unless by experiments on animals, and by subjecting them to the sufferings to which human beings are liable? We may mention that the late Dr. Swaine Taylor performed many experiments as to the action of poisons upon the lower animals in several cases where an accusation was brought against persons for murder by poison—experiments upon which the life of an accused person depended.

I might occupy many hours in relating the instructive and practical results which have been obtained by various sagacious experimentalists as to the therapeutic and physiological action

and antagonism of medicinal agents,* and as to the action of and antidotes to poisons, ever since the time of Orfila, who was really the first person to build up the science of Toxicology by extensive experiments on living animals, and to apply it for the purpose of medical jurisprudence. Especially would I cite the brilliant and unassailable results of the researches of Christison and Corrider and of Rutherford, who did so much towards the establishment of a proper system of detecting and counteracting the evil results of poisoning, thus contributing not only to Science, but to the safety of society, and to the due administration of justice.† The various experiments on animals also illustrating the effects of and antidotes to poisonous agents, especially of opium, as described in a paper by Dr. Sibson in 1848 (see *Med. Gaz.*), and included in the collection of his works lately so ably edited by Dr. Ord,‡ will be remembered by many present.

In Mrs. Marshall Hall's interesting Life of her husband,

* Dr. McDonnell (*loc. cit.*) remarks : "Suppose even that one single great discovery, like that of the circulation of the blood, or the movements of the chyle in the lacteals, or the functions of the spinal nerve-roots, were struck out, how immeasurably would the difficulties of the practice of medicine and surgery be increased? Are these not verily and indeed the keystones of the main portals? What would the edifice of modern surgery and medicine be without them? Yet these, with many lesser discoveries arising from them, are the direct offspring of experimental physiology."

† Christison, imbued by the spirit of Orfila, along with Corrider, of Genoa, then a fellow-student in Paris (1823), undertook a full investigation of the detection, action, and antagonistic treatment of poisoning by oxalic acid, a very common agent in accidents and suicides, and a subject at that time comparatively untouched by Orfila. He also greatly contributed to the knowledge of the action of conium, and proved, in opposition to the received opinion of authorities, the truth and accuracy of the description given by Plato of the effects on Socrates of this agent. He made experiments also on the poisonous action of the *bark* of the laburnum tree in connection with an important medico-legal case. With him was associated Rutherford in carrying out important investigations as to the action of medicines on the functions of the liver.

‡ Sibson there shows what in earlier days had been accomplished by experimental research on animals by Whytt, Monro, Fontana, Alston, Valli, Humboldt, &c., and of late by Wilson Philip, Williams, Nunnely, Simpson, &c. The same author also describes in his well-known paper on the causes which excite and influence respiration in health and disease, the contributions derived from experiments on animals, of Brodie, Prevost, Chossat, Hodgkin, Willis, Edwards, Regnault, Reid, Newport, Barlow, Humphrey Davy, Burrows, Seissy, Handfield Jones, &c.

it is related that at the time when some lamentable cases of criminal poisonings occurred in which the employment of strychnia was suspected, but which could not be satisfactorily proved by the ablest analytical chemists (contestable results alone being obtainable in certain cases), Dr. Marshall Hall, having shown the extreme susceptibility of the frog to strychnia, suggested that it would prove the most delicate test of the presence of the poison: and, aided by Mr. Bullock,* he performed a series of experiments which satisfactorily demonstrated that a young frog might be violently affected by the five-thousandth part of a grain of strychnia.

I especially would here allude to the experiments on lower animals made in 1830-32 by Mr. Cæsar Hawkins as regards the use of styptics in hæmorrhage from arteries, and others relative to (37) the prevention or cure of hydrophobia and the bites of serpents. (See Pathological and Surgical Writings, Vol. I., 1874.) But researches (entirely resulting from experiments on lower animals) upon the arrest of hæmorrhage had already (in 1805) been published by Dr. J. F. D. Jones,† following Ambrose Parè, Petit of Lyons (1731), Morand (1736), Gooch, Kirkland, White, J. Bell, &c. Of these experiments Jones remarks in his advertisement, when addressing himself "to men out of the pale of his profession," "whose opinion he esteems, whose feelings he honours," that "he regrets the necessity of obtaining this important knowledge by the sacrifice of brutes." But "when we remember the incessant scourge of war which has followed man through all the ages of his history—not to mention the consequences of accident

* Of Hanover Street. In some of these experiments I had the opportunity of sharing.

† "Treatise on the Process of Nature in Suppressing the Hæmorrhage from Divided Arteries, and on the Use of the Ligature." Of these "matchless" researches it is stated in Cooper's Dictionary of Practical Medicine (Art. Hæm.) that they demonstrate "that the blood, the action, and even the structure of the arteries, their sheath, and the cellular substance connecting them with it, are concerned in stopping bleeding from a divided artery of moderate size." These experiments are alluded to fully by most surgical writers.

and disease—it is not too much to assert that thousands might have been, and may still be, saved by a perfect knowledge of these subjects, which can only be directly obtained by experiments on brutes: indirectly and very slowly, by observations on the injured arteries of man, and even these cannot be made until he has fallen a sacrifice to the want of assistance or to the imperfect knowledge of the surgeon." I must mention some valuable experiments of Mr. John Cross, on the carotid arteries of dogs and cats, for the purpose of ascertaining the utility of tying arteries with ligatures and cutting off the two ends close to the knot.*

The third indictment of the anti-vivisectionists is that the practice of vivisection is necessarily so demoralising that under any circumstances it ought to be forbidden. Their cry is that experiments of this nature ought not to be undertaken because of the hardening effect on the moral nature of an habitual contemplation of suffering without any effort to relieve it. Surely this is a misapplication of Butler's well-known argument; for it is not in fact the misery of the animal under investigation, but rather the future alleviation which may possibly be secured for human suffering, which is the object of contemplation. Perhaps a similar justification may be offered for field sports, in which the excitement of the chase and the exercise of skill almost entirely abstract the attention of the sportsman from the suffering of his game; at the same time, all will agree that sports which involve cruelty out of all proportion to the benefit derived by man in their pursuit, such as cock-fighting, bull-baiting, putting animals to death painfully where only death is required, should be abolished. It is unnecessary to point out the wide difference between causing or witnessing suffering out of mere curiosity or pleasure in it, and of causing pain in a brute creature with the special object in view of saving suffering to our fellow-creatures.†

* See London Med. Repository, vol. vii. p. 353.

† Dr. McDonnell [see address elsewhere alluded to], when repudiating the idea that contact with suffering tends to brutalise and harden us as a profession,

Undoubtedly no painful experiment should be witnessed, still less performed, by one unable to comprehend and appreciate the design of such experiment; his mind would be in an unfit condition to profit by it, and the moral effect would be bad; therefore no one should be allowed to make such experiments who has not been trained to observation, and thus become capable of making a fit use of his power.

That legislation is necessary may be allowed, and one cannot but be indignant at, and strongly and absolutely disclaim, the ruthless abuse of vivisection which has aforetime occurred, especially in some of the continental schools; but I must also insist that the measures enforced by law ought not be of a nature to cripple the hands of those who are fully competent to conduct their researches in an enlightened and careful manner. By restrictions of an unwise nature the very object of legislation will be defeated, as those leading and able men of our profession, who are the best qualified to gain good from operations, are scarcely likely to have time or inclination to go through tedious difficulties in gaining licences and resorting to the places where alone such experiments can lawfully be carried on.* In looking over the reports, just published,

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observes: "Gazing at an execution or a bull-fight, reading sensational novels, and writing sensational articles, may have this effect. Does the sister of mercy, I ask, or the lady-nurse, become less benevolent because of her daily intercourse with pain and sorrow? The surgeon who performs, or the student who witnesses, a painful operation is not rendered less kindly or benevolent, the one by his effort to mitigate the suffering or prolong the life of his patient, or the other by his effort to learn how to do so. The physiologist or the student who, with a truly noble object in view, performs or witnesses experiments on animals, is not rendered 'devilish' by this, any more than a man would be who went from prison to prison to witness execution after execution with the very laudable object of making the process of hanging so complete that even wretched criminals may be saved from a prolonged and painful agony in their exit from this world."

* I believe I am right in saying that Sir R. Christison, above alluded to, no mean authority, whilst fully and sincerely deprecating the abuse of experiments on brute animals, is yet quite opposed to the rigid checks which extreme opponents desire to see enforced. He advocates the restriction of such experiments to the principal medical schools of the country, the teachers being responsible for decency and due forbearance in those who operate, and for the confinement of investigations within proper limits; all, restrictions which thwart inquiry and indicate that the researches are of the nature of criminal acts being avoided.

given by the Inspector into the House of Commons for the last two years, it has struck me that the number of experiments has been greatly on the decrease—481 having been performed during 1878, and only 270 during the year 1879. No doubt the eager and strenuous anti-vivisectionists will triumph in this fact; but is it not possible that those in whose hands the experiments would be the most safe and valuable have been withheld from making them? while, as we well know, the unscrupulous who would not hesitate to evade the law, and carry on experiments in an underhand way, are the most likely to conduct them carelessly or with cruelty. I think I may with propriety mention that a series of experiments likely to lead to important practical results has lately been arrested in two hospitals with which I am acquainted, from a fear that, with the extravagant clamour of the anti-vivisectionists in the ears of the public, the interests of the hospital might be injured if a licence were taken out, by means of which alone such experiments could legally be carried on.

To show that the character of those who have practised vivisection has not been such as to lead us to suppose that they would be unmindful of suffering, or that the experiments had had a hardening effect upon them, I may advert to him in whose honour we are assembled to-day. It is impossible to study carefully his life without being struck with the humanity, benevolence, and kindly feeling which under all circumstances he displayed. Those who have in former years stood in this place have collectively given us in full the history of Harvey's life and labours, so that we seem to have an almost personal acquaintance with him, can picture him in his daily and domestic life, and cannot possibly look upon him as a man whose moral nature had been hardened by witnessing suffering which he had needlessly or carelessly caused.*

In these observations on vivisection I trust that I may have (however faintly and inadequately) contributed some-

* Harvey experimented on deer, dogs, frogs, serpents, and fish.

thing to meet the challenge lately offered to the medical profession, that they should answer the statements averred against it on the subject of vivisection, and to justify the efforts made to banish the terrors of the knife and of Death "the insatiate archer" (38).

One principal trait which strikes one in studying Harvey's character is his devotion to the one object of his life: from the time that as a student at Padua his attention was drawn to it, he seems to have been absorbed in its pursuit and to have made all that occupied him serve to further it. During the time that he was Physician to the "White King," we do not see him led away by the excitements, pleasures, and intrigues, which in those days, more than at present, occupied the minds of all connected with the Court. His mind was so absorbed in his studies, and so bent upon solving the great problem of his life, that he brought the King to feel interest in it also, and it is said of Charles I., "the great prince," as Harvey styles him, that he ended by becoming an amateur doctor, being especially fond of physiological pursuits (39). It was in his presence that many of the vivisectional experiments were performed upon the Royal deer, which his "Serene Majesty" was glad to sacrifice in the pursuit of science. Of course the courtiers followed their sovereign's example, and in consequence were present at many of Harvey's experiments, and among them may well have been some in whom a love of physical science had been really kindled, as in the Marquis of Dorchester, who conceived a true affection for medicine, and late in life became a Fellow of the College of Physicians, and its munificent benefactor.*

The chief incidents of Harvey's life are too well known for

* Harvey mentions with much satisfaction that he had shown to the King and Queen an embryo, the size of a French bean, which had been taken from the uterus of a doe, and speaks of it as "gratum profecto naturæ spectaculum." Harvey in one passage in his work on the Circulation of the Blood remarks: "The internal jugular vein of a live fallow deer having been exposed (many of the nobility and his Most Serene Majesty the King, my master, being present) was divided."

it to be needful that I should relate any of them again, and with his character, as I have said, we have all a very intimate acquaintance. The opinion we have formed of him may, I think, be summed up in the words of one of his most recent biographers, viz., my friend Dr. Da Costa, of Philadelphia. "Harvey," he says, "illustrates in his person the finest traits of the intellect and heart of the profession. Not content with the known, but with an eye ever eager to read the unknown; reverencing the past only in so far as it may help to enlighten the future; patient of search, keen of thought, ingenious of surmise, but holding surmise only as the glimmer of a truth to be ascertained; bold of inference, yet trying that inference by every test alike of thought and experiment before it is proclaimed law; consummate in reasoning and in the art of clear expression—we have in *his* mind the best example of a scientific mind; and in the qualities of candour, perfect benevolence, serenity, self-sacrifice, and untiring devotion he nobly upheld the character long generations of good men have given to his calling when most perfect."

Such a man as described above can hardly, I say, be termed heartless and devoid of all feeling by any anti-vivisectionist, however vehement, yet, to quote his own words, he writes, "I had frequent recourse to vivisection, employing a great variety of animals for this purpose."

Again, we may notice that the character of Galen was one wholly opposed to that of heartlessness or thoughtlessness. We read of him as a man with a reverent mind, piously disposed by nature, and often referring in his writings to "the will and government of the Almighty." I will quote a short sentence out of one of his works on the use of the human body, which he himself calls "nothing less than a hymn of praise to the Creator." He says, "I hold true piety to consist, not in the sacrifice of bulls or the raising of incense, but in studying to know myself and to make known to others the wisdom, power, and goodness of God." These are the words of a man who tells us that his knowledge

was obtained by the inspection of the bodies of living animals, who gives us minute particulars of the experiments that he made upon them, and the conclusions that he drew from these experiments.

It would obviously be improper for me to remark upon the moral character of those men who in our own time have practised vivisection with (as we shall all admit) great benefit to our art; but lest it be urged that Galen, Harvey, and the great ones of old, though pious men, were yet blinded by the customs of their time to the evils which this more cultivated age sees in the practice, I may, before closing this part of my subject, remark that the late Dr. Hope was perhaps one of the greatest vivisectionists of this century, and I think I need not say that his character as a religious man is as well known as is his character as a scientific one.* To those who are not well acquainted with his life and work (so well known to all professional men), I would refer to the account of the numerous experiments that he performed upon donkeys, rabbits, &c., in the presence of some of our profession who may be here to-day.

I am prevented by want of time from dwelling more at length upon this subject, and from mentioning many results obtained by vivisection which we know to be most valuable (40).

Harvey, as is well known, before he was made Warden of Merton College, 'trained in academic bowers,' spent some time at Oxford in company with the King and his followers, and during that residence he was on intimate terms with Dr. G. Bathurst, of Trinity College, brother of the then President, and one of those concerned in the formation of the Royal Society; and by Dr. Bathurst he was materially assisted in the hatching of eggs for his experiments. It so happens that Trinity is the College at Oxford of which I

* See his Memoirs, written by his wife. Hatchard, 1843. It may be mentioned that Dr. Hope left directions in his will that a post-mortem examination of his body should be made, observing that a physician should set a good example in causing his body to be opened.

have the happiness and privilege of being a member, and I may be excused the pardonable pride of being familiar with the rooms which Harvey probably frequented, and in which his researches were prosecuted.

I do not find any allusion in Harvey's writings to the state of medical studies or teaching during his connection with that University. Had he referred to this subject, we might have learnt from him more than we now know of what has been of late in certain quarters termed the "Lost School of Medicine" at Oxford. If such a school has been lost, will not those who miss it do well to amuse themselves by looking for it in such a distant time? inasmuch as statistics relating to the numbers of medical degrees conferred by Oxford since this year, and extending as far back as 1665, fail altogether to give any indication of such a bereavement. In truth, though there was a School of Anatomy at Oxford in the time of Willis, Lower, and Millington, there never was at Oxford a Medical School in the present and ordinary sense. For example, we learn from certain statistics produced by the late Professor of Botany, Dr. Daubeny, at the British Association meeting at Nottingham, in 1866, that in no decennial period during the two hundred years following the date above mentioned did the average of M.B. degrees exceed *three;* and in the year 1857 my friend Mr. Charles Pearson, then Fellow of Oriel College (now a member of the Legislative Assembly in Victoria), in a pamphlet upon Oxford in relation to medicine, stated that the number of medical degrees conferred at Oxford was then two a year for the previous twenty-five years. Whereas I was told, but a few weeks ago, by Professor Rolleston, that at the then approaching examination for medical degrees at Oxford they had ten candidates for the first M.B., with the prospect of sixteen more in the following examination—*i.e.*, in all twenty-six—a striking contrast to the numbers above quoted. And no fewer than forty-six men, all having passed through the *complete course of Arts* before entering on medical study, are eligible this year to go in for the two medical examinations for the M.B.

degree. These figures require no comment. A correspondent, writing to me a month or two ago from Oxford, observes—"I believe our numbers for the M.B. here are nearly or quite equal to those at Cambridge, though we have not sacrificed our Arts curriculum at all."*

The expression "Lost School of Medicine" at Oxford, to which I have alluded, by whomsoever used, must be the outcome either of gross and culpable ignorance or, as I should be most unwilling to suppose, of a calumnious and vindictive spirit.† Any one who knew Oxford thirty years ago, and is able to compare the state of Physical and Biological science, as it there and then existed, with that of the present time, must needs reflect with pleasure upon the teaching appliances and advantages now offered by means of lecture-rooms, laboratories, museums, &c., the degrees in Physical and Natural Science conferred, and the general pro-

* Some interesting remarks on the connection between the study of Medicine and the University of Oxford are contained in "Remarks on the Extension of Education" at that University, addressed by Dr. Acland to Professor Jacobson in 1848. The relation between the University and the study of Physical knowledge had been previously and very judiciously considered by my kinsman the late Dr. Ogle (subsequently Regius Professor of Medicine, and who delivered the Harveian Oration) in a letter to the Reverend the Warden of Wadham College, containing suggestions for remodelling the examination statutes in 1841, suggestions which might seem almost prophetic, of the changes which after many years were introduced. I must not omit to mention for the sake of those interested in the history of the introduction of the study of Physical Science into the University of Oxford, a pamphlet by the late Dr. Daubeny, "Can Physical Science obtain a Home in an English University?"

I would also call attention to a pamphlet lately published by Dr. Pye-Smith on "Medical Education, Apprenticeship, and Medical Degrees," in which many hints of importance on the subject of university training in connection with medicine are noticed. I would also here refer to two pamphlets which have lately been published on the relation between the University of Oxford and medicine, but which have only just been brought before my notice—viz., one by Dr. S. West, Medical Tutor to St. Bartholomew's Hospital, entitled, "The Proposed Establishment of a Medical School in Oxford;" and one by Dr. Seymour Sharkey, Resident Assistant-Physician at St. Thomas's Hospital, on "The University of Oxford and Medical Education."

† A correspondent, who by the nature of his duties was more conversant than any one I know with the work carried on in all our schools and universities, alluding to this matter, refers to the "abominable tissue of malignity and folly which has been woven together on this subject."

gress and interest in such subjects which have of late been brought about at Oxford—an interest greatly quickened, if not originated entirely, by the endeavours of the present Regius Professor of Medicine, Dr. Acland.

Of late years the University of Oxford has made great and carefully-considered additions to the means of Scientific education and research. Thirty years since there were scarce any scientific laboratories, or any means of practical work for either professors or students. It is indeed surprising that Daubeny, Buckland, Baden Powell, Kidd, Strickland, were able to maintain, by their personal dignity and character, the position of physical science as they did when there was a general decay of interest in scientific studies at Oxford.

Between 1845 and 1850 a determined effort was made to add to the classical and philosophical education of this great University the means also of studying natural science in the most comprehensive way.

As regards Biology (41), under the auspices of one college, Christ Church, a large collection was formed by Professor Acland, with Victor Carus, Dr. Melville, and others, as assistants, on the type of the Hunterian Physiological series. The University possessed no collection and no work-rooms, no apparatus of this kind. The museum, now so well known, was under great difficulties founded, and provided with laboratories for practical work in Physics, in Chemistry, Anatomy, and certain parts of medicine. The physiological collection formed at Christ Church, together with the pathological collection which had been organised, and that of Van der Kolk, which had been removed from Holland, were placed there and admirably catologued by Dr. Tuckwell. A sanitary laboratory was commenced by my friend the late Dr. Pode, and carried on for some years by Mr. Donkin.*

The University has laid down that the principal service it can render to the medical profession and to Biological study is

* Who has lately removed to St. George's Hospital as Lecturer on Chemistry.

to provide every facility for scientific education, and to *prepare men in the best way through this channel for the clinical schools of the metropolis*, and though much has yet to be done, what has been done is far beyond expectation. The interest in medicine in Oxford has never, as far as is known, been equal to what it now is already. Already Professor Rolleston's work-rooms of anatomy require extension. He has added vast stores to the series of human and comparative anatomy and histology in every direction.* The chemical laboratory, though large twenty years ago, has lately been more than doubled, and new professorships in various scientific directions are sought for and will probably be obtained. The Radcliffe Library, transferred to the Museum, has had its grants more than trebled, and £300 yearly are spent there in scientific periodicals. Radcliffe's noble dome has become famous as the reading-room to the Bodleian, being open from ten in the morning till ten at night, for all true students of every country. Thus his gift has acquired a life and usefulness altogether new and never before contemplated.

I may add, on the best authority, that, although it is the desire and intention, as far as may be, of the authorities at Oxford to encourage by fresh measures a general and liberal education in the case of all students in medicine, by requiring them to pass the final examination for the B.A. degree at least one year before coming up for the first M.B. examination, efforts are nevertheless being made to increase still more than before the opportunities and capacities for teaching subjects cognate to Medicine. This is not the fitting place, nor have I time at my disposal, for enlarging further on the plans which I have the best warrant for alluding to as impending.

In testimony that the system which has now been in operation for some years in the "Lost School of Medicine" has not been inoperative or unsuccessful, I may allude to the fact that the medical graduates of Oxford enjoying posts of high trust in our hospitals and schools of the land are

* Since the above was written the lamented death of Professor Rolleston has occurred. See note (42) in Appendix.

now, and for some years have been, very considerable in number.*

Before closing my remarks on Harvey's teaching, let me allude to the general tone and spirit which is conspicuous in all his writings. Like Galen, like John Kepler, like Isaac Newton (43), like "starry" Galileo, like the guileless and lofty Faraday, like Charles Bell, all "Eagle Spirits" and "Priests of Nature," he was a firm believer in, and devout recogniser of, the hand of the Divine Architect in the structure of the outer world of nature (44). In many of his most important researches he presses forcibly the consideration of an Infinite Mind as directing, controlling, co-ordinating —a hand and Power (45) which brings into play those wondrous physical laws and appliances, the aggregate of which, when summed up and in adjusted mutual action and harmonious interplay, constitute what we call "Life."

Severe and unremitting search for truth, and illustration of his Divine will and workmanship, and not desire of public applause or personal advancement, appear to have been his incentive, and to have guided him almost entirely in his proceedings; and he perceives, as he says, in the mysteries of nature, "a kind of image in relief of the Omnipotent Creator Himself," who works with "inimitable providence and intelligence, and most admirable order." In this he recognises with the wise man in Ecclesiasticus, that 'Treasure of prudential wisdom,' that "by the greatness and beauty of the creatures proportionably the Maker of them is seen."† Of course, in this he fully recognises design or purpose, a 'principium principiens,' in all such things as can be understood, though he takes care to show that fanciful and hazy ideas of design, or so-called final or

* At a meeting held in London of above Thirty Medical Graduates of Oxford in 1878 to consider the desirability and feasibility of establishing a Medical School, in the ordinary sense of the word, at Oxford, the proposal was negatived by an overwhelming majority.

† Agreeing with a still greater authority, who observes that "invisibilia enim ejus a creatura mundi per ea quæ facta sunt intellecta conspiciuntur, sempiterna quoque ejus virtus et divinitas." Rom. i. 20, Vulg.

teleological causes, are not, of necessity, to guide us to conclusions. He points out that our first duty is to inquire whether the thing "be or not, before asking WHEREFORE it is," and though, as he says in one place, "Respect for our predecessors and for antiquity at large inclines us to defend these conclusions to the extent that love of truth will allow," yet he pins his faith to no man's sleeve, and slily taunts those who philosophise by tradition, and are, for authorities' sake, bound to see the physic of Galen, as he says, "kept in good repair," asserting that the facts cognisable by the senses wait upon no opinions, and that the works of nature bow to no authority, and he even points out where Aristotle was mistaken. Had he lived now, he would, most probably, have acquiesced in that teaching of evolution and adaptation in animal and vegetable life with which, originated by Wolff in the middle of the last century, then taken up by Lamarck, we have become familiar under the name of Darwinism; though not, of course, those unmeasured and extreme opinions on this subject by which some, indeed, out-herod Herod.

As regards Final Causes as a guide or help in ontological and biological research, much was said by Professor Acland in his Harveian Lecture for year 1865.* I do not propose here to dwell or enlarge upon the subject. I quite agree with many, such as Dr. Daremberg, the most recent of medical historians, that we cannot base our biology on preconceived notions of the utility of structure; but it does not follow that we must resist the "averment of our senses," to quote a phrase from Harvey, and shut our eyes to the plain and obvious instances of mental intention which surround us in wondrous and countless multitudes, and which, as it appears to me, no sane man can ignore. It is impossible to say how far our Harvey was guided to his results by considering the use and purpose of the valves in the veins.

* Harvey left directions that the oration should be given in Latin. Dr. Acland's was the first oration properly given in English. It had been given partly in Latin and partly in English by Dr. R. Lee, whose oration was never published. It is much to be regretted that Professor Burdon-Sanderson's was never published.

Let the principle of Design (*i.e.*, of a Designer) or benevolent intention hold its proper position, and be received as apart from scientific research, otherwise it is "wrongly placed;" and let there be not only a ruler, but an "over"-ruler; to use an expression which fell from the lips of the present excellent Bishop of Carlisle, let there be a "*scientific frontier*" in this matter (46). The old "*à priori*," or inferential, and the more recent inductive reasoning have different functions and spheres of action; they are to be considered as verities complementary and correlative of each other, and need not clash.* Let us, if practicable, make an "*Eirenicon*," and accept the words of Bacon, "Da fidei quæ fidei sunt" (47). I am induced to say this as, no doubt, great harm arises from extreme doctrinaires on both sides vilifying those who do not see through their own spectacles. What possible good can come from the vehement and repulsively positive way in which moral Nihilists like Herr Häckel, of Jena,† assail the Theologian? And again, what good can arise from that most untrue, discreditable, and insulting statement which a certain foreign ecclesiastic‡ is reported in the *Times* to have made last week in a public address in London, viz., that "in our day, *in order to get rid of the idea of God*, hypotheses had been devised making one species the outcome of another," &c.? Surely such reckless statements can only, like the fool's rod, recoil injuriously on the author's back (48).

As regards the doctrines of evolution, selection, survival of the fittest, aptitudes, inheritance, and adaptation, &c.—problems and speculative generalisations widely and deeply affecting all physical science at the present time, and of which, as biologists and students of the 'magnalia Naturæ,'

* When Napoleon objected to Laplace that he had omitted to refer to Divine Design in his famous work, Laplace replied, "I have no need to adopt the hypothesis." Daremberg has well said, "Rien ne discrédite et n'affaiblie autant les principes que d'en étendre les applications au delà des limites naturelles qu' ils comportent."

† Whose work on the Evolution of Man has been termed by Mr. St. George Mivart a "biological romance."

‡ Viz., M. Hyacinthe Loyson (Père Hyacinthe) in a lecture "Le Christianisme Positif."

and of man in Nature, we must take note, and which we cannot afford to evade or escape from—I for one would agree with the Right Hon. Mr. Justice Fry, who forcibly observes that "no new difficulty whatever is introduced by Mr. Darwin's demand: there is something to rejoice at in the extension to the lower animals of the realms of morality and religion;"* and again also with Professor Asa Gray, when he remarks: "We are sharers not only of animal but of vegetable life, sharers with the highest brute animals in common instincts and feelings and affections. It seems to me that there is a sort of meanness in the wish to ignore the tie. I fancy that human beings may be more humane when they realise that, as their dependent associates live a life in which man has a share, so they have rights which man is bound to respect."†

As Dryden has it:—

> "From harmony, from heavenly harmony,
> This universal frame began,
> From harmony to harmony,
> Through all the compass of the notes, it ran,
> The diapason closing full in man."

I can see no difficulty in considering simply organised protoplasm or slimy bathybius (if such a substance really exist, which appears doubtful) as the physical basis of life, or in looking upon the living structure in plants and animals as the same. The hypothesis of natural selection, first set forth by Wells and then developed by Wallace and Darwin, is, at any rate, a most probable and very workable one, and may account for the numberless varieties which we observe, species being evolved from species.

But then it must be held that this process and progression have been from the first as much foreseen and arranged by a Power of infinite prescience and wisdom as is the progress in the growth of the heart of the human fœtus through the

* See article in the *Contemporary Review* for December, 1879, on the Utility to Flowers of their Beauty, bearing on one part of Darwin's argument. I would here also draw attention to a pamphlet by the same writer on "Darwinism and Theology" (1872, reprinted from the *Spectator*, September, 1872).

† See "Natural Science and Religion. Two Lectures delivered to the Theological School of Yale College." New York, 1880.

cardiac types of the various series of animal life to that of man, the most consummate of creatures, to use an expression of Harvey, "the beauty of the world! the paragon of animals!" Quite as much self-existent intelligence is implied under the supposition of gradual evolution as if each orderly and progressively ascending step or link in the chain of development and of growth were the result of incessant immediate creative acts.* There is, in reality, no more dethronement or ignoring of Divine Sovereignty in the one case than in the other; though irreverence and agnosticism, so termed, may use the argument as a tool for their own purposes. A Divine plan and operance, the result of "Will," in Nature and in Man, exists in either case (49). As Sir Edmund Beckett has tersely put it, "The first living thing of any kind, and the first egg or other seed that ever grew, wants accounting for just as much as the first tiger's claw, or elephant, or man." The difficulties in the one case, if such there be, exist in the other, only at a stage anterior or farther back (50). And Asa Gray remarks, "The throwing back of design ever so in time does not harm it, nor deprive it of its ever present and ever efficient character." As the late and much revered Canon Mozley observed, quoted by the

* Sydenham had said as follows: "All own that the more we look deeply into the ways of Nature, the more does there shine before us her wonderful variety as well as the divine machinery of her operations. And these things are so far above our comprehension, that the man who shall take upon himself to measure them all by his mind, searching into the details of the manifold operations of Nature, will fail and fall—fall like Phaeton, 'magnis excidet ausis.'"

Professor Tyndall remarked in his address to the British Association, 1874, "In fact, the whole process of evolution is the manifestation of a Power absolutely inscrutable to the intellect of man. As little in our days as in the days of Job can man by searching find this Power out. Considered fundamentally, then, it is by the operation of an insoluble mystery that life on earth is evolved, species differentiated, and mind unfolded from their prepotent elements in the immeasurable past."

Ellis, in his general Preface to Bacon's Philosophical works, remarks as follows:—"In the sciences which relate to animal and vegetable life, the conviction that every part of the organisation has its appropriate function, which conduces to the well-being of the whole, serves not only to direct our thoughts to the wisdom of the Creator, but also to guide our investigations into the nature of the organisation itself."

same author, "If design has once operated *in rerum naturâ*, as in the production of a first life-germ, how can it stop operating and undesigned formation succeed it? It cannot; and intention having once existed, the test of the amount of that intention is not the commencement, but the end; not the first low organism, but the climax and consummation of the whole." I do not propose to occupy further time with this subject—one, however, which as physiologists and physicians we cannot in these days of intellectual activity and proud pretension set aside or slight.

Naturally anxious to discover any particulars of Harvey's life which have not been adduced by my predecessors on this rostrum as illustrations of his character, I have made search in various directions, as no doubt all previous Harveian orators have done.

I fail to discover any positive indication in Harvey's writings of his own theological views, excepting in his last will and testament, which is most religious in tone.* I find also but little indication of his political opinions. It does not appear why he parted from the service of his beloved and respected master the King.

There is an incident, however, in connection with the subject, which I found related in the Clarendon State Papers (vol. i., p. 574), and which is amusing—a letter dated May, 1636, at Cologne, in which the Earl Marshal (Arundel and Surrey) speaks of a visit to the Jesuits' fine new church and college in that place, where he says, "they used me with all civility," and goes on to observe, "I found in the college little Dr. Harvey, who means to convert them." Whether the good fathers were amenable to Harvey's assaults the deponent sayeth not. In other letters in these papers he is alluded to. Thus, in one

* The will is given, *in extensô*, by Willis, and commences with an invocation of the Almighty and Eternal God, and the words, "I doe most humbly render my soul to Him that gave it and to my blessed Lord and Saviour Jesus Christ, and my bodie to the earth," &c. I quote this because I lately met an educated gentleman who told me that he always understood that Harvey "was an unbeliever" in Christianity.

dated at Ratisbon, he is spoken of as "Honest little Harvey," "whom the Earl is sending to Italy about some pictures for his Majesty."

Another reference to Harvey I have met with, but which I have never seen mentioned in any systematic notice of him. It is well known that at the battle of Edgehill, October 23, 1642, Harvey withdrew, as Aubrey tells us, along with the Prince and Duke of York, who had been no doubt for a time commended to his care, under a hedge, and took out of his pocket a book and read.* But he had not read very long ere a bullet from a great gun fell and grazed the ground near him, which made him resume his station. Aubrey says nothing more of this passage in Harvey's life, but I find it related in Ant. A. Wood's Fasti Oxonienses (vol. iv., p. 46), that Adrian Scrope, Esq., a most valiant person, did most loyally attend his Majesty at the fight of Edgehill, where, receiving several wounds, he was stripped and left among the dead as a dead person there, but brought off by his son and recovered by immortal Dr. Will. Harvey, who was there, but withdrew under a hedge with the Prince and Duke while the battle was at its highest. It is reported that Adrian Scrope received nineteen wounds in one battle in defence of his Majesty's cause.

This retirement of Harvey during the fight recalls to memory the history of other earnest students of Nature—viz., Pliny the elder, his presence of mind and philosophic spirit in circumstances of bodily danger (51), also Socrates and Archimedes.

The contemplation of Harvey's work and method of thought leads me to enumerate some of those of our Fellows who have been conspicuous for their efforts to follow

* The event is very pleasingly depicted by my friend W. Yeames, Esq., R.A., in his picture exhibited at the Royal Academy in 1871. (See frontispiece.)

I find it stated in Lister's "Life and Administration of Clarendon," that, at Edgehill, Hyde was a spectator of the fight, and while the contest was least favourable bore the heavy responsibility of a very important trust; for to his protection were committed the Prince of Wales and Duke of York, aged twelve and nine years. The contest at this battle was so undecided, that of it was said by Sir R. Bulstrode, "*Victus uterque fuit, victor uterque fuit.*"

his example, in the way of direct observation and philosophical experiment, many of whom have been brought under our notice in an interesting article on the College of Physicians recently published in the *Quarterly Review*,* and were amongst the early founders of the Royal Society.

Such were Glisson, Wharton, Willis, Lower, Millington, Sloane, Needham, Warren, Langreish, Willan, Pitcairn, Pepys, W. Watson, Fordyce, Wells, Wollaston, Young, Prout, Blackall, Arnott, Conolly, Latham, Paris, Todd, Kirkes, Marshall Hall (52) and Bence Jones (whose personal kindness and services to myself in earlier life I am ever bound to hold in grateful remembrance), Robert Lee, Baly, Brinton, Parkes, Sibson, &c.†

Nor are those to be passed over who by their observation at the bedside have worked out pathological and clinical problems, and in their trials of the operations of remedial agents have been no less philosophically employed than those above enumerated [and which of us is not in our high mission daily carrying out Harvey's aim, and by his method in some degree busying himself, and this fruitfully, with that sequence of events which we term Nature, thus adding continually to the treasury of the world's knowledge (53) in all we do ?].

Such pre-eminently were Sydenham, Heberden, Fothergill, Lettsom, Baker, Mayerne, Dover, Gooch, Baillie, Elliotson, Bright, Addison, the lamented Murchison, *omnibus desideratus*, Sir Charles Locock, and among those who are "*inter vivos*," Sir George Burrows, Sir J. Alderson, Sir William Jenner, Sir W. Gull, and, not least of all, the classical and venerable Sir Thomas Watson, the Nestor and glory of our

* See number for October, 1879, page 351. From the pen, I understand, of our vigilant and worthy President, Sir Risdon Bennett.

† And in the present day a goodly number, Billing, J. A. Wilson, Garrod, Owen Rees, Walshe, Budd, Chambers, Gairdner, Guy, Lionel Beale, Wilks, Brown-Séquard, Burdon Sanderson, Handfield Jones, Guy, Barclay, Ringer, Pavy, Peacock, Sieveking, Greenhow, Johnson, Reynolds, Radcliffe, Habershon, Cheadle, Broadbent, Fayrer, Dickinson, Buchanan, Ferrier, Hughlings-Jackson Allbutt, Southey, Roberts, Long Fox, Curnow, Buzzard, Maudsley, Bristowe Williams, Brunton, Pye Smith, Fagge, Gowers, Poore, and many others.

profession, and, as the late Dr. Latham once said to me, "the greatest physician of the time," whose finished writings, equal in style to those of Goldsmith or Addison, at once charm and instruct us, "whose age is as a lusty winter," and who, "*plenus annis honore et amore*," still, I rejoice to say, lives and works among us.*

Here let me beg you to realise the loss which our College and the world at large have sustained in the death of Dr. Alfred Swaine Taylor, who but quite recently heard the dread voice and departed from among us at a ripe age, "*felix opportunitate mortis.*" We shall all agree, I think, in feeling that by his death we are deprived of a Fellow who had one of the highest and widest reputations (and this he fairly earned by the singular exactness of his experiments and the clearness of his methods), especially in the subjects to which his energy was chiefly devoted—toxicology and medical jurisprudence, upon which subjects he had left behind some valuable writings. While medical science has been enriched by his labours, we must remember that the legal profession also owes him a large debt of gratitude, inasmuch as his work on "Medical Jurisprudence" has become a text-book for the criminal lawyer. Engaged as he was for many years (indeed, for nearly half a century) in the most difficult inquiries connected with medical jurisprudence, it is the highest praise to say of him that there is no instance where his services were not subservient to the vindication of truth and justice. His authority and technical knowledge were never perverted from their proper objects. Innocence could as confidently rely upon him for its defence, as crime dreaded the patient unravelling and explaining of its nefarious and often murderous operations. Those who enjoyed his more intimate acquaintance must feel that they have lost an instructive companion and a genial friend, and one whose accomplishments made his society valuable to all who take an interest in the

* See note in Appendix, No. (54), for some lines written in reference to the portrait of Sir T. Watson, by George Richmond, Esq., R.A., now on the walls of our Censor's room. Sir T. Watson informed me he had heard the Harveian Oration in the old College of Physicians in Warwick Lane.

progress of science. This College will gladly acknowledge that it owes a lasting tribute of honour and respect to the memory of Dr. Alfred Swaine Taylor as one of its worthiest Fellows. On whom will his mantle fall?

I must now fulfil the pleasing task imposed by the positive direction of Harvey given to any one undertaking the duty of this day—viz., the "Commemoration of all the benefactors of the said College by name, and what in particular they have had done for the benefit of the said College, with an exhortation to others to imitate those benefactors, and to contribute their endeavours for the advancement of the Society, according to the examples of those benefactors, and with an exhortation to the Fellows and Members of the said College to search and study out the secrets of nature by way of experiment, and also, for the honour of the profession, to continue in love and affection among themselves, without which neither the dignity of the College can be preserved, nor yet particular men receive that benefit by their admission to the College that they might expect, ever remembering that 'Concordiâ res parvæ crescunt, discordiâ magnæ dilabuntur.'"

For a great many years after its foundation, as I am told by our excellent and zealous Treasurer, Dr. F. Farre, the Oration was always called the oration or speech "in commemoration of our benefactors;" so that, as we say at the University of Oxford, this is in fact our "Commemoration Day."

The names of all benefactors and their good deeds have been so often mentioned in this place, that it would not become me to occupy much time in alluding to them.

Imprimis, let us recall the name of the learned Linacre, our first President, who, inasmuch as it was by his suggestion that Henry the Eighth founded our College, may be considered our greatest benefactor and the establisher of our professional Commonwealth, and whose private collection of books became the germ of our first library, the chief part of which was destroyed by the great fire in 1666 A.D. After Linacre comes the profound scholar Caius, the first teacher of anatomy in England

Caldwell, and Lord Lumley, the founders of the Surgery Lectureship; Gilbert, the father of English experimental philosophy, and founder of the sciences of magnetism and electricity, the results of whose scientific experiments were so influential on the mind of Galileo,* whose work has been so highly praised by Bacon and Hallam, and who enriched our College by the gift of his library and instruments, &c.

Following these, we have Harvey himself, who, in addition to other good actions towards us, built us a library and a museum containing his books and instruments, and after his death, the exact place of which we do not know, bequeathed to us "bookes and household stuffe, pictures and apparell," including his "best Persia carpet" and "blue imbroyedyed cushion," "one pair of brass and irons with fireshovell and tongues of brass;" his preparations of bloodvessels and nerves, which we possess, being given to us in 1823 by the Earl of Winchelsea.

After Harvey we have the names of Goulston, who founded the lectureship which bears his name, and for which, "if possible, a body was to be procured;"† of the munificent and erudite Hamey,‡ who, as Dr. Munk, in the College Roll, observes, vied "with his contemporary Dr. Harvey in the frequency, and rivals him in the extent, of his benefactions to the institution," opportunely rescuing the College from parliamentary confiscation, and among other things doubling the fee to the Harveian Orators; of the Marquis of Dorchester, who bequeathed valuable treasures to our library; of Croone, who established the lecture with which his name is associated, and also provided for a sermon in conjunction with the lecture (to the discontinuation of which I am not able

* Fowler (Professor of Logic in the University of Oxford) observes that Bacon classed Gilbert among the Alchemists and Empirics, and speaks of him as being so immersed in his own particular branch of study as to have been himself turned into a magnet, and to have built a ship out of a thole-pin. "Itaque vires magneticas non inscite introduxit Gilbertus, sed et ipse factus magnes, nimio scilicet plura quam oportet ad illas trahens, et navem ædificans ex scalmo."—Aditu ad Historiam gravis et levis.

† It was after one of the Gulstonian Lectures that Dr. Ent was knighted by Charles II. (See Munk's Roll of the Royal College of Physicians of London, vol. i., page 224.)

‡ "Whose antimonial cup we now possess."

to find any historical allusion); of Edward Brown, the persevering traveller; of Hall, a liberal benefactor to the College; of Baillie, who during his life gave us all his anatomical preparations; of Dr. Arthur Farre,* who has given us his portrait and has so recently and so munificently added to our library.

Our treasurer informs me that he is daily expecting the bequest of Dr. Lambert (a Fellow of the College, who died in 1877) of £1,000.

Need I mention the numerous donors of the various valuable paintings and other works of art in our rooms, of which a complete list is published in Dr. Munk's Roll, including the portrait by J. Keenan of Sir George Smith Gibbes, a Fellow of the College (1798), and the Harveian Orator in 1817, presented to us by his grandson, Mr. Heneage Gibbes, a Licentiate of the College, which has just been varnished and cleaned?

I will here say that we have this very day become possessed of two most valuable gifts from my highly esteemed and valued friend Mr. George Richmond, R.A., of whom with regard to myself I may be permitted to say, as Harvey said of a patient of his, "He's my most particular friend, and I'm his most attentive physician."† Of these, one is the portrait of Sir William Butts, one of the physicians to our founder Henry VIII.‡ (mentioned by Shakespeare), painted in oils by Mr. Richmond from the original Holbein in the possession of W. H. Pole Carew, Esq., of Antony House, in Cornwall, who graciously

* Dr. A. Farre's gift consisted of about 1,000 volumes, among which will be found the collection which he was for many years occupied in forming, of various original essays on the early development of the embryo and fœtus in various animals, by German and other investigators. These are arranged so that they might be bound up into volumes. There are also some curious old books on midwifery, and some valuable illustrated books on pre-historic remains.

† "Fui enim ipsi medicus assiduus, ille mihi amicus necessitudine conjunctissimus."

‡ Of Sir William Butts's attainments we do not know much. He never held any collegiate office. He had an extensive grant of Abbey Lands, and was a friend of Wolsey, Cranmer, and Latimer. His name is associated, as Dr. Munk informs us, with Dr. Chambre, Dr. Cromer, and Dr. Ang in drawing up the MS. Recipes now in the British Museum [Sloane MS., No. 1047] of Medicines for the king's use (chiefly plasters, spasmadraps, and unguents).

consented, at my request, to permit the picture to be made;* the other is a crayon-drawing of Dr. Mayo, our President from the year 1857 to 1862, and formerly Fellow of Oriel College, taken shortly before his death in 1871.

Owing to circumstances, our College, like so many other institutions at the present time, is suffering from what our treasurer would probably term decided impecuniosity, its landed estates being just now much less productive than they should be. So much is this the case that, not being able to replenish our chest by giving the opportunity to Fellows and others of placing their coats of arms on our walls, or to improve our finances by the creation of honorary Fellows, as formerly has been done,† we have been this year obliged to forego our yearly evening *conversazione*.‡ So far, indeed, are we from having the "Convivium Harveianum," or dinner, which originally, and in accordance with Harvey's will, when the College was smaller (*dulcis comitum cœtus*), followed the oration.

I am sure I express the desire of all present that this may be the last year in which the omission of a college *conversazione* may prove necessary. May I venture, in closing my allusions to past benefactors, to hope that others among our Fellows and Members and our well-wishers may be found imitating and "out-soaring" them in their good example in benefiting the College, and urging the same generosity upon those whom they can influence?

With such names of past and present times on our roll as I have a little time ago enumerated, and with many others, as remarkable for general culture and for proficiency in fine

* The original Holbein was exhibited at the National Portrait Gallery some years ago, and afterwards at the Winter Loan Exhibition of "old masters" in the Royal Academy, and again in 1880.

† See Dr. Munk's "Roll of the College," vol. i., page 202, and iii., page 326.

‡ Many of our Fellows meet at the usual dinner after the quarterly meetings by intimation from the Treasurer of the "Fellows' Club," now Dr. A. B. Shepherd, I regret that the quotation from Harvey's will, "To maintain Friendship, "which formerly headed the invitation, has of late years been disused.

arts, in polite literature,* and in physics, and having such a history as we possess, may I not say that our College holds an exalted and distinguished position?

Let us not forget that this position, by virtue of its dignity, is also a most responsible one, and that each and all of us, being integral parts of the Medical Republic, share the responsibility, and are thereby urged to high achievement, bettering the example of our predecessors; that we are one and all bound, as a Brotherhood of Truth, not as members of a sordid craft, but 'to ourselves being true,' to preserve the character of faithful and loving seekers into the secrets of nature,† and this for the consolation and benefit of sorrowing and suffering humanity (even though sometimes misunderstood and unappreciated by the public) (55).

As a body of physicians we act not, as "braggart dogmatists" act, slavishly or blindly on any all-embracing Therapeutic Principle. Though 'reverencing the majesty of Custom,' remembering, as Spenser saith, that—

"All change is perilous, and all chance unsound,"

and inclining for the most part 'stare super antiquas vias,' yet fearing the ignorance of the learned, and remembering, as Aristotle says, that there are no minds so well regulated that they have no taint of folly, we do not bind ourselves,

* Need I call to mind the names of Prujean (ob. 1666), "omnium honorum artium et elegantiarum fautori et admiratori summo;" of Scarburgh (ob. 1693), "Anglorum in Medicis Hippocrates, inter Mathematicos Euclides;" of the gentle Arbuthnot (ob. 1712), member of the October Club, first proposer of the Memoirs of Scriblerus, "In Physic's Art as Galen learned, or famed Hippocrate;" of the satirist Garth (ob. 1718), member of the famous Kitkat Club, translator of Ovid, and eulogist of Dryden, whose life was written by S. Johnson; of Freind, to whom Bishop Atterbury applied the words "Phœbo ante alios dilectus;" of the munificent Mead (ob. 1754), "orbisque literati laudibus undique cumulatus;" of Akenside (ob. 1770), the author of the elegant preface to our College Edition of Harvey's works; of Brocklesby (ob. 1797), the friend of S. Johnson, Burke, and Wilkins; of Mason Good (ob. 1827), the accomplished linguist, the translator of Lucretius, and the Medical Historian; of the erudite, sagacious, and courtly Halford (ob. 1844); of Holland; and of Greenhill, well known to all as learned in philosophical and medical literature?

† It is stated that there are no less than 6,500 medical men—that is, men engaged in a scientific crusade against disease—under our Local Government Board.

"jurare in verba magistri." We possess no rules or formulæ peremptorily applicable in all cases; are neither disciples of Paracelsus, nor of Hahnemann, of Brown, Broussais, nor Cullen, and neither have as our motto "similia similibus," nor "contraria contrariis," curantur.* We can devise "no master-key for all locks." In these days the Fellows of the College do not cite physicians before them for impugning the infallibility of Galen, as in Dr. Geyne's time, who, on his humble recantation, was admitted a Fellow (1560) in the days of Elizabeth.† We claim no Ariadne's Clue, no Delphic Blade, assuring to us the discovery of any theory of disease of universal and necessary application, and are unable to say with Hippocrates, ἐστὶ δὲ μία τῶν νουσέων ἁπασέων καὶ ἰδέη καὶ αἰτίη ἡ αὐτή, "omnium morborum unus, et idem modus est." We are not wholly vitalists or solidists or humoralists (56)—not more for heroic Sorbonne than for expectant Montpellier; and, however precise or scientific may be the teachings of Physiology and Chemistry and other cognate studies, on which, as handmaids and allies, we rely, yet so complex, so inscrutable and mysterious a matter is life, so intricate and subtle the influences by which its processes are perverted or arrested, and their balance lost or disturbed, that we are compelled, if candid, frankly to acknowledge the practice of Medicine to be as yet but a conjectural though liberal art, albeit "drawn on each day, step by step, more near to an accurate science."‡

This being so, we must ever strive to follow rational indi-

* Do we not rather say, with H. Boerhaave, "Similibus conservanda similia, contraria tolluntur contrariis"?

† Who also could require the College to give the licence to practise without any "interruption, molestation, or suite."

‡ We still are, I much fear, far from the goal anticipated by Sir James Alderson, who, in his Harveian Oration, observed that the "intellect of this generation is pushing forward with still higher aim, even to the discovery of the final law which governs morbid processes, which may by possibility reveal the nature and course of the action of remedies, and which will also explain the introduction and progressive spread of epidemics." And again, that "a vista is opening which discloses the almost certain prospect that the results of inquiries now being pushed forward with so much vigour will concentrate in the discovery of some single comprehensive law, and that that law will be applicable to all that is now mysterious in the organic system of creation" (57).

cations in our competition with disease and death. We must not give ourselves over to what has been termed by Sydenham "the luxury of guesswork," but, "joining hands with nature," show ourselves to be guided by observation and experience resting upon a well-trained power of analysis and comparison.

Our pathology and our physiology are ever emerging into brighter light; but yet there is much—very much—which is not settled, the amount of the known, compared with the unknown, being infinitely slight,* even as regards the subjects with which we have most to deal, such as Inflammation, for example. To give one or two instances: our theories of that hydra-headed monster contagion and of germ influence† are yet very inchoate, and we are only now beginning to recognise the importance of the part played in Pathological processes by

* The following anecdote has been recorded. When Newton was asked how he had arrived at the discovery of the laws of motion of the planetary system, he could give no other answer than that "he had meditated constantly upon the subject;" and when Bentley admiringly and politely remarked that "Newton had killed all the game, and left nothing more to discover," the latter said, with more reason, that "there was game enough in every bush, if one only knew how to start it" (quoted in Osterlen's *Medical Logic*). Within the last two years the discovery of two new metals, Philippium, so called in honour of M. Phillipe Plantamour, of Geneva, and Decipium, has been recorded (see *Chemical News*, 1878, October and November).

† I have just read in the *Nineteenth Century*, 1879, p. 165, the following interesting fact regarding the means of dispersal of grape and presumably of other and minute organisms. M. Miguel exposed to the air in the south of France, during September, vessels containing sterilised grape-juice, and he found that in every case spontaneous fermentation took place, provided that the vessels were *un*covered, but that if a covering of fine gauze was placed over them, only a comparatively small number fermented, the remainder becoming mouldy. He attributes this fact to the free access, in the former case, of gnats carrying yeast cells on their proboscides from the vineyards. This seems to furnish an interesting instance of the transport of infective matter by insects.

I have myself known death in the human body occur from the effects of putrid matter carried by flies to the skin. The following case I transcribed from some printed source:—"A young officer, aged twenty-three, has just died at Evreux under afflicting circumstances. Being at Paris on a few days' leave, he visited the Jardin des Plantes, where he was stung on the upper lip by a fly while standing by the wild beasts' cage. On returning to Evreux he suffered some pain in the part wounded, but in spite of the counsels of his friends refused to obtain surgical advice. The symptoms became aggravated, and the poison spreading rapidly, the young man expired two days back in great agony. It is supposed that the insect had previously been feeding on putrid meat in the dens of the carnivorous animals."

parasitic and microscopical organisms and minute aërial beings, vegetable and animal. Our theories of the nature and etiology and relationships of fevers (to take salient examples in pathology) are still unsettled—the contest is being waged on Indian soil.* Our physiology is of necessity still progressive in spite of the refinement in the use of the microscope and test-tube to which we have attained; there being no definition of life even which is more complete and satisfactory than the physicist possesses of electricity, or of any other a-biological force with which it is correlated (58). Quite recently Dr. Brown-Séquard has been subverting, by important experimental researches, certain hitherto accepted facts connected with the nervous system.† There is some truth, it must be acknowledged, in the observation of Kölliker's that the life of a physiological fact is but of three days' duration. Therapeutic treatment is becoming daily more objective, preventive, expectant, and eclectic, and less dogmatic in its character; and, though we are equipped with such artillery, such certain arms of precision and potency—if the term be admissible—as digitalis, opium,‡ (60) and other invaluable re-

* I would here refer to the Presidential Address at the Epidemiological Society (Nov. 5, 1879), by Sir F. Fayrer, for some interesting remarks on the epidemic and endemic diseases of India, and some very plain-spoken words respecting our ignorance of their causation and of the proper modes of treating them.

† See Transactions of the Academy of Sciences, Paris, March 29, 1880, and also the *Lancet* for August 6th, 1881 (59). I have heard objections made to the use of vivisection based on the uncertainty of the results of such experiments, but these surely are invalid, as it must be that advances in our knowledge can only result from the correction and re-correction of previous researches. As Milton says, "Error is but opinion IN THE MAKING." The Abbé Fontana remarked, "Those only who observe and experiment make mistakes; those only who do neither never err."

‡ It would be difficult perhaps to say what remedy granted for man's service one could best dispense with, or of what the praises are most worthy to be sung. Sydenham, after giving a formula for preparing the liquid laudanum, which he might well have defined as that "sweet oblivious antidote," proceeds to say, "And here I cannot but break out in praise of the great God, the giver of all good things, who hath granted to the human race, as a comfort in their afflictions, no medicine of the value of opium, either in regard to the number of diseases that it can control, or its efficiency in extirpating them." "So necessary an instrument is opium in the hand of a skilful man, that medicine would be a cripple without it; and whoever understands it well will do more with it alone than he could well

medies, with their derivatives, and a few, very few, resources which have somewhat of a specific nature [φάρμακα μητιόεντα], such as quinine,* colchicum, arsenic, we must confess that he is the wisest man who constantly appreciates the extent of his own ignorance as well as his own powers, who most clearly recognises the cases in which he may be prudently passive, and knows well how to practise a "masterly inactivity."

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hope to do from any single medicine. To know it only as a means of procuring sleep, of allaying pain, or of checking diarrhœa, is to know it only by halves." "Of cordials it is the best that has hitherto been discovered in Nature. I had nearly said it is the only one." In another place he speaks of calling back the spirits by a small dose of laudanum in a case of debility after fever. Hence probably the designation given to the liquid solution of opium, of "laudanum"—*i.e.*, "laudandum." What an interest Sydenham would have taken in recent most beautiful and accurate experiments, such as those of Dr. Sidney Ringer on the Heart of the Frog, showing by the graphic clock-work recording method the invigorating effect of opium in certain quantities on the ventricle; proving, I would suggest, how very truly indeed it should be considered a "*Cordial!*" By the same experiments on the frog's heart Dr. Ringer shows how much preferable æther is to chloroform, and how useful ammonia is in correcting the depressing effects of chloroform.

Dr. Paris described opium as "the support of the coward, the solace of the wretched, and the daily source of intoxication to the debauchee." He says that during the war between England and France the surgeons of the French army administered opium and pepper to soldiers exhausted by fatigue. In Chomel's "Leçons de Clinique Médicale," vol ii., p. 302, I find the following quotation from Wedel's "Opiologie:" "Sacra vitæ anchora est opium bene et circumspecte agentibus; cymba autem Charontis in manu imperiti, et ceu gladius in manu furiosi. Cavendum ergo, ne ναρκωτικὰ fiant νεκρωτικὰ." The same author speaks of calomel as being "panacée de la tourbe medicale de l'Empire Britannique." This, however, was written in the year 1837.

* The total yearly consumption of quinine and its allied alkaloïds throughout the world being computed at 220,000 lb.—a quarter of this being consumed in the United States (New York *Med. Rec.*, June 18, 1881).

Mr. Clements R. Markham, in his "Popular Account of the Introduction of Chinchona Cultivation into British India," observes that the annual bark crop from the Government plantations of British India alone is already (after an experiment of but twenty years) no less than 490,000 lb.; and that in 1879-80 the quantity of bark sold in the London market from British India and Ceylon was 1,172,000 lb. Some idea of the great demand for medicinal herbs which exists may be gathered from the account narrated to me by Dr. Asa Gray of a botanical excursion which he made, along with friends, into North Carolina, during which they visited the root and herb warehouse of Messrs. Wallace at Statesville, where a printed catalogue of indigenous plants dealt in by the house enumerates about 630 species, to be supplied to wholesale druggists. One order alone for *fifteen tons* of Hepatica triloba had been received!

As the late Dr. Latham on one occasion remarked, "The art of physic consists not in the use of many remedies, but in the right use of a few" * (61).

I am admonished by my watch that I have already exceeded the time allotted to me. May I cherish a hope that in fulfilling my grateful task I have not abused your patience. "Si culpa sit, ignoscite mihi." It only remains for me to thank you, gentlemen, for your kind attention to this, my very imperfect performance; commending myself to your considerate indulgence, and asking you to join with me in the wish so dear to us all—

Floreat, vigeat Collegium.
Sit perpetuum

* Dr. Latham observed that "in our profession Science now jostles Practice as Quackery did formerly."

The above woodcut is that of the "reverse" of a bronze Roman medallion in the British Museum, representing the introduction from Epidaurus into Rome of Æsculapius, under the form of a Serpent. The serpent is leaping from a galley with oars passing under a bridge, is welcomed by the Tiber (personified), and is swimming to the Tiber-island, where a Temple to Æsculapius was afterwards erected. For further description see p. 12 and Note 8 in Appendix.

"ADVERSARIA,"

AS AN

APPENDIX.

Note (1). See p. 3.

Our Forefathers.

"Qu'est-ce-que nous avons à faire avec le temps passé?"

Referring to the participation we have in the work and efforts of our forefathers, Dr. Newman* observes: "Cast your thoughts back on the time when our ancient buildings were first reared. Consider the churches all around us: how many generations have passed since stone was put upon stone till the whole edifice was finished! The first means and instruments of its erection, the minds that planned it, and the limbs that wrought it, the pious hands that contributed to it, and the holy lips that consecrated it, have long, long ago been taken away; yet we benefit by their good deeds. Does it not seem a very strange thing that *we* should be fed, and lodged, and clothed in spiritual things by persons we never saw or heard of, and who never saw us, or could think of us, hundreds of years ago! Does it not seem strange that men should be able, not merely by acting on others, not by a continued influence carried on through many minds in a long succession, but by one simple and direct act, to come into contact with us, and as if with their own hand to benefit us, who live centuries later? . . What a privilege thus to be immediately interested in the deeds of our forefathers! and what a call on us, in like manner, to reach out our hands towards our posterity! Freely we have received, let us freely give."—*Sermon entitled "The Golden Palaces."*

Have we not to plant the tree "seris factura nepotibus umbram"?

Canon Kingsley has written as follows: "Thus standing upon the accumulated labours of ages we are apt to be ungrateful to those who built up with many labours, and often working through dark and dreary nights, that platform which now supports us. We complain impatiently of the blindness of many a man without whom we should not have seen, and of the incompleteness of many a man's doctrine who was only incomplete because he was still engaged in searching for some truth, which, when found, he handed on as a precious heirloom to us who knew him not."

Note (2). P. 5.

The Influence of the Sun.

"O blessed breeding Sun."†

In addition to the description by Ovid of Apollo mentioned at page 1 (see footnote), the poet addresses him also (see Rem. Am. 76) as "Carminis, et medicæ, Phœbe, repertor opis."

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* Lately described by Mr. Gladstone (see letter in *Times*, December 10, 1881, p. 9) as "this great and fascinating writer, the most fascinating writer, I think, of his age."

† Timon of Athens, iv. iii.

Regarding the influence of the *sun* the following quotations are, I think, interesting. Draper, in his "Intellectual Development of Europe," vol. i. p. 97 remarks:—

"I cannot dismiss the system of the Apollonian, Diogenes, without setting in contrast with it the discoveries of modern science respecting the relations of the air. Toward the world of life it stands in a position of wonderful interest. Decomposed into its constituents by the skill of chemistry, it is no longer looked upon as a homogeneous body; its ingredients have not only been separated, but the functions which they discharge have been ascertained. From one of these (carbonic acid), all the various forms of plants arise; that substance being decomposed by the rays of the *sun*, and furnishing to vegetables carbon, their chief solid ingredient. For this it may be said that all those beautifully diversified organic productions, from the mosses of the icy regions to the characteristic palms of the landscapes of the tropics—all those we cast away as worthless weeds, and those for the obtaining of which we expend the sweat of our brow—all, without any exception, are obtained from the atmosphere by the influence of the *sun*. And since without plants the life of animals could not be maintained, they constitute the means by which the aërial material, vivified, as it may be said, by the rays of the sun, is conveyed even into the composition of man himself. As food, they serve to repair the waste of the body necessarily occasioned in the acts of moving and thinking. For a time, therefore, these ingredients, once a part of the structure of plants, enter as essential constituents in the structure of animals. Yet it is only in a momentary way, for the essential conditions of animal activity are that there shall be unceasing interstitial death; not a finger can be lifted without the waste of muscular material; not a thought arise without the destruction of cerebral substance. From the animal system the products of decay are forthwith removed, often by mechanisms of the most exquisite construction; but their uses are not ended, for sooner or later they find their way back again into the air, and again serve for the origination of plants. It is needless to trace these changes in all their details; the same order, or cycle of progress, holds good for the water, the ammonia; they pass from the inorganic to the living state, and back to the inorganic again; now, the same particle is found in the air; next, aiding in the composition of a plant; then, in the body of an animal, and back in the air once more. In this perpetual revolution material particles run, the dominating influence determining and controlling their movement being in that great centre of our system, the *sun*. From him, in the summer days, plants receive, and, as it were, store up that warmth which, at a subsequent time, is to reappear in the glow of health of man, or to be rekindled in the blush of shame, or to consume in the burning fever. Nor is there any limit of time. The heat we derive from the combustion of stubble came from the *sun*, as it were, only yesterday; but that with which we moderate the rigour of winter when we burn anthracite or bituminous coal was also derived from the same source in the ultra-tropical climate of the secondary times, perhaps a thousand centuries ago."

Harvey, in his work "On Generation," when speaking of the three simple bodies "which seem especially entitled to receive the name, at all events to perform the office of 'spirit,' viz., fire, air, and water," proceeds to say, "flame is the flow of fire, wind the flow of air, stream or flood the flow of water. Flame, like an animal, is self-motive, self-nutrient, self-augmentative, and is the symbol of life; it is therefore that it is so universally brought into requisition in religious ceremonies: it was guarded by priestesses and virgins in the Temples of Apollo and Vesta as a sacred thing, and from the remotest antiquity has been held worthy of divine worship by the Persians and other ancient nations; as if God were most conspicuous in flame,* and spake to us from fire as He did to Moses of old."

The reader may remember Shelley's Hymn of Apollo, the Sun-God, or as the Rev. J. B. Deane, in his book on "Serpent-worship" (1830), styles him, the "Sun-Serpent-God" (who has been described as "the symbol of our intellectual consciousness"), of which two of the stanzas run as follows:

* The expression of Sir T. Browne's may be remembered, "Lux est umbra Dei."

"I feed the clouds, the rainbow and the flowers
With their ethereal colours; the moon's globe
And the pure stars in their eternal bowers
Are cinctured with my power as with a robe;
Whatever lamps on earth or heaven may shine,
Are portions of one power, which is mine.

* * * *

"I am the eye with which the Universe
Beholds itself and knows itself divine;
All harmony of instrument or verse,
All prophecy, all medicine are mine,
All light of art or nature;—to my song
Victory and praise in their own right belong."*

Note (3). P. 5.

Supernatural Agency in Disease.

Dr. Draper has observed (op. cit.), vol. i. p. 96:—

"Not without difficulty do men perceive that there is nothing inconsistent between invariable law and endlessly varying phenomena, and that it is a more noble view of the government of this world to impute its order to a penetrating primitive wisdom, which could foresee consequences throughout a future eternity, and provide for them in the original plan at the outset, than to invoke the perpetual intervention of an ever-acting spiritual agency for the purpose of warding off misfortunes that might happen, and setting things to rights. Chemistry, in like manner, furnishes us with a like example—an example very opportune in the case we are considering—of the doctrine of Diogenes of Apollonia, that the air is actually a spiritual being; for, on the discovery of several of the gases by the earlier experimenters, they were not only regarded as of a spiritual nature, but actually received the name under which they pass to this day, geist or gas, from a belief that they were ghosts. If a labourer descended into a well and was suffocated, as if struck dead by some invisible hand; if a lamp lowered down, burnt for a few moments with a lurid flame, and was then extinguished; if in a coal mine, when the unwary workman exposed a light, on a sudden the place was filled with flashing flames and thundering explosions, tearing down the rocks and destroying every living thing in the way, often, too, without leaving on the dead any marks of violence; what better explanation could be given of such a catastrophe than to impute them to some supernatural agent? Nor was there any want, in those times, of well-authenticated stories of unearthly faces and forms seen in such solitudes."

In a singular treatise, entitled, "*Curiosités des Sciences Occultes*," par P. L. Jacob, Paris, 1862, which treats of alchemy, astrology, magic, dreams, &c., mention is made (see p. 134) of a book giving instructions to make amulets with the Psalms of David, corresponding with different magical characters. Thus the 16th Psalm, composed by David when pursued by Saul, is considered to be useful against pains of body and mind. It procures prosperous voyages; and if carried written with its "character" under the left axilla, and repeated nine times, it prevents accidents. The 18th Psalm, if properly used, facilitates parturition. The 32nd Psalm prevents sterility; the 70th restores vigour to the aged.

I have lately seen an ancient silver cross in the Natural History Museum at Penzance covered by letters suggesting supplications, and entitled "Remedium contra Pestem." This had the date 1546 attached.

The word Epilepsy, as pointed out in Tyler's Anthropology, p. 15 (1881), or "seizure," was supposed formerly to be really the act of a demon seizing the patient.

In one of the "Year Books" of Edw. I., edited by Mr. Horwood, under the direction of the Master of the Rolls (years 32, 33, Pref. xvi.), I find that mention is

* Hesiod says, "From Phœbus physicians learnt the art of delaying death."

made of a MS. volume of reports in which is a copy of a charm in a contemporary hand, containing a list of the names of God which it is said are to be recited only in special cases, one case being "pur doute de plai." It is stated that on the occasion of an impending battle between the Bishop and the Earl of Salisbury, when the Justices examined the accoutrements of the champions, several rolls and charms were found in the coat of the Bishop's champion. Daremberg, in his "La Médecine Histoire et Doctrines," p. 142, when enumerating several strange remedies of the Salernian school, such as the eating of the stuffed sow in order to forget deceased friends, quotes the injunction to cure melancholy by an ointment made of plants culled towards the third hour of Ascension Day, whilst saying a "pater noster." Ewald, in his "Stories from State Papers," i. 145, speaks of prayers being offered at several parts of the body in cases of the sweating sickness. And quite recently I read in a description of travels in Japan, that it is the custom if a child is ill, to carry it to an idol and cause its hand to rub that part of the idol which corresponds to the affected part of the child.*

In some countries S. Bartholomew is appealed to to prevent sterility. In Pettigrew's work on Superstitions connected with the History and Practice of Medicine and Surgery, are many instances of the appropriation of particular diseases by different saints; and of the connection of the names of gods and goddesses with different medicinal agents.†

Note (4). P. 7.

On Observation.

Speaking of the principles of minute observation and numerical analysis, Dr. Walshe, in the preface to his translation of Louis on Phthisis, remarks: "Those principles are, in point of fact, demonstrably the means whereby all indisputable inferences and solid doctrines have of late years been established in the science of Pathology," and are "the instruments by which through all time truth must continue to be sought." Louis himself, in the advertisement to the first edition of the work, had said as follows, after stating that although habit had familiarised him with anatomical investigation, he still employed the same time as ever he had done in post-mortem examinations: "For I am convinced," he writes, "that if we wish to observe well we must not observe hastily; and that the sole means of rectifying unavoidable errors is repeatedly to submit to new examination questions which we may have at one time believed solved, and consequently to go on perpetually observing the same objects, just as if they were, in each instance, beheld for the first time."

In Dr. R. G. Latham's Life of Sydenham (Syd. Soc., p. lxxxv.) are the following observations: "It may fairly be claimed for Sydenham, that less than most of his contemporaries—less, perhaps, than *any*—did he permit preconceived notions of disease or treatment, and, still less, merely authoritative opinions, to step in between the disease and the observation He took cases as he found them, and *asked what they taught, not what they proved.* This simple recognition of the priority of direct observation, and its paramount supremacy to everything else, was the proclamation of what is *now an old truth, of what was then a new one*, and *of what is always a great one.*"

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* It was probably the same feeling which suggested, in days gone by, the advisability of fanning the face of the sick with leaves of the Bible, or making the number of bleedings or purges an "odd" one, in accordance with the saying, 'Numero Deus impare gaudet." In the number of *Notes and Queries* for January 29, 1876, is mention of a remedy used in Herefordshire for "fits," consisting of a ring made out of a shilling from the church offertory.

† In ancient Rome it was the custom of parturient women to invoke the aid of different female divinities in different stages of the process. In parts of Asia the belief still remains in the power of cabalistic characters on gems, papers, &c., to impart invulnerability against the weapons of enemies.

Note (5). P. 10.

The Physician and the Public.

The relation of the Physician to the Public in *ancient* times is a subject of considerable interest. The celebrated Oath of Hippocrates, accepted as genuine by some but not so by all, and this partly because it is not mentioned by Galen, sheds much light on this matter.

I have met with so many who were not conversant with this Oath—an indenture between a physician and his pupil,—a document which, as Adams observes, "exhibits the practitioners of medicine in a very remote age, already formed into a regular corporation, bound by an oath to observe certain regulations, and having regular instructors in the art," that I venture here to adduce it. It ran as follows: "I swear by Apollo the physician, and Æsculapius, and Health, and All Heal,* and all the gods and goddesses, that, according to my ability and judgment, I will keep this oath and this stipulation—to reckon him who taught me this art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring in the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the art to my own sons and those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to none others. I will follow that system of regimen which, according to my ability and judgment, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to any one if asked, nor suggest any such counsel; and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practise my art. I will not cut persons labouring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and further, from the seduction of females or males of freemen and slaves. Whatever, in connection with my professional practice, or not in connection with it, I see or hear in the life of men which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this oath unviolated, may it be granted to me to enjoy life and the practice of the art, respected by all men, in all times! But should I trespass and violate this oath, may the reverse be my lot!" Those curious about this ancient oath, or protestation, will be interested in a "Dissertatio Epistolaris" upon it, giving the orginal and also a Latin version, by Dr. Hamey, offered to the world in 1693, after his death, by the Rev. Dr. Littleton, Rector of Chelsea, containing several erudite letters from friends on the subject of the essay. The Tract was published at a shop "in Diverticulo Paulino, vulgo St. Paul's Alley."† This Oath, enjoined by the Father of Physic on his pupils, is said to be still imposed by some universities on the candidates for the degree in Medicine.‡

The procuring of abortion was common amongst the Romans, and, it is said, was liable to no penalty before the reigns of Severus and Antoninus [see Percival's Med. Ethics, p. 94]. Juvenal alludes to it several times in his Satires, as also Plato, as pointed out by Mr. Adams.

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* *I.e.*, Hygieia and Panakeia, daughters of Æsculapius.

† The writer of an interesting article on the coming "Annus Medicus," in the *Medical Times and Gazette*, Sept. 19, 1863, makes timely reference to the "Oath," and to the applicability of its teaching to those of the present day: "An heirloom which in two thousand generations has lost none of its freshness and cogency."

‡ In Dr. Greenhill's excellent work, "Address to a Medical Student," at p. 127, the form of oath taken by candidates for the M.D. degree at Berlin is given, and is compared with the form of words in which the medical degree at Oxford is conferred.

Mr. Adams quotes passages from several ancient authors illustrating the custom which was common of producing abortion in ancient times. He observes that no doubt the ancients "had anticipated all our modern methods of inducing premature delivery." He alludes to the interdiction of the noviciate from the practice of lithotomy, and shows that in antiquity the operation was always done by a separate class of operators, and that the Arabians considered it an operation which no respectable physician would even witness. He observes that in some parts of Scotland, not perhaps much more than a hundred years ago, the operation was commonly performed by non-professional persons.

It is stated of the family of Collot, the famous Lithotomist of France (ob. 1656), and the first who cut adults and old people for stone, that the operation was afterwards preserved for a long time in the family, as their peculiar property, and descended as an hereditary possession from father to son. (See Wadd's "Nugæ Chirurgiæ," 1824, p. 40).*

I may mention that in the "Records of Harvey," published by Sir J. Paget (p. 29), it is stated that the surgeons of St. Bartholomew's Hospital were stated to have been encroached on by the "surgeon for the stone" and for rupture, and by the "bone-setter." It appears that the office of Lithotomist at the hospital was abolished in February, 1731. It seems that in 1654 an order had been issued that the stone should be cut for publicly; and in 1714 another order that the stones shall be hung up in the Compting House, according to ancient custom. In 1722 was an order to put up a new rail because of the press of the company at the cutting of the stone.

The following abstract of the directions in the Hippocratic Treatise "On the Physician" as given by Adams illustrates the subject. The object of the author is "to instruct the physician how to conduct matters connected with the 'iatrium,'"—that is his establishment or "surgery," probably in part an operation room and a place for compounding medicines in.† "The physician should have a healthy look himself, for people fancy that a person who does not keep himself in good health is not qualified to take charge of the health of others. He should be of a prudent disposition and a gentleman of morals—*καλὸν καὶ ἀγαθὸν.*" Minute directions are given for the site and other circumstances connected with the iatrium, and about the performance of venesection at the arm, and mention made of several untoward accidents connected with it, such as the *blowing up of the vein, whereby the flow of blood is stopped* . . . and suffocation following as a consequence of the operation.

Again, in the treatise "On Decorum," which, however, Adams says has not the slightest claim to be looked on as genuine, but which was written by some one belonging to the stoical sect, a philosophical physician is considered to be equal to a god. "In the practice of medicine all the virtues relating to wisdom are exercised —namely, contempt of money, decency, modesty, simplicity in dress, character, judgment, quietness, accessibility, purity of life, sententious maxims, knowledge of the purifications which are proper and necessary in life, abstinence from lucre, freedom from superstition, divine excellence. The physician should keep himself aloof and not hold much converse with the common people, unless when necessary." Minute directions are given for the regulation of the physician's address on entering the chamber of the sick, and his conduct while there.

Adams, the translator of the works of Paulus Ægineta [who lived at the end of the sixth or beginning of the seventh century], and who has as a motto to his volumes

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* Wadd also alludes to a mural monument which is said to have existed in the church of Stoke-Holy-Cross in Norfolk, of a clergyman who died 1719, having the following inscription:—"Memoriæ Sacrum Thomæ Havers, Clerici, qui Theologiâ, Medicinâ, Chirurgiâ, et Lithotomiâ doctus fuit et peritus." The continuation of the epitaph (as I find in Blomefield's Topogr. H. of Norfolk, v. 5, p. 525) ran thus: "Erga Deum pius, Erga Homines, justus, Pauperibus et ægrotis semper amicus." The monument is described as being on the outside of the south wall of the church.

† On the iatrium see also Daremberg's "La Médecine Histoire et Doctrines," pp. 21, 22.

the following quotation from Seneca, "Multum egerunt qui ante nos fuerunt, sed non peregerunt. Suspiciendi tamen sunt, et ritu Deorum Colendi," observes as follows: "It appears to me that, at certain periods of ancient times, the standard of professional excellence was such as would not easily be attained at the present day, with all our vaunted improvements in knowledge, and that many of these early masters of our art were distinguished for varied stores of erudition, an ardent love of truth, and an aptitude to detect the fallacies of error, such as few of us even now can lay claim to." (See pref. to vol. i., p. 10.)

On this subject Dr. Daremberg,* in his remarks on the School of Salernum, alluded to in Note 12, describes a little work written about the year 1100, entitled "Sur la maniere dont le médecin doit se comporter auprès des malades," by one Archimathœus, which may be well compared with certain Hippocratic writings and many passages of Galen. Another work by the same author contains a curious collection of receipts and remedies which any one desirous of learning the medical treatment of the middle ages will do well to consult.

Note (6). P. 10.

Alexander the Great.

The fever of which Alexander the Great died (the causus, or ardent fever, caught in the marshes of Babylon, aggravated by hard drinking, and much relieved by the use of the bath)† is minutely described in a note by Adams in his translation of the works of Hippocrates, vol. i. p. 313, as given by Arrian from the "Ephemerides Regiæ," or "Royal Journals." One of the peculiarities of the attack was that the mind was pretty entire during its whole course, a characteristic of causus described by Aretæus. Adams observes that this is so in the case of yellow fever also, appearing to him to be an aggravated form of causus. This form of disease, "brain fever," is treated of in one of Sir H. Halford's essays (vii.) delivered before the College in 1830, and special allusion is made to the prophetic power which Aretæus says occurs in the last hours of life in those affected by the disease. It is related that Alexander had such great faith in his physician Phylippe, that on one occasion, when it was suspected that he was in Darius's confidence, he still allowed himself to be treated by him, and was cured. Grote observes that, according to Arrian (see vol. i. p. 251 of his "History of Greece," Second Edition), "During the last illness of Alexander several of his principal officers slept in the Temple of Serapis in hopes that remedies would be suggested to them in their dreams."‡ It does not appear that he was attended by any physicians, and his death, according to Cicero, had been predicted by an Indian when about to die on a funeral pile. Alexander had hung or crucified the physician Glaukias, who prescribed for his friend Hephœstion, who died.§ Some

* Of the life and works of Dr. Daremberg, who died Oct. 24, 1872, æt. only 55, an interesting notice will be found in the number of the *Br. Med. Journal* for Nov. 9 of that year. This "estimable and worthy" physician, "of great learning, intelligence, and ability," had been induced "by his high sense of duty, to remain in Paris during the siege by the Germans." "The anxiety and bodily fatigue and privations which he had there undergone," appeared to have greatly aggravated the painful heart disease from which he suffered.

† Alexander had previously nearly died from fatigue and bathing in the cold and rapid Cydnus.

‡ On sleeping in the temples to obtain communications from the Deity, specially as to disease, see Berlin Monatschrift 10, p. 229. The phrase "Ὄναρ ἐκ Διός ἐστι" is a very ancient one.

§ Of this summary method of dealing with the physician, Democedes, alluded to at p. 97, is a notable instance. Darius having dislocated his ankle, and having been painfully treated by the Egyptian surgeons at his court, and having had no sleep for seven days and nights, sent for Democedes at Sardis. He, however, dissembled and professed ignorance of the medical art until threatened with

said Alexander was poisoned When he died, however, the orator Demades at Athens coarsely but emphatically exclaimed, "It cannot be true: if Alexander were dead, the whole habitable world would have smelt of his carcase."

Note (7). P. 11.

On Aristotle.

Of Aristotle, "the master of those that know, according to Dante, the preceptor of Alexander, Mr. Luther Holden, in his recent interesting Hunterian Oration, remarks: "Now Aristotle, with all his anatomical errors, made a splendid beginning; and his enormous genius—which, considering the field of his labours, towered over the average stature of genius like the giant O'Brien from his glass case (nearly eight feet high) over his astonished visitors—his enormous genius, I say, so dazzled the men who came after him that, instead of pursuing his investigations, they even worshipped his errors."

Of this philosopher, nevertheless, Professor Tyndall, in his address (1874) to the British Association, remarks: "As a physicist Aristotle displayed what we should consider some of the worst attributes of a modern physical investigator—indistinctness of ideas, confusion of mind, and a confident use of language, which led to the delusive notion that he had really mastered his subject, while he had as yet failed to grasp even the elements of it. . . . Aristotle's errors of detail, as shown by Eucken and Lange, were grave and numerous. He affirmed 'that only in man we had the beating of the heart, that the left side of the body was colder than the right, that men have more teeth than women, and that there is an empty space at the back of every head.'"

Let us note and remember, however, what Sir A. Grant says: "No one could be keener than he (Aristotle) was to make facts the basis of every theory; but he was obliged to do the best he could in each case with his materials. He set out all that was known or believed on each subject, and added to the knowledge or criticised the beliefs as well as he could. The real aids for the advance and verification of science which exist in modern times—instruments such as the telescope, the microscope, the barometer, the spectroscope, and countless others; the knowledge of many great laws of nature; and the practice of accurately observing and carefully recording—were all wanting in the days of Aristotle. "Therefore it is absurd to treat him as if he had been a modern man of science with a vicious method."

Note (8). P. 12.

The Cultus of Æsculapius.

The fabled importation of the holy serpent from Epidaurus to Rome, representing the introduction of the worship of Æsculapius, about B.C. 291, is well indicated in the woodcut at page 80. The engraving is of the "reverse" of a bronze Roman medallion now in the British Museum, described as follows in the Museum Catalogue of Roman Medallions (p. 7, No. 4). "Rev. AESCVLAPIVS (beneath). Galley r. passing beneath a bridge of which two arches are seen; at the stern, a figure with arms extended, and at the prow, a serpent coiled r.; before

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whips and spurs. He then discovered himself, and procured sleep for the king by means of emollients and narcotics instead of violent remedies, and quite restored the king to health. For this Darius presented him with a pair of gold shackles, and each of his women gave him a vase of gold. Herodotus says that at Susa, after the cure of Darius, Democedes had a large house, was the companion of the king at his table, and enjoyed every luxury excepting that of being in Hellas. By his intimacy with the king he obtained the reprieve of the Egyptian surgeons who had been punished for their failure in attempting to cure the king. Democedes became all in all to Darius. Grote observes that the Persians always distrusted their own skill in medicine, and depended on foreign aid, Egyptians first and afterwards Greeks.

the galley, Tiber, reclining l., amidst the waters, holding reed with l. hand and stretching out r. to welcome the arrival of the serpent; in the background an island on which are walls and gates and a tree: border of dots. The tradition is that the serpent left the vessel and swam to the Tiber-island, where a temple to Æsculapius was afterwards erected. The obverse of the medallion has the laureate head of the Emperor Antoninus Pius (A.D. 138—161), and is inscribed ANTONINVS AVG PIUS PP TRP COS III.

A similar medallion is engraved in *Frœhner's* work "Les Medallions," and the French artist has more distinctly marked the outlines of the waves and the anatomy of the upper part of the reclining figure's body than those in the British Museum specimen, these details in the latter having become a good deal obliterated. Garth, in the preface to his translation of "Ovid's Metamorphoses," observes: "The legend of Æsculapius's voyage to Rome in form of a snake seems to express the necessary sagacity required in professors of that art for the readier insight into 'distempers,' the reptile being celebrated by the ancient naturalists for a quick insight." He facetiously remarks: "The venerable Epidaurian assumed the figure of an animal without hands to take fees; and therefore grateful prosperity honoured him with a temple. In this manner should wealthy physicians, upon proper occasions, practise; and thus their surviving patients reward."

Of the arrival in Rome of the serpent from Epidaurus—*i.e.*, the introduction of the veneration of Æsculapius, Fergusson, in his work (1873) on Tree and Serpent Worship, observes: "Perhaps the most remarkable event connected with the Epidaurian serpent is the embassy sent from Rome in the year 462 A.U.C., under Quintus Ogulnius. The description of the advent of the divine serpent is one of the most animated passages in Ovid's Metamorphosis (xv. 5), and which, so far as the main facts go, is confirmed by Livy (x. 47), Valerius Maximus (1, 8, 2), and Aurelius Victor (xxii. 1). That such an embassy was sent, and brought back a serpent, seems undoubted, as also that it was received with divine honours by the populace of Rome, and it may also be admitted that the plague was stayed after its arrival, but whether in consequence of it or not is another question. The Romans thought it was, and serpent-worship was established in Rome from that time forward. On the other hand, we learn from Pausanias's mention of it (2nd century) that the Æsculapian serpent continued to be venerated in Greece till after the Christian era."

Deane, in his work on Serpent-Worship (op. cit., see p. 192), observes that the deportation of Æsculapius to Rome is related by Livy, Ovid, Florus, Valerius Maximus, and Aurelius Victor, from whom it appears that whilst the deputation from Rome were engaged in admiration of the superb statue of the god, a serpent "venerable not horrid" glided from his place, and having passed through the city, went directly to the Roman vessel, and coiled himself up in the berth of Ogulnius. The ambassadors, "carrying the god," set sail, and when off Antium the serpent leaped into the sea and swam to the nearest temple of Apollo, and after a few days returned. But when they entered the Tiber he leaped upon an island and disappeared. Here the Romans built a temple in the shape of a ship, and the plague was stayed, "with wonderful celerity."

Being curious to ascertain what other monuments or coins in addition to the above described medallion existed in that "Magazine of Antiquities" the British Museum relating to Asklepios, by the kind help of my friends Mr. R. Stuart Poole and Mr. Warwick Wroth, I have examined and noted the following most important ones.

1. Head from colossal statue of Asklepios, found in Melos; of the Macedonian period, perhaps at the end of the 4th century B.C., or later. (See Mausoleum Room.)

2. Torso of a statue of Asklepios, found at Epidaurus. (See Elgin Room.)

3. Gem, with head of Asklepios, inscribed ΑΤΛΟΥ (in the gold ornament room).

(Nos. 1 and 3 are described in the British Museum Guide to the Blacas collection, now out of print.)

4. Figure of Æsculapius leaning on his staff, round which a serpent is twined. At his left side is a boy, in the character of Telesphorus, "the

subordinate therapeutic deity who had charge of convalescent patients. From the neck of the boy hangs a square tablet or packet, which may represent the case in which was kept a shell or charm inscribed on parchment or an amulet." Sculpture late Roman, described in Brit. Mus. Guide to Græco-Roman Sculptures, Part II., No. 27. (See basement, open to the public.)

5. Two votive feet in sandals, with a serpent in each case twisted round the ankles. Both were brought from Rome by the Duke of St. Albans, and are numbered 43 and 44 in the same guide as No. 4. "The serpents in both these votive monuments make it probable that these feet were dedicated to Æsculapius or some other healing divinity, out of gratitude for cure wrought in the temple of the god whose priests the patient had consulted." I find these votive feet mentioned in Mr. Bathurst Deane's work on the worship of the serpent, p. 128.* No. 118 also is a colossal left votive foot. (See same basement as No. 4.)

6. Reliefs representing a male and female figure reclining at a banquet. In some cases a procession approaches them leading animals (sow, sheep), and a horse's head is seen through a window. The interpretation of these reliefs is doubtful. They may possibly be merely sepulchral in character, though they have also been explained—at least those which have the procession bringing animals—as "ex voto" tablets dedicated by the sick to the God of Healing. In that case the reclining figures would be Asklepios and his daughter Hygieia; while the procession of men, women, and children (and the horse?), would be the family approaching to sacrifice to the god.

Regarding these reliefs, see P. Gardner in the *Contemporary Review*, vol. xxxi., 1877, and the references in the Bulletin de Corresp.-Hellen., vol. ii. pp. 74, 75.

(These reliefs are in the basement not open to the public, where is also the sepulchral relief from the tomb of Jason, a physician, representing a physician and a lad with a swollen abdomen.)

Of the *Coins* in the Museum illustrating the cultus of Æsculapius are the following:—

1. Trikka in Thessaly, the oldest seat of the worship of Asklepios. Copper; *reverse*, Asklepios seated, feeding a serpent. 4th century B.C.?

2. Epidaurus (in Argolis). Silver; *rev.*, Asklepios seated, feeding a serpent; beneath his seat a hound. Evidently copied from the statue in ivory and gold at Epidaurus by Thrasymedes, described by Pausanias (see Corinth. 27). 4th century, B.C.? In this statue the hero was on a throne holding in one hand a staff, and with the other pressing the head of a dragon; a dog at the feet of the statue.

3. Epidaurus. Copper; *obverse*, head of Asklepios; *rev.*, Hygieia (?) with bowl; in the field, a cupping-glass. (See No. 4.)

4. Amorgos, in Aegiale. Copper; *rev.*, cupping-glass. (See Lambros on this coin, and compare the bronze instrument for cupping in Brit. Mus. Bronze-room, case No. 40, top shelf.)

5. Pergamon, the great seat of the worship of the god in later times. Copper; *obv.*, head of Lucius Verus, A.D. 169; *rev.*, Asklepios standing, holding a staff encircled with a serpent, and facing Hygieia, who holds a serpent.

6. Pergamon. Copper; *obv.*, head of Commodus, A.D. 180; *rev.*, Asklepios standing in a temple.

7. Roman Aureus of Caracalla. *Rev.*, emperor sacrificing before the temple of Æsculapius. This coin is dated A.D. 215. (In A.D. 214 Caracalla slept in the temple of Asklepios at Pergamon to obtain a cure.)

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* The Egyptians offered "ex-votos" in their temples; and such offerings, of arms, ears, &c., in ivory and clay, exist in antiquarian collections. Wilkinson in his "Ancient Egyptians" describes and figures such. The Gods of Healing, amongst the Egyptians, are mentioned by historians. Diodorus states that the goddess Isis was wont to reveal herself to sick people when asleep, and give relief and restore lost organs of the body. But Mr. R. Stuart Poole informs me that it was only the later Egyptians who worshipped the god identified by the Greeks with their own Asklepios.

8. Metapontum (Southern Italy). Silver; *obv.*, head of Hygieia. The bust is inscribed ΗΓΙΕΙΑ. 4th century B.C.

9. Cos (under Roman Empire). Copper; *obv.*, head of Hippocrates; *rev.*, staff of Asklepios.

10. Selinus (Sicily), 4th century B.C. Silver; *obv.*, young river-god Selinus sacrificing at an altar, before which is a cock (an attribute of Asklepios); *rev.*, Apollo (discharging arrows) and Artemis in a chariot.

"The libation offered by the river-god to Asklepios refers to the draining of a marsh by means of which the . . . city was relieved from a plague sent by . . . Apollo, referred to by the reverse type."

[On another coin of Selinus the river-god Hypsas sacrifices before an altar entwined with a serpent (sacred to Asklep.), and a bird is seen limping away behind him (the drained marsh).]

11. Bizya (in Thrace). Copper; *obv.*, head of Emperor Philip, A.D. 244; *rev.*, Asklepios (?) reclining on a couch with Hygieia (?); before the couch, tripod and staff with serpent. On the left a slave is drawing wine from an amphora; on the right, fore-part of a horse. A cuirass and shield are also seen in the coin (compare the reliefs with reclining figures and procession of worshippers, &c.). Possibly this coin was copied from a votive tablet dedicated to the God of Healing by the Emperor Philip on his safe return from victory.

12. Parium (in Mysia). Copper; *obv.*, head of Commodus; *rev.*, inscription not legible in Br. Mus. coin [DEO AESC (ulapio) SVB (venienti)]. Male figure seated, raising the right leg of an ox which stands before him. According to Panofka, this is Asklepios "trying his first experiments in medicine."

In the Westminster School Collection of Coins is a copper one of Pergamum having the snake on it. As the Rev. Dr. Scott pointed out, the coins of Himera show a cock, the usual sacrifice to Æsculapius, in allusion to the hot springs there, used in medicine. Fennell, in his notes to Pindar (see pp. 102, 3), alluded to at p. 92, observes that cock-fighting and quail-fighting were popular pastimes in Hellas, and that Themistocles appeared to have thought that the spectacle of the game-cock's indomitable pugnacity afforded a good education to the people, as in his time public exhibitions were established at Athens by law. Alluding to the coins of Himera bearing the figure of a cock sacred to Asklepios and Athene, he observes that the bird may have been the *totem* or tribal symbol of a section of the settlers.

The article on Æsculapius in the Dict. of Biography and Mythology refers to works of art for drawings of the statues representing the hero.

The cultus of Asklepios, or Æsculapius, is well described and illustrated in many places; for example, in the article by Dr. L. Schmitz, in Smith's Dictionary of Biography. But, as I am told by Mr. Warwick Wroth, the fullest monograph on Asklepios is the learned T. Panofkas's "Asklepios," published at Berlin in 1846; it having originally appeared in the "Abhandlungen" of the Berlin Academy for 1845; and Grote has written much about the cultus of Asklepios. (See vol. i. p. 248 of his Hist. of Greece.)

Excellent and convenient summaries are the articles "Æsculapius" and "Asclepeion" in the new "Dictionnaire des Antiquités" of MM. Daremberg and Saglio, containing a number of useful references to their authorities.*

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* Concerning the character of Asclepius, who was worshipped one thousand years before he was known in Greece, Dr. Lettsom published an elaborate paper in vol. i. of the "Memoirs of the Medical Society of London" (1792), containing the results of much research into many ancient authors. The writer came to the conclusion that Æsculapius was represented under various characters, the chief being that of the physician, and that he was the same as Jupiter, Apollo, Osiris, Hermes, Thoth the inventor of letters, Apis the physician, and Sydye the man of justice, and of Cneph, produced from the mysterious egg. He was worshipped under the symbol of the serpent which gets rid of its old age, as he was supposed to have had a return to life or a renewal of youth, like Bacchus or Osiris. On the Lingam and Serpent-worship of the present day, see *Med. T. and Gaz.*, 1875, vol. ii. pp. 193,

The more recent numbers of the "Bulletin de Correspondance Hellénique" and the "Mittheilungen" of the German Institute at Athens, contain descriptions of the important discoveries on the site of the Temple of Asklepios at Athens.

The Art. "Epidaurus," in Dict. of G. and Roman Geography, gives the following references to accounts of the worship of Æsculapius by the Epidaurians, and of the sacred snakes, and of its introduction into Rome and other places: Dodwell's "Tour through Greece," ii. 255; Leake's "Morea," ii. 416; Boblaye Recherches, &c., p. 54; Curtius' Peloponnesus, ii. 416. Fergusson attempts to show that the early spread of Christianity was favoured by serpent-worship.

The article entitled "La Médecine Publique dans l'Antiquité Grecque," by M. le Dr. A. Vercoutre, a military physician, in the Revue Archéologique (see vol. 39), contains much of interest in the same direction. The following should also be consulted—viz., "Recherches Historiques sur l'Exercise de la Médecine dans les Temples," by Aug. Gauthier; and "Histoire de la Divination dans l'Antiquité," by A. Bouchè Le Clerq (Paris).

Professor Newton has pointed out to me an interesting dedication by Diophantis in gratitude for the cure of gout, from the Temple of Asklepios, Athens, in the Corpus of Greek Inscriptions published by the Berlin Academy, ii., pt. 1, p. 488.

With regard to the serpent which generally, if not always, accompanied the figure of Asklepios, and also Hygieia in Greek mythology, much curious and interesting research has been made. Pausanias, whose descriptions were derived of course from personal observation,* remarks that all dragons, particularly those of a yellow colour, were sacred to Æsculapius, and says these were of a different species from the larger ones nourished in India and Libya. No doubt the connection between serpents or snakes and Æsculapius and Hygieia (or the study and practice of medicine) arose from the general culture of, and veneration entertained by the ancients for, these animals.

Mr. Fergusson, in his work on Tree and Serpent Worship (1873, p. 3), gives the supposed history of this veneration and its alliance with the use of human sacrifices, both in ancient and in modern times (as in Mexico or Dahomey). He observes, "When we first meet serpent-worship, either in the wilderness of Sinai, the groves of Epidaurus, in Sarmatian huts, or Indian temples, the serpent is always the *agatho dæmon*, the bringer of health and good fortune. He is the teacher of wisdom, the oracle of future events." He graphically enumerates the qualities which rendered the snake a subject of love and admiration as well as of fear. He concludes that the origin of the worship of the serpent was most likely among a people of Turanian stock, the primæval inhabitants on the banks of the Lower Euphrates. It was probably a peculiarity of the Turanian Babylonians of the old Chaldean empire.

Fergusson points out that the Daphne, sacred to Apollo, a sign of victory, was, as a healing power, almost as important as the serpents of Æsculapius.

Of the serpent as emblematic of prophecy, Fennell, in his notes to the Olympian and Pythian Odes of Pindar (see pp. 48, 175), refers to the legend of Melampus, whose ears two serpents opened with their tongues, so that he could hear the speech of animals and birds. He alludes to the supposition that serpents were fond of dainties, and that they were said to administer honey, which was looked on as the special food of inspired persons.

Deane (loc. cit., p. 190) observes that the way in which the serpent became sacred as a symbol of health is not very satisfactorily explained. He remarks: "It is said by Pliny that the flesh of this creature is sometimes used in medicine, and that *this* was the reason of its consecration to 'health.'†

278, 349. It is stated that a sacred serpent is even at the present time kept in a garden near a hospital in Madras to which patients offer prayers.

In Mr. Pettigrew's "Medical Portrait Gallery," vol. i., is a short notice of Æsculapius, and the place he held in Greek life.

* And who, like Ulysses, "saw the cities of many men and learned their manners."

† The old compound "Theriaca," from whence our word "treacle" is derived,

Others say that the serpent changes his skin periodically, and thus becomes an emblem of renewed vigour in a sick man." Deane alludes to the notion

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or mithridatium, is here naturally brought to one's remembrance, and also the statement that the eating of snakes was at one time and by some thought to insure the maintenance of perpetual youth. The *Theriac*, about whose properties so much was thought and written in early times, was described in two treatises, by Galen, and was referred to at length by Paulus Ægineta. In his commentaries on the latter writer, Mr. Francis Adams has furnished much interesting information about it. He observes (see vol. iii. p. 525 of the Sydenham Soc. Tr. of P. Æg.), "Galen mentions that Mithridates, King of Pontus, had, by repeated observations upon condemned malefactors, acquired a most thorough knowledge of the proper antidotes for almost every venomous reptile and poisonous substance, and hence he constructed the composition bearing his name, which was long esteemed as a general antidote to deleterious substances. From it Andromachus, the chief physician to the emperor Nero, formed his famous theriac, *having added the flesh of vipers*, and otherwise altered some of the ingredients in the theriac of Mithridates." "As stated by Galen, it was composed of inspissated juices, liquid juices, barks, roots, flowers, seeds, and fleshes." The vegetables were chiefly hot volatile stimulants "supposed to counteract the frigidity of poisons. It was no doubt with the same intention that Andromachus added the flesh of vipers." It derived its name, Galen says, "either from its being used as a remedy for the stings of venomous animals (θήρια), or because the flesh of such a reptile, namely, the viper, entered into the composition of it."

Adams alludes to the description of the theriac by Averrhoes, who said that retains its powers until after forty years.

Galen, and after him Serapion, gave directions for trying the goodness of the theriac *by experiments on fowls or dogs previous to using it on man.*

It seems that this famous medicine, whose uses were supposed to be almost infinite, was expelled from the British Pharmacopœia about the middle of last century. Dr. W. Heberden, in 1745, wrote a learned disquisition on Mithridatium and Theriac, giving its history, an account of its various preparations as advocated by numerous writers in the course of the world's history, and showing the uselessness and absurdity of retaining the "farrago" of drugs, the only active one of which was opium in uncertain quantities, in the mat. medica. When its rejection was proposed by Dr. Heberden, the College of Physicians of London decided upon the question, and 13 voted for retaining whilst 14 voted for rejecting it.[1]

Adams says that the theriac is still retained in the "Codex Medicamentarius" of Paris, and is much used by Greek physicians in Constantinople.

Dr. Mead observed that "the physicians of Italy and France very commonly prescribe the broth and jelly of vipers' flesh to invigorate and purify the mass of blood exhausted with diseases or tainted with some vicious and obstinate ferment." See especially Charas' "Nouvelles Expériences sur la Vipère," dedicated (1669) to Vallot, chief physician to Louis XIV., containing a description of remedies obtained from the viper as against the bites of vipers and other diseases. In a recent article in *Chambers's Journal*, Dr. Stradling describes the use of the flesh of snakes as food by several nations at the present time. In another paper, after alluding to the feeding on snakes by birds and other animals, he remarks: "Lastly, man is casually ophiophagous. If he were bold who first swallowed an oyster, surely the pioneer of snake-cookery was bolder, though to my thinking there is nothing in the whole range of edible things so absolutely repulsive in its appearance, habits, and associations as that hideous spidery crustacean, the crab—very delicious it is, nevertheless. The Kaffir and Hottentot eat snakes of all kinds, even the deadly puff-adder, while the Bushman not only

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[1] Both the Theriacum, containing 61 ingredients, and the Mithridatium, with 45 ingredients, of former Pharmacopeias, were omitted in the Sixth London Pharmacopeia (1788), Dr. Baker being President. In this Pharmacopeia the classification of Linnæus was, for the first time, adopted.

having arisen out of the "opening of the eyes" of Adam and Eve, when they "took and ate" at the instigation of the serpent, or out of the study

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regards their flesh as a delicacy, but consumes without hesitation the animals which he brings down with his arrows tipped with the adder's venom. On the banks of the Mississippi, 'Musical Jack' means stewed rattlesnakes, a favourite dish, and one for which ingredients are never lacking in that infested region. Sir T. Mitchell tells us that the Australian aborigines are snake-eaters, and in some parts of France a tisane or broth of vipers is highly esteemed for gout and scrofulous affections, the big viper (*Vipera aspis*), and not our own *Pelias berus*, being the reptile used for its concoction. The late Mr. Frank Buckland states that he has tasted boa-constrictor and found it to resemble veal somewhat, and gives an amusing account in his 'Curiosities of Natural History' of a little girl appropriating some snakes' eggs and eating them, under the impression that they were big sugar-plums.

"I myself have eaten anaconda and viper, but cannot recommend either; and it must be confessed that though frogs, turtle, tortoise, igeiana, tejuassú, and even alligator are highly esteemed in various parts of the world, snakes have never risen into high favour as adjuncts to the table with white men, at any rate, nor do they seem ever likely to supersede butcher's meat in popular estimation."

The viper's flesh was introduced into several compounds contained in our older London Pharmacopœias. In Salmon's New London Dispensatory (1678), being a translation of the London Pharmacopœia, with copious additions and comments, we have a chapter devoted to the consideration of serpents. No less than twenty-four varieties are described, and their numerous and marvellous virtues and uses as therapeutic agents and amulets expounded; different parts of the creatures, as the head skin, blood, fat, gall, having specific properties and excellencies.

An ancient notion was that the flesh of vipers was not only useful as an antidote, but was specially nourishing, and tended to prolong life; hence chickens were wont to be fed thereon.[1] (See Clarendon Papers, vol. i. p. 373, quoted in 4th vol. of Southey's Com. P. Book, p. 484.)

Juvenal (see Sat. xiv. v.), has the following lines:

"If thou wouldst see another autumn close,
And pluck another fig, another rose,
Take mithridate, rash man, before thy meat,
A father thou, and unprotected eat!"

Possibly the following saying, derived from a Greek proverb, and mentioned in Bacon's 40th Essay, had its origin in this idea, "Serpens nisi Serpentem comederit non fit Draco." Pliny notices the fable (see lib. x. ch. 49 of his Nat. H.) that any one eating the serpent bred from "corrupting" bird's-blood may learn the language of birds.

Paulus Ægineta also enumerates "lozenges or trochisks, and also salts compounded of vipers' flesh and other antidotes containing flesh of other animals, as the wolf, the cicada or tree-hopper, the skink, &c. Many of the so-called antidotes contain opium or poppy-juice. Jeremy Taylor observes, in one of his sermons, when indicating that we not only escape from, but derive advantage from, temptation, "we kill the viper and make a treacle of him" (vol. vi. 254).[2] It seems that in the 13th century any sovereign remedy was called treacle, and Quarles, in his Emblems, has the following:—

"If poison chance to infect my soul in fight,
Thou art the *Treacle* that must make me sound."

In Queen Elizabeth's time the word was spelt *Triacle*.

The words of Pliny, whose works have been described as "an unequalled monu-

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[1] Deane (op. cit.) says that the exprestion "to eat snakes" became a proverb, denoting the feeding on nourishing food. F. Quarles mentions viper-wine as being aphrodisiac in its action. Sampson, 313.

[2] In Southey's Com. P. B., vol. 3, p. 249, others are quoted using similar expressions, as Hales of Eaton, Farindon. See also Sir T. More and Piers Plowman.

of the erection of the brazen serpents with healing powers by Moses in the wilderness.*

Fergusson remarks that serpents were kept at Delphi and in the caves of Trophonius, after the return of the Heraclidæ, for oracular purposes, but especially at Epidaurus, where was the famous temple and grove of Æsculapius, in which serpents were kept and fed down to the time of Pausanias, some measuring thirty cubits in length. There was a temple to Æsculapius in Alexandria in which a large serpent was kept.† Whence the worship of the god came, and when it was introduced to Greece, and whether it passed from Alexandra to Greece, or *vice versâ*, is uncertain.

Nor has the worship of Æsculapius failed to be revived, for I find it recorded in Southey's Commonplace Book, vol. ii. p. 607 (quoted from Pennant's Tour from Dover to London), that the first Lord Holland thought fit to restore an ancient altar once devoted to Æsculapius, and renewed the like devotion to the God of Health in this form :—

"Ob salutem in Italiâ
Anno 1767 recuperatam,
Hanc columnam
Olim D Æsculapio Sacram
Hunc iterum donat dedicatque. HOLLAND."

With regard to the Temples of Health, or Asclepia of the Greeks, Adams, in the preliminary discourse of his translation of the works of Hippocrates (see Syd. Soc. Trans., vol. i. p. 5), observes as follows :—After alluding to the two warrior sons of the mythical Æsculapius, Polodeirius and Machaon (princes and commanders of a contingency, as described by Mr. Gladstone in his "Homer and the Homeric Age"), who were skilled in surgery, he alludes to the deification of Æsculapius which followed in the course of time, and the establishment of the Temples of Health (of which there were throughout Greece as many as sixty-four, according to Schultze—see his "History of Medicine"), presided over by the Asclepiadæ, "as receptacles for the sick to which invalids resorted in those days for the cure of diseases, under the same circumstances as they go to hospitals and spas at the present time. What remedial measures were adopted in these temples we have no means of ascertaining so fully as could be wished, but the following facts, collected from a variety of sources, may be pretty confidently relied upon for their accuracy. In the first place, then, it is well ascertained that a large proportion of these temples were built in the vicinity of thermæ or medicinal springs, the virtues of which would no doubt

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ment of studious diligence and persevering industry," seeing that he collected everything useful and curious, are "Fiant ex viperâ pastilli, qui *theriaci* vocantur à Græcis." He mentions (lib. 8, c. 41 and 20, c. 95, 6) certain plants which were believed to counteract the action of serpents, such as the fennel, the juice of which was supposed to sharpen the sight as well of the lower animals as of man. It seems, however, that the word "Theriaca" was applied to a composition of many vegetable ingredients which are employed as an alexipharmic or antidote against all venomous bites; and that this was believed in until the middle of the last century. It was used in ancient times by Egyptian kings and Roman emperors to render them proof against poison.[1] Pliny inveighs against the Theriac owing to the multitude and expense of the drug, and its vain ostentation, all to give a glorious and wonderful lustre to the art, in order that it may be better accepted and more vendible.

* The brazen serpent was preserved for 500 years and had incense burnt to it until abolished by King Hezekiah (see 2 Kings xviii. 4).

† The question has been asked why serpents were included with apes and sewn up in the same sack with parricides who were thrown into the sea or river by the Roman Law (see Juv. Sat. viii. and xiii.).

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[1] See the Annals of Tacitus, Book xiv.

contribute greatly to the cure of the sick." Adams, in his commentary on P. Ægineta's chapter on Baths, remarks, that most of the ancient Temples of Health were connected with medicinal springs. He refers to what Pausanias says of the warm saline springs in the neighbourhood of Asclepieioni at Cenchreæ, and of springs near the Temple of Æsculapius at Corone, and of the wells near the Temple of Æsculapius at Pergamos.* "At his entrance into the temple the devotee was subjected to purifications, and made to go through a regular course of bathing, accompanied with methodical frictions, resembling the Oriental system now well known by the name of shampooing. Fomentations with decoctions of odoriferous herbs were also not forgotten. A total abstinence from food was at first prescribed, but afterwards the patient would no doubt be permitted to partake of the flesh of the animals which were brought to the temples as sacrifices. Every means that could be thought of was used for working upon the imagination of the sick, such as religious ceremonies of an imposing nature, accompanied by music and whatever else could arouse their senses, conciliate their confidence, and, in certain cases, contribute to their amusement. In addition to these means, it is believed by many intelligent mesmerists of the present day that the aid of animal magnetism was called in to contribute to the cure, but on this point the proof is not so complete as could be wished. Certain it is, however, that as the mesmerists administer medicines which are suggested to the imagination of patients during the state of clairvoyance, the Asclepiadæ prescribed drugs as indicated in dreams. These, indeed, were generally of a very inert description; but sometimes medicines of a more dangerous nature, such as hemlock and gypsum, were used in this way, and regular reports of the effects which they produced were kept by the priests in the temples. It is also well known that the Asclepiadæ noted down with great care the symptoms and issue of every case, and that, from such observations, they became in time great adepts in the art of prognosis. . . . . We are still possessed of two documents composed from the results of observation made in the ancient temples of health."† Grote, in his "Aristotle," 1872, v. i. p. 3, shows from Galen that among the Asclepiads the habit of physical observation, and even manual training in dissection, were imparted traditionally from father to son from the earliest periods; thus serving as preparation for medical practice when there were no written treatises to study.

Since the above was written, Mr. W. Wroth, of the Coin Department, British Museum, read a paper at the meeting of the Numismatic Society (Oct. 20, 1881) on the Worship of Asklepios at Pergamon as illustrated by the coinage of the city from B.C. 400 to A.D. 268. The following is an outline of the paper:—‡

It was at Pergamon that the cultus of the God of Medicine, which acquired considerable importance in Hellenistic and Roman times, had its principal seat; and the currency of that city, especially in the Imperial age, offers a large and nteresting series of types relating to Asklepios and to his companion divinities, Telesphoros and Hygieia.

Before entering into the numismatic details of the subject, the writer referred in general terms to the character of the Asklepieian worship in Asia Minor and Hellas Proper, and especially to its development at Pergamon, as made known to us from the literary sources and from recent archæological discoveries. Among the more interesting coins referred to was one belonging to the time of the Pergamene kings representing the God of Medicine seated (not *standing*, as in the later

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* Plutarch is quoted as stating that all the temples of health were erected on high situations, and where the air was wholesome.

† Tacitus, in his "Annals" (Lib. iv.), alludes to ancient rights of sanctuary pertaining to temples of Æsculapius, as well as of Juno; and (Lib. xii.) also to immunity of the people of Cos from taxation, owing to their antiquity and to the fame of the descendants of Æsculapius (of which family was Xenophon), who was connected with the island.

‡ A notice of which will be found in "The Academy," Oct. 29, 1881. I understand that the paper will eventually be published entire in "The Numismatic Chronicle."

and more familiar representations), and feeding a serpent rearing up before him. It was suggested that this representation might be a copy, or at least a reminiscence, of the famous statue of Asklepios at Pergamon made by the artist Phyromachos, who flourished about B.C. 240.

I may here allude to the erudite Harveian Oration of the learned, charitable, and hospitable Dr. R. Mead (1723), to which was added a discourse, "De Nummis quibusdam a Smyrnæis in Medicorum honorem percussis," with an appendix by Dr. Chishall, which gave rise to much speculation about the College of Physicians settled at Smyrna from the most ancient times, and distinguished by the privilege of celebrating annual games in honour of Æsculapius and Hygieia. The coins found in Smyrna were described as having the faces of physicians on one side; on the other, figures, by later writers explained as being figures of the poet Homer, sitting with the finger on the lips, in token of that silence which the oath of Hippocrates enjoined. Before the face of some is an asterisk, of others a thunderbolt. These marks were said to be explained by Laertius, in his Life of Plato. Regarding these coins referred to and depicted by Dr. Mead, Mr. W. Wroth informs me that for the obverse type we have the head of Apollo, and for the reverse a figure of Homer, seated. He says, "These must have been the coins which the Smyrnæans called Θμήρεια (Strabo, p. 646), and the action of the raised hand cannot have been intended to indicate the silence enjoined by the Hippocratic oath. Eckhel says of Mead's explanation: "Miram hanc et plane singularem Meadii opinionem admitti non posse . . . comprobavi!"*

Note (9). P. 12.

The Status of Physicians in Rome.

Much discussion has arisen as to the status of physicians in Rome, much learned controversy taken place as to what privileges of free condition and honour due to their services they enjoyed. The question is one which has been much elucidated of late years, and in itself a subject for an essay. Any one interested in it would of course find much valuable material connected therewith in Dr. Greenhill's erudite articles (Medicus, Medicina, Chirurgia, &c.) in Smith's "Dictionary of Antiquities," and much also in the writings of Dr. Daremberg, the larger "History of Medicine," vols. i. and ii., and the little volume "La Médecine Histoire et Doctrines,"† second edition, 1865. (See in the latter volume, chapters headed "La Médecine dans les Poètes Latins" and "État de la Médecine a Rome sous la République."‡) The more recent paper§ in the "Revue

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* We are told by Dr. Macmichael, in his "Lives of British Physicians," that the home of Dr. Mead (the Mœcenas of his day, and friend of Pope, Halley, and Newton, of Lord Bolingbroke and of Lord Chancellor Harcourt) was a grand museum, that he kept a second table for his humbler dependants, that he was driven to his country house near Windsor by six horses, but that his generosity entirely fulfilled the inscription which he had chosen for himself, "Non sibi, sed toti." See Nichols's "Literary Anecdotes," vol. vi., where it is stated that the sale of his books, pictures, busts, coins, and antiquities realised above £16,000.

Dr. Mead greatly assisted his friend and patient Lord Harcourt in collecting his valuable library. In Campbell's "Lives of the Chancellors," vol. iv. 498, an original letter from Dr. Mead to the peer is given, chiefly relating to the purchase of books.

† Dr. Daremberg's "Histoire des Sciences Médicales" was noticed in the Br. and For. Med. Chir. Review for 1872 (see October number, p, 330, &c.).

‡ Availing himself of Ménière's "Études Médicales sur les Poètes Latins," 1858.

§ "La Médecine Publique dans l'Antiquité Grecque."

Archéologique" for 1880, by Dr. A. Vercoutre, a military physician, contains highly interesting descriptions of the duties and position among the Greeks of the physician, especially the important body of civil "public" physicians, paid out of the public treasury and provided with the "ïatrium" or ambulance, containing remedies and all sorts of surgical and medical appliances, and with consulting and operating rooms and apartments, for the benefit of the sick poor of the various cities of Greece.* He also alludes to the provision made by the Greeks for medical service in their armies, for wounded soldiers, and the establishment of baths and public places for warmth and sleep, and of what would be called "maisons de santé," a system analogous to the present one of "assistance publique." In case of war or pestilence additional provision was made. The author quotes Hippocrates (the "Precepts") as enjoining help to the poor and stranger without reference to reward, although no mention of this is contained in the "Oath." He shows that the condition of the physician in Greece was always one of freedom and of honour, and often one well recompensed, slaves and women being prevented practising. He points out, as has often been before done, that the high opinion of the physician among the early Greeks is shown by the consternation which arose in the Greek army at the thought of the death of Machaon; and alludes to the public honours and freedom of the public games granted to physicians who had deserved well of citizens. He quotes the Athenian decree that Hippocrates should be initiated into the great mysteries without expense, that he should be crowned with a gold crown of great value, and that he should be publicly maintained during his lifetime.†

The author then considers the condition of the public professional functionaries among the Romans, after pointing out that it was before the advent of Christianity that the noble medical institutions where the poor received gratuitous help existed in Greece. Seduced by the beauty of the Greek institutions, the Romans adopted them to some extent, but medicine in Rome of the Cæsars was confided to slaves, freed-men, or strangers. The Romans had no feelings of humanity, disdained medicine and the arts, and despised a state of dependence or poverty; and thus public medicine was not seriously adopted. Moreover, in Rome different classes of society, or corporations, had their special medical attendants. The author describes the modifications made by the Romans in course of time as to the number and mode of election, &c., of the public physicians. About the middle of the fourth century A.D., Christianity revised and based on just and human principles the laws and institutions of the Roman people, abolishing iniquitous customs, and framing new laws when necessary, and creating and popularising good institutions. In time charity developed the "officine," or ambulance, into what became the first established hospitals, as by the influence of S. Basil and S. Chrysostom. The author points out places in modern Greece where, at the present time, the ancient mode of public medical service is maintained.

Dr. Vercoutre quotes largely from modern‡ and ancient authors, and cites numbers of inscriptions on which he bases his statements.

Although, as has been said, the Romans did not look upon "Medicine" or its practitioners in the same favourable light as did the Greeks, of which feeling Cato the Censor's‖ antipathy to Greek physicians as well as to philosophers, is a good example (see Plutarch's Life of Cato), yet we must remember the spirit and way in which Antonius Musa, the physician who cured Au-

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* The earliest public medical officer whose name has come down to us was Democedes (Herod iii. 125—131), referred to at page 87.

† We are told that Hippocrates had the same honours paid to him as had Hercules.

‡ Kühn, Malgaigne, Zimmermann, Wescher, Perrot, Foucart, Briau.

‖ Termed by Daremberg, "Le farouche Caton cet esprit etroit et routinier;" "ennemi echarnè des Grecs," &c.

gustus by help of the cold bath* (as Virgil's Iapys had successfully treated Æneas before him†) was entertained; we must bear in mind that a public statue was erected in his honour, and that his reputation was so increased by his skill that all the physicians at Rome, the "Turba Medicorum,"‡ shared in the honours he received, and were ever afterwards placed in equal rank with the knights.§

Specially interesting on the condition of the medical profession among the Romans are Middleton's essay, "De Medicorum apud Romanos degentium conditione," published 1726, and Schlæger's work, "Historia litis de medicorum apud Veteres Romanos degentium conditione." In addition to these are many others on the same subject in our medical libraries, under such headings as "Condition of Physicians among the Romans and other Ancients," and "Physicians Exiled from Rome," &c. The name of the physician who first practised medicine in Rome was Archagathus.‖

In Dr. Greenhill's article "Medicus," above mentioned, a number of noted physicians who were personal friends of celebrated Romans are named. Dr. Daremberg's work on the medicine and surgery of Homer is full of interesting curious matter. He alludes to Malgaigne's studies in the Anatomy and Physiology of Homer, and to his essay on the organisation of surgery before the time of Hippocrates.

Note (10). P. 13.

On the Reverence of Ancient Anatomists.

The reverence with which anatomy and physiology were pursued in earlier times, contrasting but too often with the handling which these subjects receive in our days, is pointedly described by my old and kind friend the late Sir F. Palgrave, in the "Merchant and Friar" (p. 223). "Friar Bacon was contemplating his subject with that tranquil and intelligent solemnity which, until the dissection of the dead body became, as it now is, a familiar and daily portion of medical study, characterised the tone of thought brought by the investigator to his pursuits. Deep and considerate reflection, heightened by devotional respect, were the sentiments which physiology inspired. In some degree the grave feelings of the ancient anatomist may be attributed to the character of mystery then enveloping the posthumous examination of the human remains. Conducted not unfrequently with danger, the opportunity for such investigations was rare. These incidents

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* Though the young Marcellus was said to have been killed, and Horace thought himself injured, by it (Ep. i. 15).

† See Atterbury's Dissertation on the Iapys of Virgil, of whom the poet wrote:

> "Scire potestates herbarum, usumque medendi
> Maluit, et mutas agitare inglorius artes."

‡ Pliny (Nat. H. 29, 1) describes a monument declaring of an unhappy man:— "Turba Medicorum se periisse."[1] The Rev. J. Kenrick, in a little work on Roman Sepulchral Inscriptions, alludes to funeral inscriptions containing complaints of death owing to inefficiency of the surgery of the physicians, "medici male membra secarunt," &c.

§ Kenrick (op. cit. p. 15) after referring to a sepulchral inscription directing that if the wishes of a testator were not complied with, the legacy should go to the College of Physicians, "ad collegium Medicorum," proceeds to observe that "every large incorporation among the Romans was a college; and the medical body included practitioners of every grade, even to the veterinary surgeon and the midwife (Iatromeia). He remarks (p. 25) that the monuments show that the medical men of Rome were commonly Greek freedmen.

‖ The first Englishman consulted at Court (Edward II.) as physician was John of Gadsden, Fellow of Merton (see paper by Mr. Hussey, of Oxford, on the Royal Touch for Scrofula).

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[1] Hadrian's last words were "Turba Medicorum Cæsarem perdidit."

gave more value to the study. They imparted a solemn preparatory tone to the inquiry, and the same sobriety followed it onwards. Instead of being attended merely by a crowd of unthinking youth, of rude and untutored students, even old grey-headed men came eagerly to learn; all presented themselves prepared as for an important event. They encountered the task with minds predetermined to their studies by religious reverence. Thus were they preserved—well was it for them that they should be so—from the assumed defiance of death, the scurril treatment of the placid corpse, the ribald jest, the impure gibe, the hardened jeer: all no less baleful to the individual than to the dignity of the noble science imparted for the relief of suffering mortality."

In far-back times, among the Greeks, the ancient philosophers slighted the dead body, "looking on it as the shell from which the bird had flown."* We know on the authority of both Pliny and Cicero that in their time the ashes of the dead could never be removed without permission from the pontifical college, or of the high priest.

Note (11). P. 16.

On Pervious "Foramen Ovale."

From an inaugural dissertation of Cæcilius Folius, a Venetian physician, Willis quotes the opinion that the blood passed in all cases from the right to the left side of the heart, as he had met with one instance of pervious foramen ovale. In this he was followed by Gassendi (who had met with a similar case) and others, who wished to damage Harvey's doctrine. *Apropos* of this I may state that many years ago, when curator of the Pathological Museum at St. George's Hospital, I closely examined the foramen ovale in a great number of hearts in the post-mortem room, and found very many in which some communication existed between the two ventricles by means of such foramina through the septum. Unfortunately I cannot at this moment lay my hands on the published record which I made at the time.

It is of interest here to notice the opinion that a cardiac bruit may be generated at a patent "foramen ovale." See the observations of Dr. Markham (*Med. T. and Gaz.*, April, 1857) and Dr. B. Foster, "Clinical Medicine and Essays," 1874, p. 51, &c. Also the case related by Mr. A. Campbell, with a drawing by Dr. Whittaker, in the *Glasgow Medical Journal* for January, 1874. Dr. Peacock, whose authority on Diseases of the Heart is so great, informs me that he does not remember to have met with any case of murmur referable to patency of the foramen ovale. "Indeed," he remarks, "as in most cases of open foramen ovale there is also stenosis of the pulmonary artery, it would be difficult to trace a murmur to the foramen ovale."

Professor Gairdner and Dr. G. Johnson inform me that they believe they have each met with a case of murmur from patency of the foramen ovale.

Note (12). P. 17.

The School of Salerno.

Salernum, alluded to by Petrarch as "Fons Medicinæ," and spoken of by S. Thomas Aquinas as being as remarkable for the study of medicine as Paris was for science and Bologna for law, and described by Gibbon as "an illustrious city in which the men were honest and the women beautiful."

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* But in times still more remote ("temporibus et diebus antiquissimis") the Egyptians, we know, held the dead body in great reverence, specially the heart, as "the vessel of that effluence of the universal soul which lives in us." See the interesting romance of ancient Egypt, "Uarda," by Georg Ebers, Tauchnitz Edition, 1877, and especially the description of the process of making the mummies (vol. i.).

Regarding the part played by the "Schola Salernitana" in medicine see the interesting chapters headed "De l'Ecole de Salerne," in Daremberg's little volume "La Médecine Histoire et Doctrines" (1865), referred to at page 97. The Medical School at Salernum maintained its influence until a similar one was established at Naples, and finally disappeared on the promulgation of the Centralising Decree of the 29th November, 1811.

The Latin didactic poem "Regimen Sanitatis," written about the middle of the 12th century by the School of Salerno* for Robert, the eldest son of William the Conqueror, went through 160 editions, as mentioned in the Notes to the Life of Elyot in "the Boke named the Gouernour," see p. cxi., edited by Mr. H. H. S. Croft. Reference is made to English translations of a commentary on the work.

Note (13). P. 20.

Realdus Columbus.

Regarding the physiological insight of Realdus Columbus, Hamilton observes (see his Hist. of Med., vol. ii. p. 71): "He explains the use of the lungs to be for the preparation and generation of the blood and vital spirit in them: for he imagined that the blood, being attenuated by elaboration in the right sinus or ventricle of the heart, is carried thence to the lungs, where by their continual action it is agitated, further attenuated, and mixed with the air entering through the bronchiæ from the trachea, and that the blood and air, when thus incorporated together, are received into the ramifications of the pulmonary vein and carried by it to the left ventricle of the heart. This theory of the functions of the lungs, and the nature of the change which the venous blood undergoes in its passage through that viscus, to be brought back to the condition of arterial blood, if restricted to the absorption of the oxygenous or vital portion of the air, taken in at each inspiration, is *almost in perfect accordance* with the discoveries of modern chemistry."

Note (14). P. 22.

Classical Education in Relation to the Study of Medicine.

The reader conversant with the "Psychological Enquiries" of Sir B. Brodie† will remember what Eubulus says (see Part II. pp. 171—3) in favour of classical and mathematical studies.

Mr. W. Luther Holden, in his Hunterian Oration, has observed: "The mind must undergo a long training before it is fit to grapple with science, and if we set aside classical education we shall be ignoring the value of the best system of training which exists; and upon this point I need only refer you to the verdict given by Her Majesty's Endowed School Commissioners.

"And my own experience as a teacher for forty years fully corroborates their judgment. In students who have had public school training I have found a fuller development of the logical faculty—a more cultivated memory, a greater grasp and power of combination. I have found the task of teaching them so much easier, that I have no hesitation in saying that I can teach such pupils more in two months than others who have had no like education in six.

"Bearing this in mind, let us strive to raise rather than lower the standard, by requiring a proof of sound classical training from those who, if they have not had this, have probably had little or no mental training whatever. Above all, let us not further hamper our noble profession, which in nine cases out of ten is

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* And derived, according to Daremberg, from the works of Hippocrates, Galen, Dioscorides, and Pliny.

† Whose life was designated by M. Giraldès as "L'accord d'un beau talent et d'un beau caractère."

taken up as a means of gaining a livelihood, with the stigma of being illiterate, nor subject the youths who are to be the future representatives of English surgery to the danger of being looked upon as 'symbols' of an inferior education."

The dependence of the high position and importance of our own (the medical) profession upon literary culture is happily touched upon by Sir Risdon Bennett in his inaugural address delivered at the opening of the Birmingham Medical Institute in 1880.

The following lines from the address of Sir Theodore Martin when installed (Nov. 21, 1881) as Lord Rector of St. Andrews University will approve themselves to all: —

"I believe that it is quite possible to combine a classical and scientific education, leaving the student to give the preponderance of his time and attention to that which he finds most congenial to his gifts and tastes, or most likely to prove of value to the work he has to do in life. The too narrow and uniform course of study formerly pursued in our schools and universities, did not sufficiently take into account the diversities in the social position and in the quality and bias of mind of the student. All this is now in the fair way to be corrected. In the wide range of academic studies now pursued there is scope for every variety of gift and inclination, and there is no longer any excuse for the deadening of enthusiasm, often degenerating into habits of idleness. But whatever a man's special gifts may be, or whatever his future profession or pursuits in life, it seems to me that he cannot but be a gainer by the training which is to be had under a good system of classical study. The man who has grappled successfully with the great Greek and Roman writers, may be trusted to have developed a faculty which will stand him in excellent stead, whatever he may be called upon to do, or wherever he may be called upon to go. What he knows he will know thoroughly, and he will have acquired a habit of application and intellectual discernment which will enable him to acquire and digest other knowledge with a rapidity and to turn it to account with an address that must give him an incalculable advantage over other men, who may be full of general information or practical knowledge, but who have not undergone the discipline of difficulty, of reasoning, and reflection involved in a mastery of the great classical writers. The young man who can put into terse, well-chosen English all the meaning of any passage of Thucydides or Tacitus, or who can make a good *précis* of an oration of Demosthenes or Cicero, will go into active life well prepared to follow any intellectual pursuit." Sir Theodore Martin has in his remarks alluded to the changes which have occurred, and are occurring, in education.

The following statement from a friend (J. Ball, Esq., F.R.S.) now possessing a world-wide reputation in more than one branch of physical science has been placed at my disposal, and well illustrates the matter in hand.

"While an undergraduate at Cambridge an Oxford friend (Mr. Pritchard) paid me a visit, and expressed much surprise at various points of difference between the two universities. Soon after he was elected a Fellow of Oriel, then, I believe, at the height of its reputation; and before long—it must have been in the spring of 1838—asked me to pay him a visit there.

"We dined, of course, at the Fellows' table. My head then ran altogether on physical science, of most branches of which I had some smattering. For some reason I was interested but ignorant of various points connected with the geology of the neighbourhood of Oxford. Thinking the occasion especially favourable, I put sundry questions to the grave and courteous dons between whom I sat at dinner, but received brief and inconclusive replies. With the want of tact of raw youth—I was not yet twenty—I recurred to the subject and put further questions, when at length the senior Fellow present said gravely, 'Well, at the best, geology is a very dangerous subject; I think the less we say about it the better.'

"This sentence remained imprinted in my memory because it set me on a conclusion which has remained with me through life as to the prodigious and general influence of traditional ideas. Here were two similar institutions near each other in the same country, recruited from the same society, with an interval of fully two centuries between the modes of thought current in each.

"I should have said that the speech of the senior don evidently met a general response, and he no doubt got credit for shutting-up a young Cambridge bore."

In Dr. Percival's "Medical Ethics" (specially Note vi. pp. 142—5, are interesting remarks on the education and training of the Physician, and references to many writers on the subject. See also especially "Gregory's Lectures" on the Duties, &c., of a Physician: the essay by Halford on the Education and Conduct of a Physician.

Sir B. Brodie often spoke of the solace which in long professional journeys out of London he obtained by recalling passages from classical authors committed to memory when young. Sir H. Halford wrote several of his "Nugæ Metricæ" in his carriage, "beguiling the tedium of many a long day," after the example of his friend Lord Grenville, thus providing himself with a similar resource "connected with reminiscences of those early delightful studies, whenever my own power of further exertion should be terminated by age, or interrupted by such disease as might leave me in possession of my faculties." To quote one of his own translations:—

> "Cum contemplari juvet, et, crescentibus umbris,
> Nocte sepultorum solus peragrare recessus."

Note (15). P. 24.

The Growth of Knowledge.

It is with much pleasure that I quote the following words from the pen of my old college friend, the Rev. J. Gregory Smith, now Vicar of Malvern, which appear in "Thoughts on Education," 1880. (Parker and Co.) He observes (see p. 41), "Whatever is most exact, methodic, and elaborate in modern science, is but the mature development of a germ, which lay buried, as the seed in its parent soil, under the misty and confused imaginings of a younger age. No science ever yet leapt forth, like Athene in her panoply, from the head of a Bacon or Descartes. Indistinguishably blended together, even when disentangled from the heterogeneous combination of childlike thought and feeling, the several sciences were being tinged, as it were, by the glowing wreaths of the retiring mist. Astrology was the forerunner of astronomy, alchemy of chemistry. History emerged from the region of fable under the paternal guidance of Herodotus, till its outlines grew clear and definite under the severe hands of Thucydides. The calm and thoughtful Sophocles was the legitimate descendant of the blind old bard who sang ballads of Troy and of Odysseus. Plato and Aristotle were the disciples as well as the reformers of that philosophy which had been stirring into life in the theogeny of Hesiod, and was gradually refined and moulded into shape from the rude and chaotic cosmogony of Thales and Anaximander. The imagination of man is the precursor of his understanding. The Delian Apollo is the undesigned personification of the subsequent glories of science, art, and literature. The myths of ancient Greece are the heralds of that triumphal march of science which they illustrate. From this bright fountain, lisping in broken murmurs its childlike tale under the soft and sunny sky of Ionia, issued the diverging streams of thought destined to bear the stately argosies of knowledge on their broad waters, and to meet and rest at last in the ocean of perfect wisdom."

Dr. Donnet, writing to the *Lancet*, 1879, vol. i. p. 793, on the anticipations of Harvey's doctrine of the blood's circulation, remarks: "The torpedo and the screw may be said to have been foreshadowed by Ben Jonson in his 'Staple of News;' the law of gravitation by Shakespeare in his 'Troilus and Cressida;' telegraphy by Leo, Archbishop of Salonica (888); the late discovery of the two satellites revolving about Mars by Professor Asaph Hall, by the astronomers of Laputa in Dean Swift's 'Gulliver's Travels;' steam by the Egyptians; armour-plated ships by one of the Maltese galleys sent by the Order of Malta to the assistance of the Emperor Charles V. of Germany, in his expedition against Barbarossa; the ram by the old rostrum; the revolver, the mitrailleuse, the breechloader, with many others, have likewise had their foreshadowings."

May we not truly say, "Multa renascentur quæ jam cecidere"?

Dr. H. Goodwin, the present Bishop of Carlisle, has observed that "each discovery reaches on towards some other, and even the detection of residual errors in previous conclusions becomes a specially fertile source of further progress. Guessing, doubting, testing, correcting, may be said, in homely phrase, to be the efficient engines of scientific motion; and the inductive sciences may find an incidental justification of their name in the fact that they *lead on* from one point to another, that each discovery induces another, that another, and so on (it may be) *ad infinitum*." *

A good example of the growth of knowledge on a single subject may be drawn from the History of the Trichina Spiralis (see Dr. Cobbold's work on Parasites, 1879, p. 150). He remarks: "If it be asked with whom rests the discovery of *Trichina*, the reply must be framed with a due regard to the precise issue at stake. The first recognition of the capsules in parasitic products is fairly claimed by Hilton; the worm by Paget; the zoological allocation and nomenclature by Owen; the adult worm by Virchow; the developmental phenomena by Leuckart; the rearing of the larvæ by Herbst; and, to crown all, the clinical importance of the parasite by Zencker." He further observes regarding the breaking and interruption of the life-cycle of certain parasites, that "the knowledge that we have acquired by experimental research in this connection has already enabled us to set a limit upon the prevalence of certain well-known disorders, such as Trichinosis, Cestode-tuberculosis, and so forth."†

Note (16). P. 25.

Political Knowledge.

As has been observed by a writer upon Political Economy in the *Edinburgh Review*, vol. i. pp. 446-7: "In the philosophy of mind, for example, the great fact of association was obscurely perceived by Hobbes, and even by Aristotle; the true theory of abstract signs was almost in possession of the schoolmen; some of the French grammarians had nearly approached that interesting fact in the history of language, which Mr. Horne Tooke has the full merit of having ascertained; and, not to multiply instances too much, the two great discoveries by which Mr. Hume and Bishop Berkeley have effected such a remarkable revolution in metaphysics, the correct analysis of our ideas of cause, and the precise limitation of our knowledge of external substances, may be traced—the former in the writings of Barrow and Aquinas, the latter in the sceptical system of Democritus. The political economist might adduce similar instances from the history of his science. That doctrine of commercial freedom, the rapid progress of which sheds so much lustre on the enlightened practice of the present age, presented itself to the mind of Fenelon, secluded, at a vast distance from the vulgar details of business, in the retreats of literature and religion: by a still more remarkable coincidence the same truth was distinctly apprehended and zealously maintained by Sir Dudley North, who had passed his life in the practical occupations of trade, at a time when the commercial system was loudly and successfully recommended to all the legislatures of Europe, both by merchants and by speculative economists. That principle, with regard to the primary and essential source of wealth, the elucidation of which has given political economy a new form, or rather first gave a strict scientific form to that subject, has been detected in some obscure authors, whose names and writings are now

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* "Et quasi cursores, vitaï lampada tradunt" (Lucretius).

† Referring to the trichina spiralis, I see from a note in the *Lancet* for June 28, 1879, p. 935, that this parasite has been found in the body of a hippopotamus which died at Marseilles, by Mr. S. Heckel. The animal was about two years of age, and for the four months that it had been at Marseille it had been fed on milk, flour, and fresh vegetables. It was not known what food it had had previous to that time.

only sought after on account of this casual anticipation: it is likewise stated in a much more remarkable manner by a philosopher of antiquity whose name once exercised a despotic authority, and whose writings have for some time sunk into unmerited neglect."

Note (17). P. 25.

The Copernican System.

Sir A. Grant (loc. cit., p. 186), speaking of the Copernican system, remarks that "Shakespeare lived and died in the faith of the older (*i.e.*, the Ptolemaic or Alphonsine) system. Milton had been bred in it as a boy, and the plan of his universe in the 'Paradise Lost' was drawn according to it. Yet still, as a learned man, he was well acquainted with all that could be said in favour of the Copernican system; and he puts these arguments into the mouth of Adam in the eighth book of 'Paradise Lost.' An angel, in reply, reminds Adam—*what is, in fact, the case—that neither the motion of the sun nor of the earth can be absolutely proved*," &c. "Milton's mind was apparently uncertain to the last which of the two systems, the Ptolemaic or the Copernican, was the true one," as Professor Masson has said.

C. Wren, in his interesting speech, or oration, on his being elected Professor of Astronomy at Gresham College (1657), observes *à propos* of the new views of Copernicus, "And now the learned begin to be warm, the schools ring with this dispute; all the mathematical men admire the hypothesis, for saving Nature a great deal of labour, and the expense of so many intelligences for every orb and epicycle; yet the apparent absurdity of a moving earth makes the philosophers contemn it, though some of them, taken with the paradox, begin to observe Nature, and to dare to suppose some old opinions false; and now began the first happy appearance of liberty to philosophy, oppressed by the tyranny of the Greek and Roman monarchies." After which he proceeds to eulogise Gilbert as an asserter of this liberty.

Lyell, in his work on Geology, mentions that lectures founded on the Ptolemaic system of the world had been delivered at Salamanca in this century. Quoted by G. Cornewall Lewis; see his Letters, p. 134.

Note (18). P. 26.

Lavoisier.

The practical result of Lavoisier's discoveries must soon have been apparent to his generation, as I find it recorded that, as one of the few who successfully applied chemistry to agriculture, in nine years he doubled his produce in grain, whilst he quintupled the number of his flocks. (See Davy's "Agricultural Chemistry," p. 15.)

Note (19). P. 27.

Harvey not even yet Appreciated.

And the results of Harvey's discoveries are but little appreciated even now by the public, as Dr. Ware, in his introductory lecture on "The Duties and Qualifications of Physicians," quoted by Dr. Greenhill in his "Address to a Medical Student," 1850, p. 132 (Oxford, 1849), indicates. He observes: "The discovery of the circulation of the blood by Harvey was not less fundamental or essential to a right understanding of the science of life than that of gravitation by Newton was to the right understanding of all physical science. In the two great divisions of the creation—animate and inanimate matter—they were the discoverers of the principles or laws with which all subsequent advances in knowledge have

been connected, and on which they have been in some measure dependent. Yet how different is the reputation they have enjoyed, not only in kind (which was perhaps to be expected) but in degree and extent! Who hears the name of Harvey uttered beyond the limits of our profession? Who knows anything of his life or labours? How little do men estimate the value of his discovery or the influence it has had on a science to which they are, notwithstanding, daily looking for aid and comfort! Who does not hear the name of Newton? It is equally in the mouth of the philosopher and of the schoolboy. It is associated in every man's mind, throughout the civilised world, with the laws of the universe which he inhabits. Compare Bichat with Davy. They were men strongly resembling each other in genius, in an early development of talent, and in the commanding influence they exercised over the sciences to which they were respectively devoted. Each, too, arrived in early youth at an eminence in his separate sphere of exertion which is with most men the reward of many years of unwearied toil. But how different the rank which they held with the world at large! The anatomist and the physiologist look up to Bichat with an admiration approaching that which the chemist feels in regard to Davy; but ask the man of letters what he knows of the two philosophers, and you will find a striking and truly mortifying difference.

"To take a still stronger example: Suppose that the great founder of modern surgery, John Hunter, had been a lawyer or statesman, and had applied to his pursuits the profound sagacity and unequalled industry which he bestowed on anatomy and physiology: he would have acquired a reputation equal to that of any individual of the age in which he lived; we should have heard of him in the same breath with Mansfield, Burke, and Johnson. But what does the world know of him now? or what did his contemporaries know of him then? Little more than that he was a *very respectable surgeon!* which, in comparison with the actual character and desert of the individual, is much as if one were to say of Lord Mansfield, that he was *a* respectable lawyer!" *

Dr. Arthur Wilson, in his work (1843) already alluded to, observes that, "for the better security of our social interests by the improvement of our professional studies, there is no help but in our ourselves. Of physic as a science, and in its usefulness, the public take no heed. Their sympathy is only with its follies. In truth, the ignorance of the gentry of England in medicine, gross as their credulity, is the superstition of barbarism."

There are, however, grand and notable exceptions to this neglect. The reader may remember the late Cardinal Wiseman delivering a highly interesting and most thoughtful and suggestive lecture† on the "Points of Contact between Science and Art," alluded to also at p. 127. He therein paid a most graceful and timely tribute to the memory of Harvey. "Divine Providence," he said, "has granted to this country the immense privilege of having made two of the greatest discoveries that the world has ever known: the one, that by which Newton enthroned, in the midst of our system, the sun as its lord and regulator; the other, that of Harvey, who enshrined the heart in the middle of the little world (the microcosm) which each of us possesses. Both have led to consequences which strike us with amazement, and can, indeed, hardly be too highly prized" (see p. 87). Again (p. 89), after glancing at the consequences of Newton's labours, he observes, "The other grand discovery to which I have alluded, that of Harvey, has been as fertile almost in beautiful as in profitable results. From the moment that double circulation in the body was established as a truth, equal in its completeness to that of the sun's place in the firmament, what an application of science has followed in its train; how have chemistry, mechanics, hydrostatics, found their principles, and most wonderful illustrations, in the functions of life," &c., &c.

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* Upon the coldness and inappropriateness of the church service, and the obvious want of appreciation of Hunter's work in life, which were evidenced on the occasion of the translation of his body from the vaults of St. Martin's-in-the-Fields to Westminster Abbey, March 28th, 1859, effected at the instigation of Mr. F. Buckland, see *Med. T and Gaz.*, Dec. 19, 1863.

† At the Royal Institution, Jan. 30, 1863.

Note (20). P 30.

The History of Transfusion of Blood.

"On comparing and examining the works of various authors on transfusion, this operation is found to have been the means of saving life, from the time of Blundell, 1820, to the end of 1875, in at least *eighty* cases of women dying from hæmorrhage in confinement, in *thirty* cases of wounds in war or of surgical wounds, in *fifty* cases of diseases of the blood or anæmic consumption, in *twenty* cases of typhus, cholera, hydrophobia, syphilis, dangerous fevers, and in *ten* cases of blood-poisoning from asphyxia, scorbutus, &c.—say a total of *two hundred* authenticated cases of patients who have been rescued from death in a period of fifty years by the generosity of persons who have given them their blood, and by the skill and confidence of operators." Such is the highly interesting and to many, no doubt, surprising statement which Dr. Roussel, of Geneva, has made—whose little work on "Transfusion" I shall further notice (see p. 115).

Regarding the early history of the operation of transfusion of blood, a subject of deep interest and importance, many contradictory statements have been advanced. It has been stated by Dr. Roussel that the Egyptians, the Hebrews, and the Syrians were in the habit of practising transfusion, and that their writers mention it; he also gives the names of many Greek and Roman writers who speak of having witnessed it. Whatever authority Dr. Roussel may have for quoting the above names as being conversant with the operation, we have positive *statements* made by comparatively recent writers, that as far back as towards the end of the fifteenth century the operation was practised on the human subject. *Many authorities* affirm that this was the first time that it was performed on man, the patient being Pope Innocent VIII., G. B. Cibo, the 225th Pope.* The most explicit account of this case in the English language is, I believe, to be found in Horner's translation of Villari's Life of Savonarola (vol. i. p. 144), who, as is said, had predicted the death of the Pope, as well as of Lorenzo† and the King of Naples. It is recorded of the Pope, who had had an apoplectic stroke the year before, that the vital powers rapidly gave way, and that "he had for some time fallen into a state of somnolency, which was sometimes so profound that the whole Court believed him to be dead. All means to awaken the exhausted vitality had been resorted to in vain, when a Jew doctor proposed to try to do so by the transfusion, by a new instrument, of the blood of a young person—an experiment that hitherto had only been made on animals. Accordingly, the blood of the decrepit old Pontiff was passed into the veins of a youth, whose blood was transfused into those of the old man. The experiment was tried three times, and at the cost of the lives of three boys, probably from air getting into their veins, but without any effect." The Pope died July, 1492.

The above translation of Villari's account of the treatment of the Pope in his fatal illness, is stated, in a foot-note to the translation, to rest on the following authorities, viz., the "Diarium" of Stefano Infessura, the Diarium of Burchard, Guicciardini, Sismondi, Leo, and Muratori.

In this account of Villari it is stated that transfusion of blood was actually performed in the case of the Pope, and that a "new instrument" was used on the

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* Alluded to by Hallam, in his "Constitutional History of England" (see vol. i. p. 97) as having issued a Bull for the reformation of monasteries in England.

† Whose health, we are elsewhere told, a physician of Padua had tried to establish by "draughts of distilled precious stones." It is recorded (see Sprengel's Hist. Med.) that Avicenna prescribed precious stones, besides gold and silver, to purify the blood. He also, it appears, prescribed other curious remedies, even bugs in ague and hysteria. In Salmon's London Dispensatory, referred to at p. 94, is a chapter on the virtues and uses of "stones," including gems, &c., in medicine.

Our London Pharmacopeias, even as late as 1721, contained formulæ for the administration of coral, pearl, and several of the "precious stones."

occasion; that the blood of the Pope was passed into the veins of the boy; that previous to that time the experiment had only been made on animals.

On referring to the "Diarium Urbis Romæ" ab a. 1294—1494, of S. Infessura,* which is quoted, at length apparently, by Eccardus in his "Corpus Historicum Medii Ævi (Lipsiæ, 1723), Tome II., p. 2006, I find the following description of the Pope's death:

"Nam in primis tres pueri decem annorum è venis, quorum Judæus quidam Medicus, qui Papam sanum reddere promiserat, sanguinem extraxit, incontinenter mortui sunt. Dixerat namque Judæus ille, se velle sanare Pontificem, dummodo habere posset certam quantitatem sanguinis humani. Et quidam juvenis, quem propterea extrahi jussit à tribus pueris, quibus post phlebotomiam unum Ducatum pro quolibet donavit; et paulo post mortui sunt. Judæus quidem aufugit, et Papa sanatus non est."

In the above statement it will be noticed that although it is affirmed that blood was taken from three boys, all of whom died (as in the record quoted by Villari), there is no mention of its being passed into the Pope's veins, much less that the blood of the Pope was passed into the veins of the youth,† or that any new kind of instrument was used in the operation. It is not stated in what manner it was proposed to use the blood, or whether it was used at all.

I next referred to a great authority—viz., Burchard, who in the year 1506 wrote a Diarium of a portion of Italian history (and is referred to as "Clericus et ceremon. mag.," also as "Procurator Apostolicus et Episcop. Hortan"). He describes‡ the death of the Pope, giving word for word the same statement as that of Infessura, as cited by Eccardus.

I next referred to another celebrated authority—viz., the "Rerum Italicarum Scriptores" of Muratori (1734), tome iii., pt. ii., p. 1241. He quotes the words of Infessura, as Eccard and Burchard had done, with slight verbal differences.

I then examined another authority, also professedly derived from the MSS. of St. Infessura, of Vialard, and others—viz., the Annales Ecclesiastici of Baronius and Raynaldo (1754), in which, at pp. 196–7 of vol. xi., is an allusion to the Pope's death in the following words:—"Laboraverat diutino morbo, a biennio enim, quo torpore soporifero viginti horis sine vitæ signis jacuerat, adversa valetudine fuerat usus: acciditque tum, ut cum vis morbi medicam artem eluderet, Judæus impostor, qui valetudinem pollicebatur, a tribus pueris annorum decem, qui paulo post emortui sunt, sanguinem exhauserit, ut ex eo pharmacum stillatium chimica arte paratum propinandum Pontifici conficeret: quod cum Innocentius rescivisset execratus nefas Judæum jussit facessere, qui mox fuga supplicio se subduxit."

In this version it will be seen that we have the story of three boys having died from the operation of venæsection, performed by the Jew; but it is by no means said that the blood was used for the purposes of transfusion. On the contrary, it is stated that the Jew wanted, after some kind of preparation, to give the blood to the Pope as a drink. It is, moreover, stated that the Pope angrily refused the offer of the Jew.

After consideration of the above references and quotations, I think it must be concluded that the various writers on the operation of transfusion are mistaken in asserting that the operation was performed on man for the first time in the case of Pope Innocent VIII. It would appear that the Hebrew physician did obtain blood from three boys by venæsection [and it is possible that they died from

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* Described as "Civitatis Hortanæ Prætor: deinde S. P. Q. R. Scriba sive Cancellarius."

† This statement of Villari's alone, to my mind, casts suspicion upon his account, as it never could have been imagined that the poor and evil blood of the dying old man could suitably or with advantage replace that of the young and tender boy's.

‡ See edition by Achilles Gennarelli Eques, Florentiæ, 1854, p. 193. It is there stated that Raynaldus and other historians are in accord as to the death of the three boys.

some cause or other*], and most likely it was with the intention of administering it, in some form, to the Pope as an invigorating potion. This would, indeed, be in accordance with the prevailing views of the time, as the drinking of blood, as well human as of animals (and especially that of early life), has been recommended both in former and recent times.†

Later on, the gloss as to transfusion crept in, contemporary with, and no doubt in consequence of, the interest which was being taken in the operation; it being assumed ignorantly that the original intention of the Jewish physician (or impostor) was to use the boy's blood for transfusion; or possibly the fable might have been invented to give colour and weight to the adoption of the operation.

I will now allude to more recent writers.

Sismondi, in his "Histoire des Républiques Italiennes," &c. (fourth edition, 1829), vol. viii. p 248, describes the transfusion as having been certainly performed by a Jew physician, and also the death of the three boys, aged ten, the children's parents being recompensed. As his authority he gives the Diary of Stefano Infessura, p. 1241; also Raynaldo; and ex-Volaterrano, l. xxii., and others. He speaks of the operation having been often proposed by charlatans, but of its having only previously been performed on animals. He states that the blood of the boys was *replaced by that of the Pope.*

In the same year that the above edition of Sismondi appeared a Life of the Pope was published at Milan, in 1829, by Serdonati, entitled "Vita e fatti d'Innocenzio VIII., in which occurs (p. 94) the following passage :—"Il papa che giorno e notte era occupato in questi provvedimenti, forse per soverchie fatiche, s'ammalò subitamente, l'anno 1492 del messe di luglio, e non giovando rimedio o diligenza alcuna, si morì molto divotamente. Mentre ch'egli era malato un medico ebreo offerse di fargli rimedi di sangue di fanciulli, e prometteva gran cose per giovamento del papa, e non solamente non fu accettato, ma il papa di più lo ributtò agramente, con dire che voleva rimettere liberamente la vita e la morte sua nel volere di Dio." ‡

This account quite accords with those above quoted, which indicate that transfusion *was not performed* in the case of the Pope.

Quite recently Mr. F. A. Symonds, in his "Renaissance in Italy: The Age of the Despots," 1875, p. 339, has repeated the story that a Jewish doctor "*proposed*" to invigorate the Pope by transfusion, and that three boys, as he somewhat sensationally puts it, "throbbing with the elixir of early youth, were sacrificed in vain." The account rests on Infessura.

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* Whether from inanition the result of large bleedings, or from clumsiness and carelessness in the venæsection, air getting into veins, or coagula forming in the vessels, I confess I look with great suspicion on the statement that all the three youths died in consequence of the venæsection. If so the same may surely be said of them as Shakespeare's Pucelle said of herself after her condemnation :

> "Whose maiden blood thus rigorously effused
> Will cry for vengeance at the gates of heaven."

† Since writing the above I have met with the following reference to the above-mentioned Pope's death in Bruy's "Histoire des Papes," 1733, iv. p. 278, which supports my suggestion. He observes that "un Juif lui prépara un breuvage composé du sang de trois jeunes garçons qui venoient d'expirer ; et le Pape l'aiant scu, il en eut une si grande horreur, qu'il donna aussitôt ordre d'arrêter ce Juif, et de la punir," &c.

The above statement has been pretty well repeated in the "Nouveau Dictionnaire Historique" of Chandon and Delandine (1804), quoted in *Notes and Queries* for Oct. 2, 1875.

‡ Altri scrittori dicono eseguito l'esperimento infelicemente colla morte di tre fanciulli.

Apparently, no further allusion can be found in medical literature to the recourse to this operation until 1615, when Libavius, a celebrated chemist of Halle, in a work published at Frankfurt ("Appendix necessaria syntagmatis arcanorum chymicarum"), described the procedure of transfusion of *arterial* blood of one person into the veins of another. The operation and its conditions are graphically described, but Libavius obviously mentions it only to criticise and condemn it; as he remarks that the physician who performs the operation must be out of his senses ("parum sanæ mentis"), and in need of Hellebore.*

In 1653 R. des Gabets, a French monk, showed the possibility and advantage of transfusing blood from vein to vein in man.

Forty years later than Libavius, probably about 1656, Wren (Sir Chr.), when at Oxford, made some experiments as to the injecting into the dog's veins of various ingredients, such as ale and wine, vomits, purgatives as scammony, narcotics as opium; and in a letter (? to Sir W. Petty) remarked, "I am in full pursuit of the experiment, which I take to be of great concernment, and what will give great light to the theory and practice of physick."

In 1663 Boyle, writing from Oxford, gives an account of the experiments for carrying "liquors" direct into the blood, which had, some time before, been proposed by Wren, and carried out on a dog provided by himself (Boyle); opium dissolved in sack being used. Boyle says that Wren performed the experiment in the presence of the Marquis of Dorchester, and that he (Boyle) afterwards suggested that not only trials of poisons, but of their antidotes also, or liquid cordials, should be made on the bodies of malefactors. Boyle observes that a foreign ambassador in London had tried the experiment on a man, but the result was not forward enough to be yet made known.

In 1664 Daniel, a German physician, described the operation which he had for some time used of transfusing blood from a healthy man into the veins of another.†

In December, 1665, the Transactions of the Royal Society recorded the fact of Wren's having, some years previously, proposed the experiment of infusion into the veins, and that subsequently the Royal Society had advanced infusion into transfusion, as they gave an order for a trial of the latter at their public meeting, May 17, 1665. The trial not being successful, owing to the want of proper apparatus, Dr. Lower set about and contrived a better method; he having already practised the operation in Oxford. He was followed by several experimenters in London, who successfully practised the operation by the public order of the Royal Society.

At No. 7 of the Royal Society's Transactions for 1665, p. 128, is a defence of Wren, as the original proposer in Oxford of injections into the dog's veins—as against the claims of some "beyond the seas." It is there stated that the experiments becoming known to a foreign ambassador "that was curious and then resided in London," he tried it on a servant who was an evildoer. It was soon afterwards extensively tried in Oxford and London, and before the Royal Society, and especially by Dr. Timothy Clark, one of the Royal physicians. Sprat, in his History of the Royal Society, p. 317, remarks as follows:—Wren was "the first author of the noble anatomical experiment of injecting liquors into the veins of animals, an experiment now vulgarly known, but long since exhibited to the meetings at Oxford, and thence carried by some Germans and published abroad. By this operation divers creatures were immediately purged, vomited, intoxicated, killed, or revived, according to the quality of the liquor injected. Hence arose many new experiments, and chiefly that of transfusing blood, which the Society has promoted in sundry instances, that will probably end in extraordinary success."

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* In the "Dictionnaire des Inventions" by Noel and Carpentier (Bruxelles, 1837), it is stated on the authority of the "Revue Britannique," December, 1825, that our knowledge of the operation was solely due to Libavius.

† About this time the names of Graaf, of Holland, 1664, Fracassetti, of Pisa, 1665, and Manfredi, of Rome, appear in connection with the operation.

In Pepys' Diary are several curious and quaint allusions to the practice of transfusion of blood at the time of its early adoption, of which the mention may be interesting. Thus in the Journal for November 15, 1666, he obseryes :—"Dr. Croone told me, that, at the meeting at Gresham College to-night . . there was a pretty experiment of the blood of one dog let out, till he died, into the body of another on one side, while all his own ran out on the other side. The first died upon the place, and the other very well, and likely to do well. This did give occasion to many pretty wishes, as of the blood of a Quaker to be let into an archbishop, and such like; but, as Dr. Croone says, may, if it takes, be of mighty use to man's health, for the amending of bad blood by borrowing from a better body." A day later (the 16th) he says he met with Mr. Hooke, "and he tells me the dog which was filled with another dog's blood at the college the other day is very well, and like to be so as ever, and doubts not its being found of great use to men; and so do Dr. Whistler, who dined with us at the tavern." Again, under date of November 21, 1867, he describes a man whom Gresham College had "hired for twenty shillings to have some of the blood of a sheep let into his body." In connection with this the editor, Lord Braybrooke, in a note refers to an account given in the Philosophical Transactions (No. 30, p. 557) of the experiments of transfusion performed at Arundel House, November 23, 1667, on the person of Arthur Coga (as stated by Weld, in the presence of the Bishop of Salisbury and some members of parliament). On the 30th November Pepys mentions having seen the person who had his blood taken out. He observes, "He speaks well, and did this day give the Society a relation thereof in Latin, saying that he finds himself much better since, and as a new man." "He is to have the same again tried upon him—the first sound man that ever had it tried on him in England, and but one that we hear of in France."*

Lower, at Oxford, who had performed the operation of transfusion in February, 1665, communicated to Boyle, then President of the Royal Society, in a letter (May 6, 1666) his mode of proceeding in conducting the operation of transfusing the blood out of one animal into another; and this description was imparted to the Royal Society, and is recorded in the Philosophical Transactions for December 17, 1666; being, as Dr. Roussel remarks, "the first authentic scientific document upon the operation which we possess." Following Lower's communication are many quaint and curious suggestions, "quæries and tryals," made by Boyle to the operator.

One of the earliest works on Transfusion is the little volume published by J. S. Elsholtz,† entitled "Clysmatica nova, &c." (2nd edit. 1667), in which the "Ars Enematica" is described, and various experiments by Italians, English, French, and Prussians, of transfusion from one animal to another, or from an animal to man, are noticed. The author had made experiments in 1660, somewhat later than those of Wren, Boyle, Lower, &c. He enumerates many cases in which remedies in solution might be administered by means of injection into the veins

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* The reader of George Eliot's novels may remember a striking scene in "The Lifted Veil," in which the operation of Transfusion upon an apparently dead woman is described. Meunier, the doctor, opens "the artery in the long, thin neck that lay rigid on the pillow," and the narrator is called on and performs artificial respiration until relieved by the doctor, when began "the wondrous slow return of life; the breast began to heave, the inspirations became stronger, the eyelids quivered, and the soul seemed to have returned beneath them. The artificial respiration was withdrawn, still the breathing continued, and there was a movement of the lips." Sensibility returned, so that the woman with uplifted hand and haggard face and gasping eager voice could tell her secret. "The lips continued to murmur, but the sounds were no longer distinct." Soon there was no sound—only a slight movement: the flame had leaped out, and was being extinguished the faster. "The wretched woman's heartstring's had been set to hatred and vengeance: the spirit of life had swept the chords for an instant, and was gone again for ever."

† Not mentioned by Roussel. This work is in the library of the Med. Chir. Soc.

with more effect than by the mouth, such as narcotic (somnifera) cordials, as in cases of debility, syncope, fevers, pestilence, poisoning, palpitation of the heart, phthisis ; and in cases of epilepsy, apoplexy, angina, when swallowing cannot be relied on, &c.* He seriously suggests even that the temperament of persons might be regulated and corrected by such venous injections, the blood from a phlegmatic person being injected into that of a choleric or sanguineous one ; also that even in the case of husbands and wives, or of brethren of irreconcileable dispositions, their blood might be beneficially mixed by venous injection.

Baron Feuchtersleben, in his Medical Psychology (see Syd. Soc. Tr. pp. 175, 335), alludes to transfusion having been resorted to with the effect of altering the dispositions of animals (quoting Nasse), observing that the results as yet obtained do not warrant its use as a therapeutical agent. He refers the reader, with regard to its use, to Friedreich's Litterargeschichte, p. 177.

In 1667 Professor Denys (Dionysius), of Paris, along with a surgeon named Emmeretz, after experiments on animals, tried the transfusion of blood from the artery of a sheep into the veins of a boy suffering from extreme lethargy with eventual success, and subsequently upon an insane person and others.†

In 1667 the Phil. Trs., Nos. 25 and 30, contain allusions to Dr. King transfusing blood from one animal to another by the veins, and a description of Drs Lower and King,‡ at Arundel House, transfusing the blood of the sheep into the human subject. Then follows a notice of experiments in Paris by Denys of transfusion of arterial blood of a lamb into a human subject, and of one animal into another. In the same year is a description of the operation by Dr. Fabricius, of Dantzic, of injecting medicated liquids into human veins. In subsequent numbers (1667-9) are descriptions of the operation by Gayant and by Denys, of Paris, who was impeached by legal tribunals owing to the death of a man operated on, which was thought to be really attributable to the over-use of stimulants. In his defence at his trial Denys adduced two persons who, having been given over by their physicians, had been recovered by the operation.

Weld, in his Hist. of the R. Soc., i. 223, says that failures in transfusion turned the current of public opinion, and led to the immediate abolition of the process, which was not practised again by the Society. It appears also from other sources, that owing to failures and deaths assigned to the operation in France, the Parliament of Paris in 1688 made the operation criminal except with the sanction of the Faculty.

In 1668 Dr. B. Santinello, an Italian physician, wrote a book,§ the burthen of which is to show how useless and injurious, how beset with

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* Pareira, v. i. p. 132, quotes Kohler (mentioned by Dieffenbach, who also cites several other analogous cases) as having preserved the life of a soldier in whose throat a piece of beef tendon was sticking by injecting six grains of tartar-emetic into a vein, thus causing vomiting of the meat. Meckel restored animation in a woman immersed in water by like means. Pareira quotes other instances in which the "chirurgia infusoria," the "ars clysmatica nova," is admissible.[1]

† In 1667, a work by Tardy, with an account of the operation, was published.

‡ This was Sir E. King, the physician, "qui præsenti animo (ope divinâ) Sereniss : regem Car. II. a morte subitanea dexterrimè eripuit, Feb. 2, 1684," by bleeding him with a lancet, or as some say, a penknife, on his own responsibility. For this act Sir E. King was ordered by the Privy Council £1,000, which he never received. The College possesses his portrait by Sir P. Lely. Evelyn, in his Diary, Feb. 4th, 1684, praises Dr. King's "extraordinary dexterity, resolution, and presence of mind" in this matter. Sir E. King lived to the age of 80.

§ Confusio Transfusionis sive Confutatio operationis transfundentis Sanguinem de individuo ad individuum. (Romæ.)

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[1] Experiments showing the effects of the injection of various salts into the blood-vessels were published by J. Blake in the *Edinb. Med. Chir. Journal* for 1839 and the *Archiv. Gen. de Med.* of the same year. The author alludes to similar researches by Magendie and Scheele.

difficulties, was the operation, and how opposed to Holy Scripture and to the writings of physiologists and philosophers and others. He alludes to the operation having grown out of that of "Infusion," and to its origin in England, and having passed thence to France, and graphically criticises the alleged cases of its curing the somnolent and maniacal patients. He quotes the suggestion of Marsilius Ficinus that old people, like leeches, should suck the blood of the young.*

The operation of transfusion, and also of injection of various remedies, is fully recognised and described by the celebrated surgeon Scultetus, and the details of the process given in his work, "Armamentarium Chirurgicum renovatum et auctum," 1672. He gives the literature of the subject at his time. He speaks of the operation having been successfully performed on a man at Bologna by Cassino, and quotes a statement that it had been used in Germany in 1642.

In 1679 Mercklin, of Nuremberg, published a work, "De ortu et occasu Transfusionis Sanguinis," the main object of which was to throw discredit on the operation of transfusing blood from animals to man.† It contains letters addressed to him from friends, and a curious vignette illustrating the operation, of the dates of 1672–74, referring to his tract (? a former one) on the subject. He considers the claims of Ovid, Ficinus, J. Colle (1628), and Libavius (1615) to a knowledge of the operation, and attempts to show that it is neither useful for prolonging life nor for the cure of disease, but that it is dangerous and injurious, and contrary to sacred and other writings. With regard to the operation of transfusing blood from man to man he will not decide, and considers that is an open question and in want of further trials. He alludes to the Striges (blood-suckers) when speaking of Ovid's pretended knowledge of the process.‡ He considers the mode of origin of the operation: the labours of the English and French following them, and especially the part taken in it by Lower, King, and Cox, and Drs. T. Clark and Henshaw. He recognises the French as having first tried the transfusion from brute to man about 1667, and especially Dionysius, of Paris, and alludes to the labours of Major, M. Hoffman, Altdorf in Germany, and others in Bologna. He notices the fact that two men died at Rome after undergoing the operation, and the Pope immediately forbade the practice.

In 1680, Folli, in his "Stadera Medica" (Firenze) had a chapter "Della Medicina Infusoria," and in this and other chapters he alludes to transfusion of blood. He

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* This author acutely observes that convulsions may arise either from repletion or inanition. He speaks of the application of plaisters to the umbilicus to strengthen the fœtus, and of baths of milk in emaciation.

† The Dedication, addressed to sundry "Viris Nobilissimis, Maxime Strenuis, Magnificis et Prudentissimis," closes with the following quaint invocation: "Deus sanguinem, in Nobilissimis Corporibus vestris, ad seros usque vitæque saturos annos intaminatum servet ut nec alieni Sanguinis Transfusione, nec multo medicaminum usu opus habeatis."

‡ Most writers on the history of tranfusion of blood hand down the mention of Ovid's supposed allusion to the operation when, in describing the fabled restoration the aged Æson to youth and vigour by Medea, he writes (see Metam. vii. 285-6):—

> "Quod simul ac vidit, stricto Medea recludit
> Ense senis jugulum, veteremque exire cruorem
> Passa, replet succis."

And again:—

> "Stringite, ait, gladios, veteremque haurite cruorem,
> Ut repleam vacuas juvenili sanguine venas."

In these lines it is maintained that the poet speaks of exhausting the old blood and infusing medicinal juices and new vital blood into the emptied blood-vessels. For my part, I confess that I fail to see in the above lines any allusion to such a procedure as transfusion. The supposition appears to me to be altogether gratuitous and fanciful, a mere trope and "figure of rh_torick."

figures the instrument he recommended, which, as Roussel points out, is "an almost perfect apparatus." He proposed to attach a silver canula to the artery, and a canula of bone to the vein, and to connect them by a portion of an animal's artery so prepared as to have a tube branching from its side, by which the contained air could escape.

In 1706 appeared an English translation of a work by Purmann, a surgeon of Breslau, "Chirurgia Curiosa," containing a chapter (p. 302) headed "Of Chirurgical Infusion and Transfusion, and why they are in no greater reputation in the world." The author describes the earlier operations on lower animals before tried on man, and gives directions as to the operation. He mentions that he had been grievously afflicted with a sort of leprosy, and had the operation performed on himself; and a second time resorted to it when sick of a violent fever, and ordered "Aqua Cardui Benedicti" to be injected, "upon which," he says, "I was wholly delivered from my fever in less than two days."

Again, Heister, in his "Institutiones Chirurgicæ," 1739, p. 447, has a chapter, "De Chirurgica infusoria et transfusoria." He enumerates the class of cases in which the operation may be called for, describes the procedure, and figures the instruments required, and has a section on the history and literature of the operation, dwelling on the names of Dennis, Sturm, Valerius, Hoffmann, Muysius, Libavius, Wren, Ettmüller, Elsholtz, Manfred, Mercklin, &c

After the above writers we hear no more mention for the space of 120 years of the operation of transfusion, owing, as Dr. Roussel supposes, to the opposition of public opinion.

After that period, Russell, of Eye, in Suffolk (1792),* successfully treated cases of hydrophopia by transfusion; and in the same year Professor Harewood, of Cambridge, practised it on the dog. In 1796 Darwin advised the operation in certain cases of disease. Several authorities in France, Germany, and Italy admitted the utility of, but did not greatly practise, the operation.

In the year 1818, however, our countryman Blundell† performed a series of experiments on the utility and practicability of the operation (see Ashwell); and in his "Physiological Observations and Experiments" (1824) we find these detailed.‡

Since the researches of Blundell several authorities on the operation in England, France, and Germany have written upon it; and Prevost and Dumas, in 1821, made new physiological researches on the action of blood transfused from other animals on the organism. These were followed by others—by Dieffenbach and Bischoff. In 1823 Milne Edwards brought the claims of the operation before the Fac. of Med. in Paris. This author in his "Physiology" has several interesting pages on the physiology of the operation, and alludes to the valuable communication by Brown-Séquard to the Comptes rendus, 1855, "Recherches experim. sur la faculté que possédent certaines elements du sang de regenerer les propriétés vitales."§

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* In this year, according to the "Dict. des Inventions" before mentioned, a man named Durosnoy, condemned to death, asked to have transfusion of his blood into the veins of an old man performed, so that he might be in some way useful to mankind; but his request was refused.

† Lecturer on Physiology and Midwifery at the United Hospitals of S. Thomas and Guy.

‡ Blundell observes (p. 72), that the dog's blood is more coagulable than human or horse's blood; and (p. 99) that the blood of the horse is more congenial to human subjects than other blood. He nourished a dog by tranfusion of 4 oz. of arterial blood for the space of three weeks, the dog taking only water by the mouth. Piorry found that in the case of the dog blood equal in weight to from $\frac{1}{21}$ to $\frac{1}{20}$ of the weight of the body could be abstracted without causing death. Dr. Madge, in his paper alluded to (see above), observes that whilst the blood corpuscles in many animals are larger than in man, those of the lamb and dog are smaller, and therefore suitable for transfusion.

§ In the *Lancet* for March 16th, 1881, p. 279, it is stated that in one case of

An interesting *résumé* of the history of Transfusion was published in 1872 by Dr. H. Leisrink, of Hamburg,* and translated by Dr. Gill, who added an appendix containing notices of contributions by Heyfelder, Gesellius of St. Petersburg, of Aveling, and Wagstaffe of S. Thomas's Hospital. *Leisrink recognises Blundell as the first to tranfuse human blood into a human subject.* He observes that the revival of transfusion in France and Germany is associated with the names of Dumas, Prevost, and Dieffenbach, and especially Martin, Panum, Kühne, Neudörfer, Nussbaum, and Hüter. After giving his historical sketch, he considers the subject under three headings. (1) What indications do our present knowledge supply as to when transfusion should be employed? (2) Ought we to use defibrinated blood or non-defibrinated blood? (3) What is the best and simplest way of conducting the operation?

The labours of those in England† who have recently studied the subject are described by Dr. Madge in a very interesting communication to the *Br. Med. Journal* for January 10, 1874, in which the author gives a *résumé* of the then state of the question of transfusion.

In 1877 appeared in an English form (translated from the French and German by Mr. C. H. C. Guinness, B. A. Oxon), the little work on transfusion by Dr. Roussel, of Geneva, before alluded to (see p. 107), with a preface by Sir J. Paget. In this the author enumerates the contributions towards the subject by observers of various nations, and criticises the different methods adopted. He describes at length the method and apparatus which, after much consideration, he had been led to adopt, and the use of which has been exhibited by him on many occasions in divers countries and at several of our London Hospitals (see *Lancet*, 1876, vol. 2, pp. 609 and 899).

The author concludes by enumerating and making notes upon a number of cases in which he had operated, laying the greatest stress on the necessity of using the instrument for transfusion of his own contrivance, one in which a cupping glass and an aspirator are introduced into the mechanism; and one having a resemblance to that proposed by Folli in his work before quoted (see p. 111), in that it prevented the blood in its passage from one person to another, from encountering the air, as he knew that if the blood is once touched by the air it loses its vitality at once. The instrument is figured at p. 44 of Roussel's book.

Of late years the injection of milk, in place of blood, into the veins, has been proposed and practised. This was first practised on dogs, rabbits, and then used on man by Dr. Hodder, of Toronto, in 1850, then by Dr. Home, of New York (see Lancet, Jan. 25th, 1879, p. 141), and others, in cases of cholera, of phthisis, of anæmia, etc., and recently carried out successfully by Mr. Austin Meldon, of Dublin. (See the Transactions of the British Medical Association, 1879, and the *British Medical Journal* for Jan. 10th, 1880.)

I will also allude to observations made by M. Anselmier, and related in the Comptes Rendus for December, No. 24,‡ on what he has termed ARTIFICIAL AUTOPHAGY—that is, the nourishing by means of blood drawn in small quantities from the veins of the individual to be nourished. A series of experiments were instituted on two groups of animals, one group being abandoned to the effects of inanition and then exclusively fed with the blood drawn from the veins of the animals experimented on, and the results showed that the artificial autophagy considerably prolongs life—viz., for nearly one half more than its duration in spontaneous autophagy. The author's views may be applied in the case of shipwrecked persons or others subjected to the horrors of starvation.

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transfusion, quoted from a German paper, death followed, owing, as was thought, to a gouty state of the blood injected.

* From the "Sammlung Klinischer Vorträge," No, 41.

† Including the names of McDonnell, Playfair, Barnes, Aveling, Richardson, Beatty, G. Hewitt, Savage, Higginson, B. Hicks, Waller, Routh, &c.; and those of De Belina, Martin, Guerin, Ore, Gesellius, Sontougine, Hüter, Hasse, Schiep, Albini, &c., among foreigners.

‡ See *Medical Times and Gazette*, January 28, 1860, p. 98.

I will close these notes upon transfusion by citing a highly interesting "Report of Experimental Inquiry instituted to determine with what fluids and by what methods the operation of Blood-Transfusion may best be performed, and to ascertain the effects, immediate or remote, which result from the operation in animals." This report was contributed by Mr. E. A. Schäfer, F.R.S., to the "Transactions of the Obstetrical Society of London," November, 1879, and was followed by much discussion. The main point considered in Mr. Schäfer's paper, after determining by the microscope what effect various fluids might have on the red and white corpuscles of the blood [as common salt, cows' milk, blood or serum of other animals under various conditions], are, an examination of the different methods of transfusion—*i.e.*, 1, mediate, into a vein or artery; 2, immediate, from a vein or artey into a vein, and from an artery into an artery; experimental evidence in favour of direct centripetal arterial transfusion; and other methods of transfusion. Directions and precautions necessary in performing the operations of direct venous and direct arterial transfusion are given, the requisite apparatus being described.

The following are the conclusions arrived at by Mr. Schäfer:—

1. Ordinary milk is highly detrimental, and ought never to be used for transfusion.

2. Solution of salt, and any other watery fluid, is without permanent benefit, and should never be used for transfusion.

3. The blood and serum of the lower animals is highly detrimental, and in large quantities fatal, and ought never to be used for transfusion in the human subject.

4 The only fluid which can be employed with any benefit for transfusion in the human subject is human blood, and this may be either in the normal or in the defibrinated condition.

5. The less the blood used for transfusion is suffered to come into contact with foreign substances the better is likely to be the ultimate result.

6. Consequently the more the apparatus used is simplified, the better is likely to be the result.

7. The simplest and best form of apparatus is a short flexible tube, terminating in glass canulas, which is used to directly connect either a vein of the giver to a vein of the patient, or an artery of the giver to an artery of the patient.

8. The amount of blood used may be measured by the time of flow. Enough blood would probably flow from vein to vein in three or four minutes, from artery to artery (towards the heart) in half a minute or a minute.

9. In ordinary cases in which transfusion is required it will probably be found most convenient to employ the method of direct transfusion from vein to vein, but in case where death is imminent, direct transfusion from artery to artery towards the heart ought, if possible, to be carried out.

10. Failing any person willing to submit to have a canula inserted into a blood-vessel, but nevertheless one being found ready to yield blood into a basin by the ordinary process of venesection, transfusion may be tried, although with greater risk to the patient, by means of a syringe or elastic pump. The arm of the giver, and the interior both of the basin and of the instrument, ought to be thoroughly washed with hot water containing carbonate of soda in solution, and the blood injected quickly without defibrination, and with every precaution to prevent the introduction of air. Injection into an artery of the patient *towards* the heart, as recommended by Blundell, ought to be preferred to any other mode. If the injection is into a vein, a funnel with an indiarubber tube, provided with a spring clip and with the canula for the vein attached to the end of the tube, is as simple and effectual an apparatus as could be devised.*

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* The last instances of the use of transfusion of which I know are the cases of Dr. Mahomed for hæmorrhage in typhoïd fever, brought before the Clinical Soc. Nov. 25, 1881. The operation was performed with Dr. Aveling's apparatus. Regarding the instrument, Dr. Mahomed remarks, "It should have *no valves*, and the expansion of the tube in the middle should not contain more than two drams." I would here notice the fact that blood has been transfused into the cavity of the peritoneum.

I cannot forbear alluding to Billroth's critical remarks on transfusion in his Lectures translated by the Syd. Soc., i. 52-5.*

The separation and preservation of the hæmatosine of human blood described, as effected, I believe, by two French experimenters in 1872, has been used by Prof. Lorenzi, of Florence, in the way of transfusion (see *Br. M. Journal* for 1872, Oct. 26).

Since writing the above I have met with notice of an experiment related by Brodie in his "Notes on Animal Heat,"† of Mr. Coleman, who, after abstracting from a horse so much blood as to induce extreme syncope, transfused into it the blood of a glandered horse, the result being that the sound horse recovered from the syncope, but became affected by the glanders.

Note (21). P. 30.

Harvey's Loss by Fire.

Harvey alludes to this loss in the following pathetic manner: "And whilst I speak of these matters let gentle minds forgive me, if, recalling the irreparable injuries I have suffered, I here give vent to a sigh. This is the cause of my sorrow: Whilst in attendance on His Majesty the King during our late troubles and more than civil wars, not only with the permission but by command of the Parliament, certain rapacious hands stripped not only my house of all its furniture, but, what is subject of far greater regret with me, my enemies abstracted from my *museum* the fruits of many years of toil; whence it has come to pass that many observations, particularly on the generation of insects, have perished, with detri ment, I venture to say, to the republic of letters."

Fuller in his "Worthies," vol. ii., alludes to this loss. Speaking of the good progress which Harvey had made to lay down a practice of physic conformable to his thesis of the circulation of the blood, he says that he was plundered of his papers in the civil war, which not only murdered many men alive, but destroyed more not yet born, whose diseases might have been prevented or removed if Harvey's worthy name had come forth into the public. He hopes that grateful posterity will, by superstructure on bad foundation, thankfully pay the fruit to his memory who watered and planted (not to say made) the root of his discovery. Fuller, who observes that Harvey's father had a week of sons, quaintly alludes to his general works as follows: "The doctor, though he is a bachelor, may be said to have left three hopeful sons to posterity—his books. 1. De Circ. Sanguinis, which I may call his son and heir, the doctor living to see it at full age and generally received. 2. De Generatione: as yet in its minority; but I assure you growing up apace into publick credit. 3. De Ovo: as yet in its nonage thereof, but infants may be men in due time."

Note (22). P. 31.

Portraits and Busts, &c., of Harvey.

According to Willis‡ (to whose account I have added a few particulars) there are extant the following portraits of Harvey:—1. One by Cornelius Jansen, in the College of Physicians. 2. One in the Library of the Royal Soc., by De Reyn, engraved in Knight's Gallery of Portraits. 3. One in our National Portrait

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* One of the most satisfactory illustrations of the use of transfusion which has of late occurred is, I think, the case related by Dr. Macewen, of Glasgow (see *Lancet*, July 5, 1879).

† See vol. ii. of his collected works, p. 87, edited by Charles Hawkins, Esq., F.R.C.S.

‡ "To whom all Harveian Orators," as Dr. Owen Rees said in his H. Or., "must feel indebted."

Gallery, once the property of Dr. Mead, engraved by Houbraken and Gaywood. 4. Another, which belonged to Dr. R. Bright, "our English Morgagni," still in possession of his son, the present and recently elected Master of University College, Oxford.* 5. One at Acton Hall, Oswestry, removed by Captain Lloyd from Rolls Park, near Chigwell, the former residence of descendants of the Harvey family. 6. The bust over the memorial tablet in Hempstead Church, modelled from a mask taken after death. 7. One by Faithorne, founded on the one by Jansen. 8. One in the Bodleian Library, Oxford. 9. One at Caius College. 10. One at Jesus College, Cambridge.† 11. Another by Jansen, belonging to Sir H. Wilmot. 12. One at Donnington Park, belonging to Earl Moira. This was the one attributed to Vandyke. 13. One belonging to Lady Berkeley, Cranford Lodge, Middlesex. Mr. Scharf informed Dr. Willis that there was formerly one at Wynnstay, the property of Sir W. W. Wynn, but it had been destroyed by fire. (This fire occurred, I find, March 6, 1858.)

In the College we have a bust of Harvey by Scheemaker, from the portrait which Dr. Mead possessed, and by him presented to the College in 1739. In an index of coins struck off at Berlin in 1825, in memory of celebrated physicians and physicists, and in honour of Blumenbach, I find (p. 46) a coin having the effigies of Harvey described as being mentioned in a numismatic series edited by Durand, Paris, 1823. Harvey, in the index, is referred to as "theoriæ de circulatione sanguinis stator celeberrimus, optimarum de generatione observationum auctor." This coin is in the Br. Mus. Mr. W. Wroth informs of another one, similar in type, executed by Rogat, and probably for the same series.

Since the above was written a life-size figure of Harvey, by Mr. Bruce Joy, has been erected at Folkestone, as alluded to on page 27.

Note (23). P. 32.

The Rich and the Poor.

The reader may remember the following conversation in Walter Scott's "Red Gauntlet": "Ye know very well, Alan, that in the other faculty who study the 'Ars medendi,' before the young doctor gets to the bedsides of palaces, he must, as they call it, walk the hospitals, and cure Lazarus of his sores, before he be

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* This once belonged, I believe, to Dr. Mead, and was given by a son of Sir F. Milman to Dr. Bright. The present owner informs me that it has been always supposed to be by Vandyke, but I find that Mr. Willis looked upon it as being by Bemmel. Wadd, in his "Nugæ Chirurgicæ," states that Harvey's picture in Dr. Mead's collection had the following lines written by Dr. Mead:—

"Harvæi magnum nomen laudesque manebunt
Sanguis dum in gyros itque reditque suos."

† Regarding the alleged portraits of Harvey at Cambridge (here alluded to) Professor Paget has kindly given me the following particulars. He says, "There is a picture in Jesus College which is said to be a portrait of Harvey. It is supposed to have been given as such to the college by Jarvis Kenrick, LL.D., in 1808. It has been said to be by Rembrandt, but this appears to me very doubtful. It is a well-painted picture. I doubt whether it is a portrait of Harvey; the face is not sufficiently like that which you have in the College of Physicians. There is a portrait in the Lodge of Caius College, which was presented to the college by the Marquis Townshend in 1803. This also is called a Rembrandt, and looks like one. It measures 23½ inches by 20½ inches. In Caius we have also a copy of your Jansen in the College of Physicians. It was, at my instance, made by Eddis in 1837 or 1838. We have also in Caius another portrait of Harvey, copied from one in the possession of Lord Winchilsea, if he still retains any of his ancient possessions. This is *very* poor artistically. It was made by an amateur artist, a Caius man, the Rev. Richard Cobbold, the author of 'Margaret Catchpole.'"

admitted to prescribe for Dives, when he has gout or indigestion; also the chirurgeons have a useful practice, by which, they put their apprentices and tyrones to work upon senseless dead bodies, to which, as they can do no good, so they certainly can do as little harm; while at the same time the tyro, or apprentice, gains experience, and becomes fit to whip off a leg or arm from a living subject, as cleanly as ye would slice an onion."

Harvey was called upon to attend to the health of all classes of society, the learned and the simple, the "Greek and the Barbarian," from the prince to the pauper, from the King on his throne to "the clown who crackles his chestnuts at the Christmas fire:"* agreeing, no doubt, with the sentiment expressed in the following quotation from Prevotius in the preface to the "New London Dispensatory" (1678), by W. Salmon, Professor of Physick, "Quicunque medendi arte claruerunt atque ex humanæ salutis custodia, magnam sibi apud omnes gratiam comparârunt, prima existimationis suæ fundamenta in pauperum tabernis jecisse videntur."

Note (24). P. 32.

Clinical Teaching.

When making inquiries into the extent of our clinical teaching in days gone by, I received a letter from Professor Gairdner, of Glasgow, in which occurs the following remarks:—

"I have it in my notes of lectures that Rutherford (a pupil of Boerhaave) began a course of clinical lectures in Edinburgh in 1720,† and that in 1754 Van Swieten, the pupil and commentator of Boerhaave, was commissioned by the Empress Maria Theresa to found a clinique in the school of Vienna, after the model of that in Leyden. I am not, however, able to give you 'chapter and verse' for either of these statements; but, assuming them to be correct, I should think it possible that some kind of germ of clinical teaching existed under Boerhaave even preceding Rutherford's essay in Edinburgh.

"Rutherford certainly did much to establish the Edinburgh School, through the novelty of his clinical teaching, and, if I am not mistaken, Dr. Christison published some samples of a clinical lecture of his in the *Edinburgh Journal* some twenty-five years ago or thereabouts, when the journal was edited by a committee of the Professors. Either he or Dr. Rutherford Haldane (who is a descendant of Dr. Rutherford) would probably be able to give you more exact information. There must be records about it in the College of Physicians of Edinburgh.

"Of course you know about De Haen, Stoll, and the two Franks; but they were all later than this. You know also the traces of clinical teaching in Hippocrates, and the famous epigram of Martial to Symmachus, so often quoted as showing that clinical teaching of a kind existed in ancient days."

Sir R. Christison has kindly referred me to a succinct but full account of the Introduction of Clinical Teaching into Edinburgh in his address as President of the British Medical Association, when it met at Edinburgh in 1875. He has also referred me to a notice of the earliest Lectures of Dr. John Rutherford (who first

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* To afford . . . . . "quod
Æque pauperibus prodest, locupletibus æque."

This recalls other lines of the poet—

"Pallida mors æquo pulsat pede pauperum tabernas
Regumque turres."

† In the library of the Med. Chir. Soc. is a 4to vol. of MS. of Dr. J. Rutherford's Clinical Lectures, 1750. This book was presented to the society by Mr. H. Vevers, of Hereford, in 1874. No date exists on the title page, but Dr. G. Harley showed from dates in the body of the MS. that it must have been written in or about the year 1750. The writing gives one the impression of its being a fair copy of notes taken from the lecturer's words.

took up the Clinic in Edinburgh in 1747) in the *Journal of Medical Science* about thirty years ago. He observes: "Elsewhere in the British Isles there was no Clinical Teaching for a very long time after it had attained celebrity here"—*i.e.*, in Edinburgh In an account of building the first infirmary at Edinburgh, given in A. Monro's Life, p. xiii., I find it stated that Professorships were founded in Edinburgh in 1720, and Clinical Lectures given by Rutherford in 1748.*

It has been doubted whether Dr. Billing at the London Hospital, or Dr. Elliotson at S. Thomas's Hospital, should be considered as having priority as a clinical teacher. Of course the answer can only be given when it is on all sides agreed as to what constitutes clinical teaching.

It appears that Dr. Elliotson was elected assistant physician to the hospital in 1817, and full physician in 1823, at which date, no doubt, he began his clinical teaching.†

Dr. Billing is described in the pamphlet styled "The London Hospital and Medical College," 97th Session (1881-82), having the "imprimatur" of the authorities (see p. 7), in a notice quoted from an address by Dr. Little, as having re-introduced clinical lectures in the year 1822, a course of such lectures having been delivered in 1792, after which time none were given until those of Dr. Billing.

I have now before me a large book of 445 pages, and bound in vellum,‡ almost full of clinical cases properly indexed. On the outside are the words "Dr. Billing" in large letters, and beneath the words "London Hospital," and in darker and apparently more recent writing, "1882. The first clinical journal ever kept in London." The first page of the book contains "Instructions to Clerks," in the form of a scheme to be followed in the examination of the sick. It has also written on it the Horatian maxim, "Si quid novisti rectius." In the preface of the second edition of his "First Principles of Medicine," Dr. Billing refers to his election to the London Hospital as physician in 1882 and commencing clinical teaching the same year. In this preface Dr. Billing alludes to the labours of Dr. Thomas Davies as a teacher and introducer of the use of the stethoscope in and after 1829. He mentions the opposition which, even in the year 1836, was offered to the use of the stethoscope by the profession.

I find that the early history of medical studies at Edinburgh, along with much information regarding its most celebrated teachers, is well given by Dr. Struthers in his "Historical Sketch of the Edinburgh Anatomical School,' 1867. From this it appears that provision was made for dissection of the human body in Edinburgh as early as 1505.

Note (25). P. 34.

Absorption by the Skin.

No doubt Harvey recognised the ancient theory of the action of medicines by absorption from the surface of the skin, a theory indicated by the universal use of unguents, embrocations, &c. See, for example, the ointments, plaisters, and liniments of our various pharmacopeias. In the Royal Pharmacopœia Charas (1678) are enumerated (p. 270) an ointment of opium for "torments" in the head, as also frontlets of roses, lilies, elder, kernels of peaches.

In recent days the knowledge of this principle has been greatly systematised, as by Madden, in 1837, who found iodine in the urine after the application of iodide of potassium to the skin.

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* I believe I am right in stating that in London the first Lecturer on Clinical Medicine was Dr. Billing, who died, aged 91, on Sept. 2, 1881, at the London Hospital; immediately following him was Dr. Elliotson, and then Dr. Latham.

† He was one of the first in this country to recognise and teach the value of the stethoscope (Munk). It has been said that as a clinical teacher he was unrivalled. He did not *lecture*, but *teach*.—*Lancet*, 1868, ii. 204.

‡ Kindly lent to me by G. Long, Esq., son-in-law of Dr. Billing.

I have lately witnessed a remarkable case of great and alarming prostration owing to a strong infusion of digitalis being applied over the abdomen for the purpose of inducing diuresis, which it did effectually. Investigations into cuticular absorption by Prof. Christison and others are alluded to by Dr. Paris, our former president, in his "Pharmacologia" (see Ed. ix. p. 142); who, also, at p. 232 remarks that garlic, if it be only applied to the soles of the feet, may be perceived in the breath. This fact is alluded to by Hewson. See his works, Syd. Soc., p. 199.

In Fletcher's comedy, the "Chances," first published in the year 1647, the operation of remedies acting through the skin is alluded to. Thus mention is made of the application of the lettuce cap to the s haven head to produce sleep, and also of stamped "radishe" to the head for the cure of epilepsy.

Experiments showing the capacity of the skin to absorb opium are adduced by Dr. Sibson in his paper on narcotic poisons alluded to at page 49.

Sundry popular medical works enjoin the use of remedies supposed to be absorbable by the skin. Thus, in good John Wesley's "Primitive Physic," powdered poppy seeds with yolk of egg are to be applied to the temples and forehead, and in vigilia leaves of water-lilies or a poultice of henbane and poppy seed should be applied to the head.

Dr. Daremberg, in noticing the medical works and practices of the fourteenth and fifteenth centuries, speaks of the recommendation of Cermison, a Professor at Pavia and Padua, 1389–1441, who was in the habit of using the external application of camphor, in the form of ointment, in cases of disease of the genito-urinary organs.

Wren, in his "Parentalia" (p. 199), alludes to the production of purging and vomiting by dressings and plaisters to the surface. Boyle mentions (vol. iv. p. 765 of his works) the production of vomiting by the application of tobacco to the wrists; and poisoning by the cutaneous absorption of this plant has been noticed in modern times, as by Nomias, in 1874, in a communication to the French Academy of Sciences, and by Hildebrand (see a paper by Dr. Bremond, in 1875, before the "Société de Therapeutique Dosimetrique" on cutaneous absorption). The much contested question of the use of thermal and other waters in which people bathe, depends in a great measure upon the capacity of the skin under certain circumstances to absorb liquids—a property well known to be possessed by some of the lower animals.* This point our best works on physiology discuss. See also Madden's "Inquiry into the Physiology of Cutaneous Absorption," also observations by Willis (1867), the writer of Harvey's Life, in his work on the special function of the sudoriparous and lymphatic system" (p. 24).

In Pereira's Mat. Med., Ed. 3rd, vol. i. p. 126, is a description of the various ways of applying medicines to the skin, with or without friction. It is noted that Hippocrates and other old writers employed such applications along with friction, but this practice fell into disuse until attention was again drawn to it by Brera, Chiarenti, Chrestien, and others.

See Dr. Waller's observations in the *Med. T. and Gaz.*, 1859, June 30, on the application of alkaloïds to the skin, and the determination of their most proper solvent or menstruum.

Note (26). P. 34.

On Puncturing the Abdomen in Tympanitis.

I have seen, I believe, at least two patients die merely from the excessive distention by flatus in the stomach and bowels, the "hypochondriacis inclusa meatibus aura" not being relieved. I lately, however, had the satisfaction of

* Many contend that removal of the cuticle, or the use of great pressure, is absolutely necessary in order that absorption may occur. This was the opinion of Currie, who in his "Medical Reports" alluded to at p. (c. xvii.), considers the subject of "Inhalation" by the Skin, quoting authorities *pro* and *con*.

witnessing prompt relief in a patient apparently dying from this cause, afforded by puncture of the distended colon. I would refer here to an interesting paper on Gastro-Intestinal Distention and its influence on the function of the heart and lungs, by Dr. Sibson, in the London *Medical Gazette* for 1848, and in the *British Medical Journal* for 1873, as bearing on the subject.

I believe the practice of piercing the abdomen of sheep and cattle for the purpose of evacuating flatus is not uncommon in English veterinary practice.

Fortune, in his work on Japan, speaks of the people's custom of puncturing the abdomen to let out the flatus.

Mr. T. P. Teale, of Leeds, in his address on Surgery to the Br. Med. Assoc. (see the Assoc. Journal, v. 11, 1846, p. 119) has alluded to the operation, and to its successful adoption by Sir H. Marsh* and Mr Levret.†

Mr. T. P. Teale, son of the above-mentioned writer, states "that paracentesis of the abdomen has lingered in Leeds as a tradition, and has been done occasionally, and now and then I have seen notices of its being done elsewhere. As a rule it is unattended with risk, but I believe one or two instances are known in which, at a post-mortem, it appeared that leakage through the punctures into the peritoneal cavity had taken place. But such a result is exceptional. I believe that to be effectual for much good it must be a tapping of *the colon*, as tapping of *the small intestine* (as I have often seen in abdominal exploration for obstructed bowel) only empties about six inches of bowel. My notion is that tapping the colon is effective and safe, and not liable to leakage through the puncture, but that tapping of the small intestines is ineffective, and probably attended with risk, as the fluids of the small intestine can more readily ooze into the peritoneal cavity. About five or six years ago there was some correspondence on the subject in, I think, the *British Medical Journal*, and my father's notice of it was referred to."

An interesting history of the Literature of Puncture of the Abdomen for Tympanitis is given by Dr. Saunders in the *Br. Med. Journal* for Nov. 18, 1871; and in the Oct. and Nov. numbers of the same year are communications by Mr. H. Wathen, Dr. Braxton Hicks, and others.

Dr. Littleton (see *Med. T. and Gaz.*, 1871, ii. p. 699) points out that Mr. Cusack and Sir P. Crampton had in years past sanctioned the operation.

Note (27). P. 36.

The Labour Stool.

The labour stool is spoken of by Pharaoh when enjoining the Hebrew midwives to save the men children alive. (See Exodus, ch. i., verse 16.) "When ye do the office of a midwife, and set them upon the stools." Of this expression Dr. Hayman, in his article "Medicine" in Smith's Dict. of the Bible, observes, "Some have doubted whether the word used by Moses does not mean rather the uterus itself, as that which moulds and shapes the infant."

Regarding the labour stool or chair, I am told by Dr. A. Farre that such were used and were in great favour in Germany up to a comparatively recent date, and were superseded by a large mattress with a notch cut in the margin of it to allow the midwife to support the perinæum as the woman lay on her back during labour, with two side straps to pull at and assist her to bear down—"a bad practice, endangering the perinæum."

Dr. Farre has referred me to several old works on obstetrics which he has presented to the College, which contain illustrations of the labour stool, and these I have examined. For example, in a very curious volume, a thin spare book, in black-letter type, entitled, "The Byrth of Mankynde, otherwyse named the Woman's Booke, newly set furth, corrected and augmented, &c., by Thomas Raynold, Phisition" (1545), we have a drawing (see p. 65) of the labour stool or chair. It is a low stool of a horse-shoe shape, with four feet or short legs like those of a milk-stool, having a semicircular back, and also being curtained round

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* See *Lancet*, Dec. 28, 1844.

† See Bull. de l'Acad. Roy. de Med. T. ix. p. 9.

the lower part. This is said to be the oldest treatise in English on midwifery, and to be a translation of Eucharias Rhodian.

In another volume, "De Conceptu et Generatione Hominis : de matrice et ejus partibus, necnon de conditione infantis in uterô," &c., by J. Rueffus (1587), are several plates showing the interior of the lying-in room and accompanying attendants, &c. In this volume is a curious woodcut showing Adam and Eve standing on either side of the Tree of Life, the woman taking of the fruit from the serpent in the tree, the stem and branches of which are composed of the human skeleton, the cranium being in the midst of the foliage. At page 3 is a plate with a parturient woman on the stool, holding on with both hands by handles, and the midwife on a smaller stool in front, who has her apparatus hanging by a cord to her back by a waistband, delivering her. In the background are a man and a woman with their backs to the spectator, looking at the moon and the stars, evidently consulting, casting the horoscope of the "res nata." At page 17 is a large drawing of a labour stool with a slanting back, and with a fringe of curtains at the lower part. This is introduced in Chapter II., "De Obstetricium officio et apta sedilis forma." Then follows in Latin a quaint description of the chair and its mode of use. This book contains curious drawings and descriptions of diverse malformations of the fœtus.

A German book (1530), "Der Schwangerem-frauen und Hebammen Rosengarte," is said to be the first printed treatise on midwifery.*

My friend Dr. H. Fly Smith informs me that according to Cazeau (see American Trans., p. 394), the lying-in chair of the ancients is still in use in Germany. He has pointed out to me a passage in Dr. Churchill's book on midwifery (Ed. 4, p. 211), stating that "in the earliest times the sitting posture was preferred (in labour); and in Ambrose Parè, Dewater, and other old writers, we have a description and plates of labour-chairs, one of which the late Professor Hamilton used to exhibit to his class."

As a frontispiece to Dr. E. von Siebold's "Lehrbuch der Geburtshülfe," &c., 1822, Würzburgh), is an engraving of the Gebürts-Kissen, a kind of thick mattress, described as a comfortable and simple cushion for the facilitation of delivery, &c., contrived as a substitute for the labour-stool. At the edge of this cushion is a triangular piece cut out, corresponding to the space between the limbs of the parturient woman. At pages 126–9 is a minute description of the labour-cushion, and of its mode of use.

On referring to the "Speaker's Bible and Commentary" I find that the annotator writes as follows. He observes that the Hebrew means literally *Two Stones.* Probably a peculiar seat is meant, such as is represented on monuments of the Eighteenth Dynasty, and, according to Lane, is still used by Egyptian midwives. Gesenius says it means a stone *laver*, in which the newborn infant was washed ; and quotes a passage stating that the Persian kings order the newborn male infants of their relatives to lie in a stone basin, in which they are washed. In Clarke's Commentaries I find it stated that the same word in the Book of Jeremiah (xviii. 3) is translated "potter's wheels."

Note (28). P. 39.

Credulity and Incredulity of Learned Men.

The genius of Bacon in the discovery and correction of errors of philosophers,†

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* According to Siebold, the most ancient work on midwifery, entitled "De Mulierum Passionibus," was written by Moschion, who lived in the reign of Adrian.

† Bacon, or rather Verulam, is ranked by Ruskin along with Shakespeare and Turner as one "in that central constellation round which, in the astronomy of intellects, all other stars make their circuits." He remarks, "By Shakespeare humanity was unsealed to you, by Verulam the *principles* of nature, and by Turner her aspect." See "Lectures on Architecture and Painting," 1854, pp. 180, 181.

and establishing principles on which they should work, and not as an actual philosopher, is dwelt on by Whately in the preface to his edition of the "Essays." Though not without a taste for pursuits of physical science, Whately alludes to his inaptitude for them, and to his rejection of the discoveries of Copernicus and Galileo. Sir T. Browne also could not accept the system of Copernicus. He points out that Bacon appears in his essay on Praise of Wisdom to disparage Copernicus.*

Respecting Bacon's deficiency in the scientific knowledge of his time† Professor Fowler remarks that, in extenuation of his not mentioning Harvey's theory of the circulation, it may be said that most of Harvey's contemporaries, even in his own profession, regarded the theory as hardly worthy of serious discussion," and he observes (see his "Bacon," page 150): "Again, Bacon appears never to have heard of the astronomical discoveries recently made by means of Kepler's calculations, and he was singularly ignorant of many facts both in the theory and the history of mathematics and mechanics. We must recollect, however, that the communication of discoveries was much slower in those days than at present, and that the publication of discoveries by means of memoirs or books was often delayed for many years. Thus, much has been said about Bacon's ignorance of Galileo's experiments on falling bodies, made at Pisa between 1589 and 1592. But though these experiments were undoubtedly known to many scientific men, Galileo did not publish any account of them till the appearance of his 'Dialogues' in 1632. As to his silence with regard to Kepler, it is curious that it is shared with Descartes, and, though Bacon was probably ignorant of Kepler's writings, Descartes cannot well have been."‡ Fowler suggests that probably Harvey had a personal objection to Bacon, for Aubrey had mentioned that Harvey, in talking of Bacon, had remarked that "his *eie was like the eie of a viper.*"§

He occupies two or three pages in the extenuation of Bacon's persistent rejection of the Copernican theory, and points out that other eminent philosophers had done the same; he shows how long Newton's views were in subverting the Cartesian system, and alludes to the obstinate resistance offered by Leibnitz to the Newtonian doctrines of gravitation.

He states (loc. cit.):—"Bacon was evidently a believer not only in natural, but in judicial astrology, though with a certain amount of hesitation and discrimination. He accepted, without question, the Peripatetic doctrine of the transmutability of the elements, and was a firm believer in the possibility of transmuting metals." This latter error, if so it be, was maintained many years afterwards by Boyle, and treated without disrespect by Newton.

The reader may remember some very pertinent observations by Charles Lamb, showing how wise and learned men may be betrayed into belief of the impossible, in his Essays of Elia. See "Witches and other Night Fears." He remarks: "We are too hasty when we set down our ancestors in the gross for fools, for the monstrous inconsistencies (as they seem to us) involved in their creed of witchcraft. In the relations of this visible world we find them to have been as rational, and shrewd to detect an historic anomaly, as ourselves. But when once the invisible world was supposed to be opened, and the lawless agency of bad spirits assumed, what manner of probability, of decency,

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* The great Lord Kenyon is said piously to have believed to his dying day that the sun goes round the earth once every twenty-four hours. See Campbell's "Lives of the Chief Justices of England."

† It is stated in Campbell's "Lives of the Chancellors," iii. 113 (note), that Hyde, Earl of Clarendon (1612—74), was not acquainted with the writings of Shakespeare.

‡ Spedding comments on Bacon's silence as to his contemporaries in his preface to the "De Interpr. Nat. Præs."

§ The King to Suffolk:—"Look not upon me, for thine eyes are wounding," and "Come, basilisk, and kill the innocent gazer with thy sight." (2 Henry VI. iii. ii.) Again, Macbeth to Banquo's ghost, "Thy crown does sear mine eyeballs," A. iv. Sc. i.

of fitness or proportion—of that which distinguishes the likely from the palpably absurd—could they have to guide them in the rejection or admission of any particular testimony? That maidens pined away, wasting inwardly as their waxen images consumed before a fire, and that corn was lodged, and cattle housed—that whirlwinds uptore in diabolic revelry the oaks of the forest—or that spits and kettles only danced a fearful innocent vagary about some rustic's kitchen when no wind was stirring—were all equally probable where no law of agency was understood."

Bacon, wise and learned as he was, gave credence to many other matters which would hardly have been expected to have gained his assent. We are told he was so impressed by an eclipse that he always fainted when he saw one;* and it is recorded that a lady actually died of fright owing to the sight of an eclipse (Whytt's Works, p. 580); and at the present time, as recorded by Wood in his "Discoveries at Ephesus, 1877," p. 240, the Turks on seeing an eclipse are wont to think that there is a monster endeavouring to devour the sun or moon. To show how theoretical Bacon could be, it is stated that he took three grains of nitre every morning for thirty years, as he thought life could be prolonged by a panacea, and that the action of the external air in drying and exhausting, which could be prevented by the use of nitre, was the cause of death. Bacon also proposed to cover the body with wax to prevent perspiration, and thus prolong life. Truly, "Wisdom is not always in the Wig." Erasmus, we are told, the friend, correspondent, and patient of Linacre, deserted him for Paracelsus, the learned quack, so little could he recognise the true from the false. He was, however, considered by Coleridge as "the prince of sound common sense" (see "Statesman's Man." xxiii.).

Boyle, we are told, believed that troublesome hæmorrhage from the nose, in his own case, had been permanently cured by the application of powdered human skull to the skin.

Tycho Brahe was of the opinion that all the troubles that happened to him after seeing an old witch with a broom were in consequence of the unfortunate sight. It has truly been said that "the credulity of mankind is enormous, and the deceptive powers of man, under the entanglement of credulity, is commensurate."

As regards the transmutation of metals, Fowler observes that "the thing itself is not beyond the bounds of possibility." "There was a time," says Faraday, "when this fundamental doctrine of the alchemists was opposed to known analogies. It is now no longer so opposed to them, only some stages beyond their present development." In 1681 the Trans. of the Royal Society contained a description and attempted explanation of the conversion of a corpse, long buried, into hair, in which Dr. Tyro, a good anatomist, believed; and long subsequently physiologists gave credence to spontaneous combustion of the human body, and to equivocal generation. (See Davy's "Physiological Researches," pp. 407-414.) It is said that it is only thirty or forty years ago that the Edinburgh Royal Society declared in favour of the transmutation of metals.† A humorous story has been told of the late Professor Sharpey, that instead of sending his three guineas as a subscription from London he sent three pennies, saying that that would suffice, as they might transmute them into guineas.

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* The Rev. Dr. Rowley, his chaplain, said the moon was never in her passion, or eclipsed, but he was surprised with a sudden fit of fainting, and that though he observed not, nor took any previous knowledge of the eclipse thereof. None of his servants, says Aubrey, "durst appear before him without Spanish leather boots, for he would smell the neats leather, which offended him."

† I have it on the authority of Mr. R. Palgrave, clerk of the House of Commons, that there was a statute of Queen Elizabeth making legal the search for the philosopher's stone. On the philosopher's stone, and the elixir or universa medicine, see the notes of Johnson and others in Malone's edition of Shakespeare, Henry IV. Pt. 2, iii. ii., with a curious letter of the Duke of Buckingham to James I.

Dr. Prout even thought that the lime in the albumen and yolk of the egg was not derived from the shell, but was transmuted from other materials.

That the best and wisest may spin theories which are more conspicuous for ingenuity than for accuracy may be exemplified by the following suggestion of Dr. Young, as quoted by Dr. Paris in his Treatise on Diet (see p. 42). After alluding to the obscurity of the relation between the action of the nervous fluid and the phenomena of secretion and the analogy between the operation of the nervous fluid and that of galvanic electricity, both suspending the natural affinity of bodies, dissevering elements between which the strongest attractions exist, and determining them to unite in different forms and proportions, Dr. Paris points out that Dr. Young has suggested "that we may easily imagine that, at the sub-division of a minute artery a nervous filament may pierce it on one side, and afford a pole positively electrical, and another opposite filament a negative one; then the particles of oxygen and nitrogen contained in the blood being most attracted by the positive pole, will tend towards the branch which is nearest to it, while those of the hydrogen and carbon will take the opposite channel, and that both these portions may be again sub-divided if it be required, and the fluid thus analysed may be re-combined with new forms by a reunion of a certain number of each of the fluids of minute ramifications."

Note (29). P. 40.

The Baconian Philosophy.

Professor Fowler has remarked (loc. cit., p. 90): "To infer propositions of general application from particular observations (induction), and to apply general propositions to particular cases (deduction), are, indeed, processes so essential to thought of any kind—or, at least, to any thought except of the most elementary character—that man could hardly be said to possess any knowledge for himself, much less to be able to communicate it to others, till both these methods had come to be in ordinary use. It is, therefore, absurd to speak as if Bacon were the inventor of induction, great as are the obligations under which the inductive branch of logical analysis will always be to his efforts and his genius. Men have always reasoned inductively in the affairs of common life, nor has there ever been any period in the history of science so enslaved to authority, or so wedded to abstract theory, that the inductive side of inquiry has been neglected altogether. What Bacon complained of, and rightly complained of, was not that the writers and teachers of his time had no recourse to the observation of facts at all, but that they only looked out for facts in support of preconceived theories, or else, where authority and prejudice did not lead the way, constructed their theories on a hasty and unmethodical examination of a few facts collected at random. In either case they neglected to test or verify their generalisations, while they wasted their efforts in drawing out syllogistically long trains of elaborate conclusion which, for aught they knew, might be vitiated by the unsoundness of the original premisses." Again (p. 91), "Inductive knowledge—that is, the systemic analysis and arrangement of inductive evidence, as distinct from the natural induction which all men practise—is almost as much the creation of Bacon as deductive logic is that of Aristotle. It must, however, be acknowledged that the one left far more to be added and remodelled by his successors than did the other."

Baden Powell (op. cit.) says of the Baconian Philosophy: "As to the general tone, spirit, and character of the Baconian philosophy, some degree of misapprehension very commonly prevails. By some it is degraded into mere utilitarianism, aiming only at practical advance in the arts of life; by others its '*inductive*' character, in the narrow sense of the term, as opposed to '*deductive*,' has been insisted on, but just in the same erroneous light as an exclusively *deductive* character has been assigned to the Aristotelian system; whereas its founder expressly made *induction* of the most primary importance. The Baconian method

is essentially a combination of both processes; and the material distinction is, that whereas in the Aristotelian method the *deduction* sets out from first principles assumed on mere ideal, or even verbal abstractions, the Baconian *deduction* necessarily sets out from some principles originally *inductive*, however simple and elementary." *

Note (30). P. 41.

The "Induction" Method.

At the "quick and stormy period" of Harvey, when English life was so "rough and full of mutations and rare incidents," when political animosities and feelings were so barbarous and savagely intemperate that after the death of Charles I. the army surgeons were bidden to search in his disembowelled body for signs of the French disease or impotency†—when London was not even lighted by lamps and lanterns, much less by gas—when there was no standing army, no Turnpike Acts, and but slender appliances for locomotion, Members of Parliament coming up to London in bodies, attended by guides and attendants, the House of Commons sitting from 8 to 12 at noon only—when the prisoners in Newgate Jail could regale themselves with the odour of flowers wafted from the gardens of Lady Hatton—when in the treatment of disease recently killed animals were applied to the surface of the body‡—when judicial astrology was studied—when witchcraft was defended on the judgment-seat and in the pulpit, and the rack was resorted to for the extortion of confessions; when the grave Judges of the Law rode

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* It may here be mentioned that in France the "Baconian Method" in the province of physiology is greatly discredited (see Claude Bernard's Lectures, as given in the *Medical Times and Gazette*, January 14, 1860). After speaking of the defect of this method Bernard observes that "the method of counter-proof inaugurated by Galileo and Newton in their scientific investigations, and which has given, as first fruits, so many immortal discoveries, is the only one which should be adopted in physiology."

† See South's sermon preached before King Charles II. on the anniversary of the death of Charles I.—*Sermons*, vol. iii. p. 437. See also the "Elenchus Motuum nuperorum in Anglia; simul ac Juris Regii et Parliamentarii brevis Enarratio," attributed to Dr. G. Bate (doubted by Hamey), chief state physician during the time of Charles I., Cromwell, and Charles II., who gives no flattering description of Cromwell, and who, in allusion to the treatment of Charles I.'s body after his death, writes as follows:—"Neque satis ducunt in vivum sevisse. Spoliant Inimici securi percussum corpus, cruore manus abluunt, baculos intingunt, truncum in segmenta discissum, et arenam sanguine imbutam licitantur; capillos etiam venum exponunt: exenterandum corpus tradunt Medicastro cuidam et Chirurgis castrensibus (abactis propriis Administris) Regio nomini infensissimis, quibus in mandatis erat inquirere sedulo (hoc ipsis perinde erat, ac si pronunciare juberentur) an morbo Aphrodisio, vel alio quovis vitio laboraret," &c.

The hair of the King was said to have been sold after his death, partly as a means of cure for king's evil.

‡ This was even as late as Sydenham, Vol. i, xxix. 60, 68, 70; see also the "Secret History of the Court of James I.," where, in an account of the illness and death of Prince Henry, first son of the king (the case being typhoid fever), bleeding was resorted to and pigeons were applied to ease pain), and the king's touch for scrofula was sought for.

It was the custom in Henry VIIIth's time to apply a cock to the stumps of limbs amputated for felony.

The French in their retreat from Moscow, it will be remembered, bivouacked inside the hot carcases of their horses for the sake of warmth. I once met with the captain of a ship who told me that he had, in the West Indies, been cured by the natives, of incipient fever, by being enveloped in newly-killed pigeons.

on horseback in all weathers to Westminster Hall*—when the mode of salutation in English life was universally by kissing, and not by hand-shaking—when the use of tea, then pronounced "tay" (called by the Chinese "tcha"), and coffee was almost unknown in England†—when no sanitary measures or police existed—when the Royal Society was as yet unborn—when hackney coaches were a novelty—when Lions were baited in the Tower—when the application of pendulums to clocks was new, and the barometer‡ had not been invented by Torricelli (the pupil

* A practice which, according to Aubrey, ended at the death of Sir R. Hyde, Lord Chief Justice. Aubrey says that Anth., Earl of Shaftesbury, would have revived it, but several of the judges, being old and ill horsemen, would not agree to it. Pepys, in his Diary, 1660, Oct. 23, alludes to the practice.

† Tea was first brought to England from Holland by Lords Ossory and Arlington, but for the general introduction of Tea in England we are said to be indebted to Katherine, Queen of Charles II. It was imported into Europe first by the Dutch East India Company early in 1591, as Sprengel the historian says, introduced by the combined efforts of the Dutch merchants and physicians.

As regards this vegetable production I found some curious observations in Feddoe's Hygeia (1802). He describes (Essay No. III.) the "Abuses of Tea," showing, as he thinks, by experiment, that Tea proves as fatal as laurel, opium, or digitalis. He gives the following fabulous origin of the tea-plant. "Darma, having fallen asleep, in violation of his vow, cut off his offending eyelids and cast them away; when from the spot where they fell there sprouted up a Tea-plant, the use of whose leaves quickly dispelled every cloud from the mind of the repentant saint, and recruited his system, exhausted, as it had been, by long abstinence, watching, and other exercises of devotion."

On the medical qualities of tea and the effects of tea-drinking, see Lettsom's work (1772). In the *Lancet* for July 5, 1879, p. 364, an interesting case of poisoning by tea, with very peculiar cerebral symptoms, is related. Death ensued, and marks of extreme congestion of the brain were found.

The Chinese, as I am informed by Mr. R. Stuart Poole, have the following story as to the origin of the use of the tea-plant:—"An ancient emperor, with the then paternal instinct of the Chinese sovereigns, endeavoured to discover the cause of the many diseases which afflict the Celestials. A council of the most learned physicians consulted and unanimously decided that the cause was the drinking of cold water. An imperial edict was accordingly issued commanding the use of warm water. The result was a general revolt. The wise men were again called together, and after trying many infusions, hit upon tea, to the advantage of all posterity."

Pepys, in his Diary, 1660 (Sept. 25), has the following note: "I did send for a cup of tee (a China drink), of which I never had drank before, and went away (the King and the Princesse coming up the river)," &c. Again (June 28th, 1667), he says: "Home, and there find my wife making of tea; a drink which Mr. Pelling, the potticary, tells her is good for her cold and defluxions."

In the *Quarterly Review*, vol. viii. p. 141, occurs the following passage: "Tea was so scarce in England at this time that the infusion of it in water was taxed by the gallon, in common with chocolate and sherbet. Two pounds and two ounces were in the same year formally presented to the king by the East India Company as a most valuable oblation."

As a proof of the present estimate by the public, if such were wanting, of the value of tea, I will quote the following statement: "The quantity of tea exported from China to the United Kingdom from the 1st June, 1880, to the 4th April, 1881, was 172,949,106lb., as compared with 160,034,115lb. exported during the corresponding period of the previous year. The quantity exported to the United States from China and Japan during the same period was 81,224,310lb., as against 68,253,171lb. in the previous year."

‡ The barometer was first called the Torricellian tube or cane; then the baroscope; and then the baro-meter. The first telescope made in this country was constructed by Dr. J. Goddard, who was created Warden of Merton College, Oxford, when Cromwell was Chancellor of the University of Oxford.

of Galileo and Pascal), or the thermometer by Sanctorio *—when domestic fools were heard and seen—when ague was often fatal—when coffee-houses supplied the place of newspapers—when Betterton had not yet introduced shifting scenes into our theatres, from Paris—when storms at sea could be referred to witchcraft† —when the inhabitants of all England were only about five million two hundred thousand people—when Harvey could define London, as he did in his description of the post-mortem examination of Dr. Parr, as a city "especially destitute of light, cool, and mobile air, the grand cherisher of life, and one whose grand characteristic is an immense concourse of men and animals; where ditches abound, and filth and offal lie scattered about, to say nothing of the smoke engendered by the general use of sulphurous coal as fuel"—at such a period it was that a true scientific method and a keen spirit of inquiry nevertheless prevailed.

During such times,‡ as Macaulay remarks (though speaking of a little later period), notwithstanding all the political and social revolutions, a body of sages had turned away with benevolent disdain from the conflict, and had devoted themselves to the nobler work of extending the dominion of man over matter.

"The torrent which had been dammed up in one channel (alluding to the politics of the times), rushed violently into another. The revolutionary spirit ceasing to operate in politics, began to exert itself with unprecedented vigour and hardihood in every department of physics. The year 1660, the era of the restoration of the old constitution, is also the era from which dates the ascendency of 'the new philosophy'—in that year, the Royal Society, destined to be a chief agent in a long series of glorious and salutary reforms, began to exist. In a few months experimental science became all the mode. The transfusion of blood, the ponderation of air, the fixation of mercury, succeeded to that place in the public mind which had been lately occupied by the controversies of the rota. Dreams of perfect forms of government made way for dreams of wings with which we were to fly from the Tower to the Abbey, and of double-decked ships which were never to founder in the fiercest storm. All classes were hurried along by the prevailing sentiment—Cavalier and Roundhead, Churchman

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* Dr. Sanctorio (born 1560), Professor of Medicine at Padua, had the idea of a thermometer first from the hydraulic apparatus constructed by Heron of Alexandria, about the 3rd century A.D., by which the air confined within a receiver communicating with a basin of water, and exposed to the vicissitudes of night and day, caused the liquid alternately to rise and fall. It was Sanctorio who was led to the beautiful and important discovery of insensible perspiration (and was ridiculed by a conceited writer in the *Spectator* (see No. 25), and who, among other mechanical contrivances connected with physiology, arranged an apparatus for measuring the temperature *of the skin*. The thermometer was re-invented in Holland by C. Drebbel, the son of a peasant. The above remarks are extracted from a paper in the Edinb. Rev., July, 1812 (p. 185). The writer observes: "Within the short space of less than forty years, the stores of science were thus enriched by the invention of four capital instruments, the barometer and thermometer, the telescope and microscope." Deluc, a Genevese (1729—1812) was the first to substitute mercury for the spirit of wine in construction of the thermometer. Respecting the invention of the thermometer, it is stated in Dr. Plots' History of Oxford (1705), chap. ix. p. 234, after allusion to Christopher Wren's advancement of this instrument (by his invention of the circular thermometer), that it is of very great antiquity, "there having been one of them found by Robert de Fluctibus graphically described in a MS. of 500 years'antiquity at least." Quoted from the "Mosaical Philosophy," lib. 1, cap. 2.—See Wren's Parentalia, p. 208.

† As was the case when Harvey was with his friends detained on the sea in a storm, for the cause of which several women were brought up to London for trial as witches.

‡ "Truth making its way amidst the uprising and storms of the moral world, the shock of nations, breaking up of empires, madness of raging people, fury of tyrants."—*Dean Church.*

and Puritan, were for once allied. Divine jurists, statesmen, nobles, princes, swelled the triumph of the Baconian philosophy. Poets sang with tremulous fervour the approach of the golden age. Cowley, in lines weighty with thought and resplendent with wit, urged the chosen seed to take possession of the promised land flowing with milk and honey, that land which their great deliverer and law-giver had seen as from the summit of Pisgah, but had not been permitted to enter. Dryden, with more zeal than knowledge, joined his voice with the general acclamation, and foretold things which neither he nor anybody else understood."

Again he remarks: "But it is not less true that the great work of interpreting nature was performed by the English of that age as it had never before been performed in any age by any nation. The spirit of Francis Bacon was abroad—a spirit admirably compounded of audacity and sobriety. There was a strong persuasion that the whole world was full of secrets of high moment to the happiness of man, and that man had, by his Maker, been entrusted with the key which, rightly used, would give access to them. There was at the same time a conviction that in physics it was impossible to arrive at the knowledge of general laws, except by the careful observation of particular facts. Deeply impressed with these great truths, the professors of the new philosophy applied themselves to their task; and, before a quarter of a century had expired, they had given ample earnest of what had been commenced."

Ellis, in his general Preface to Bacon's Philosophical works, observes of this age: "It was an age of change and of hope. Men went to seek in new-found worlds for the land of gold and for the fountain of youth; they were told that yet greater wonders lay within their reach. They had burst the bands of old authority; they were told to go forth from the cave where they had dwelt so long and look on the light of heaven. It was also for the most part an age of faith; and the new philosophy upset no creed and pulled down no altar. It did not put the notion of human perfectibility in the place of religion, nor deprive mankind of hopes beyond the grave. On the contrary, it told its followers that the instauration of the sciences was the free gift of the God in whom their fathers had trusted—that it was only another proof of the mercy of Him whose mercy is over all His works."

Mr. Hepworth Dixon, when writing of Bacon, has remarked: "Bacon was buried, as directed, near his mother, in the parish church of St. Michael's, near St. Albans. This picturesque and lonely little church became a place of pilgrimage. The obligations of the world to Bacon are of a kind which cannot be overlooked. Every man who rides in a train, who sends a telegram, who follows a steam plough, who crosses the Channel or the Atlantic, who eats a good dinner, who sits in an easy-chair, who enjoys a beautiful garden, or who undergoes a painless surgical operation, owes him something. The patriot, the statesman, the law-reformer, the scientific jurist, the historian, the collector of anecdote, the lover of good wit, of humorous wisdom and of noble writing, also owe him something. It is hard to say which man amongst us is not the easier in circumstances, the brighter in intellect, the purer in morals, the worthier in conduct through the teachings and the sufferings of Francis Bacon. The principles of his Philosophy are of universal application. Other great minds have to suffer from the limitations of creeds, of language, or of race. Luther found his frontiers in the German empire, Shakespeare had to clothe his fancies in the English tongue, Descartes could carry his influence only through the Latin world; but the true method of observing nature is as easy in Rio or Pekin as in Paris or London, while the results of an inductive method of pursuing truth are not more precious in the palace or the university than in the workshop, on the farm, or in the mine."

The attack (of Bronchitis, from the effect of a chill), which proved fatal to Bacon at Highgate, was alluded to by the patient himself when writing to the Earl of Arundel and Surrey (1626) describing some experiments touching the conservation and induration of bodies by cold which he had made when journeying from London to Highgate He remarks, that he was likely to have had

the fortune of Caius Plinius the elder, who lost his life by trying an experiment about the burning of the mountain Vesuvius. The illness began, as he says, with "such a fit of casting or cold, or indeed a touch of them all three."

It may be of interest here to refer to the observation of Warton, formerly Professor of Poetry in the University of Oxford, on the attraction which physical science had in the times alluded to for the learned. Speaking, in his "Life of Ralph Bathurst, M.D., Dean of Wells, and President of Trinity College, in Oxford," 1761, after alluding to the interruption and diversion of classical and polite literature, he speaks of his friends neglecting performances of taste "because they would not have been relished by a nation of gloomy devotees whose ideas of learning and religion were equally sordid and absurd. This circumstance drove all the scholars of those times to philosophical inquiries, which at length introduced the establishment of the Royal Society."

This volume contains the Literary Remains of Dr. Bathurst, and among other things an allusion, see p. 42, to his being concerned with Dr. Willis, Dr. Petty, and others in the recovery of Anne Greene, who had been hanged at Oxford, December 14, 1650, "for the murther of her bastard child;" and at p. 295, among certain poems are commemorative epigrams in Latin and English (one by Christ. Wren, of Wadham Coll., and one by Ant. Wood, of Merton Coll.) on the woman. Allusion is made to a pamphlet entitled, "Newes from the Dead," containing an exact narration of the above revival.*

It is stated, p. 218, that Dr. Bathurst most probably wrote a great part of the preface to Willis's "Cerebri Anatome." He was the author of some Lectures on Respiration and other physiological subjects.

We know also that Willis was assisted in writing the above-named work by Dr. Millington and Sir Chr. Wren.

Note (31). P. 45.

Anti-Vivisection Meetings.

The fourth annual meeting of the International Association for the Total Suppression of Vivisection was held June 17, 1880. At this meeting, according to the *Times* of June 21, Lord Haldon proposed a resolution demanding the total abolition of the practice of vivisection, on the ground that it was not only scientifically useless, but opposed to the laws of God and the higher interests of society. He declared his belief that if the opinion of learned men could be obtained it would be found that no result would ever be acquired from vivisection adequate to the torture it inflicted. The Marquis Townshend, in seconding, complained that the *medical profession did not come forward and answer the statements averred against it.* Lord Shaftesbury expressed his hearty concurrence with the objects of the Association. Experience had shown that regulation of vivisection was not effective. It could not be kept within bounds without total prohibition. He found day by day men of knowledge asserting that vivisection was not only useless, but actually dangerous, through being misleading. They found that dogs were very different animals from men, and, he might be allowed to say, in many respects very superior animals to men.

The persistency and "quality" of the opponents of experiments properly safeguarded and hedged about as they might be, are apparent from the following notice of a meeting held in June, 1881, which I have extracted from a newspaper:—

"Protection of Animals from Vivisection.—On Saturday the annual meeting of the Victoria Street Society for the Protection of Animals from Vivi-

* The copy of "the second impression" of this pamphlet I have seen in the library of S. Paul's Cathedral. It was printed at Oxford, 1651, from the 1st Ed. in Morgan's "Phœnix Britannicus," and contains some highly curious details as to the means adopted in the case. The event is referred to by Evelyn in his Diary for March 22, 1675, who states that the woman subsequently married, had several children, and lived fifteen years after the hanging.

section was held, by invitation of the Lord Chief Justice of England, one of the vice-presidents, and of Miss Coleridge, at his lordship's town house, 1, Sussex Square, W. The Earl of Shaftesbury presided, and among the guests, numbering about 150, were Cardinal Manning, Lady Belcher, Lady Bunbury, Lord Talbot de Malahide, Lord and Lady Mount-Temple, Sir J. E. Eardley Wilmot, M.P., Lady Malet, General Grant, General Colin Mackenzie, Professor Sheldon Amos, Mrs. Livermore (of Boston, United States of America), Mr. R. H. Hutton, Mr. Lewis Morris, and the honorary secretary, Miss Frances Power Cobbe. The secretary, Mr. C. Warren Adams, presented a very satisfactory report, which was adopted on the proposition of Cardinal Manning, seconded by Sir E. Wilmot, M.P., who is in charge of the society's bill for the total abolition of vivisection, which, he stated, would be down for second reading in the House of Commons on July 13. It prohibited the vivisection of animals, with or without anæsthetics. A second resolution, declaring the meeting's endorsement of the bill, was moved by the Lord Chief Justice, who avowed himself a complete and absolute convert to the Victoria Society's view of the question, and a hearty advocate of Sir E. Wilmot's bill. The motion was seconded by General Grant, supported by Professor Amos, and unanimously carried."

Note (32). P. 47.

Sir Charles Bell.

The following epitaph on the tablet of Sir C. Bell's tomb (in the secluded Protestant burial-ground at Rome, where also Shelley and Keats were buried), written by his life-long friend F. Jeffrey, is a touching indication of his character, and worthy of reproduction :—

"Sacred to the memory of Sir C. Bell, who, after unfolding, with unrivalled sagacity, patience, and success, the wonderful structures of our mortal bodies, esteemed lightly of his greatest discoveries, except only as things tended to impress himself and others with a deeper sense of the infinite wisdom and ineffable goodness of the Almighty Creator."

In a letter to Miss Shaw, dated 1810, Bell observes : "I see a God in everything, my love ; it is the habit of my mind. Do you think I could have been employed as I have been without contemplating the Architect? There, I AM an enthusiast!" Again, Lady Bell, in her "Recollections," speaking of her husband, observes : "His habit of thinking led him to see, in every arrangement of matter or spirit, a proof of design in creation."

In his address at the International Medical Congress in London, Professor Michael Foster recently spoke of Bell as follows : "That Charles Bell accomplished as much as he did shows how valuable are the lessons which may be learnt as simple but careful deductions from anatomical data ; that he failed to accomplish more warns us no less clearly that the teachings of anatomical deductions needed *to be verified or guarded by experimental research.*"

It has been related that when Cuvier was dying and his fingers twitching the bed-clothes, he said to those around him, "This proves the truth of Charles Bell's nervous system," "Ce sont les nerfs de la volonté qui sont malades."*

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* Of the great Haller watching, when dying, the failing powers of his organs, it is said that the last words addressed to M. Rosselet, his physician, were : "My friend, the artery no longer beats."

Sir H. Holland, in his "Recollections of Past Life," p. 214, describes the fatal illness from brain disease of Wollaston watched over by Sir B. Brodie and himself. He describes "his philosophical mind taking calm but careful notice of its own decay—the highest faculties, which were little if at all impaired, occupied in testing by daily experiments of his own suggestion the changes gradually taking place in the functions of the senses, the memory, and the voluntary power—a self-analysis of mind."

Lord Tenterden's last words, spoken in a slow solemn tone, as when he used to conclude his summing-up in cases of great importance, were, "and now, gentlemen

Note (33). P. 48.

Sir H. Davy. The Imaginative Faculty.

It is interesting to note that the Paris Academy of Sciences accorded a prize to Davy (1807) when the two countries were at war.

Regarding the faculty of Imagination, Sir B. Brodie has well observed (see Psychological Inquiries, Second Part, p. 180): "As the imagination is the essential part of the genius of the poet, presenting to him analogies and relations which are not perceived by ordinary minds, so it is the main instrument of discovery in science, and of invention in the arts. To the philosopher who enters on a new field of inquiry it furnishes those lights which illuminate his path and lead him onward in his journey—fallacious lights indeed if he trusts implicitly to them, but far otherwise if he takes them for no more than they are worth, not supposing that they can in any degree supersede the necessity of strict observation and a hesitating and cautious judgment. Such is the history of all the great achievements in the inductive sciences; nor is it otherwise even with those sciences in which we have to deal, not with probabilities, but with absolute certainties. . . . Wherever great things are accomplished it is the imagination which begins the work, and the reason and judgment which complete it."

Buckle again writes at length on the use of the *imagination in science* when referring to the researches of Black, and of Leslie, whose investigations on Light and Heat were so enhanced by the aid of poetry, "for he knew that the poets are, after their own manner, consummate observers, and that their united observations form a treasury of truths which are not inferior to the truths of science, and of which science must either avail herself or else suffer from neglecting them." (See "History of Civilisation," ii. 507.) Again he observes: "To my apprehension no poet except Dante and Shakespeare ever had an imagination more soaring and more audacious than that possessed by Sir Isaac Newton."

D'Israeli the elder remarks: "The same enthusiasm surrounds the world of science with that creating imagination which has startled even men of science by its peculiar discoveries. Werner, the mineralogist, celebrated for his lectures, appears, by some accounts transmitted by his auditors, to have exercised this faculty. Werner often said that 'he always depended on the muse for inspiration.' His unwritten lecture was a reverie—till kindling in its progress, blending science and imagination in the grandeur of his conceptions, at times, as if he had gathered about him the very elements of nature, his spirit seemed to be hovering over the waters and the strata. With the same enthusiasm of science, Cuvier meditated on some bones, and some fragments of bones, which could not belong to any known class of the animal kingdom. The philosopher dwelt on these animal ruins till he constructed numerous species which had disappeared from the globe. This sublime naturalist has ascertained and classified the fossil remains of animals whose existence can no longer be traced in the records of mankind. His own language bears testimony to the imagination which carried him on through a career so strange and wonderful. It is a rational object of ambition in the mind of man, to whom only a short space of time is allotted upon earth, to have the glory of restoring the history of *thousands of ages which preceded the existence of his race, and of thousands of animals that never were contemporaneous with his species.* Philosophy becomes poetry, and science imagination, in the enthusiasm of genius. Even in the practical part of a science, painful to the operator himself, Mr. Abernethy has declared, and eloquently declared, that this enthusiasm is absolutely requisite. 'We have need of enthusiasm, or some strong incentive, to induce us to spend our nights in study, and our days in the disgusting and health-

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of the jury, you will consider your verdict." The dying words of Dr. W. Hunter are well known.

Lord Beaconsfield is reported to have occupied himself during his last illness with the correction of his last speech in the House of Lords. "I will not go down to posterity," he said, "as talking bad grammar."

destroying observation of human diseases, which alone can enable us to understand, alleviate, or remove them. On no other terms can we be considered as real students of our profession—to confer that which sick kings would fondly purchase with their diadem—that which wealth cannot purchase, nor state nor rank bestow—to alleviate the most insupportable of human afflictions.' Such is the enthusiasm of the physiologist of genius, who elevates the demonstrations of anatomical inquiries by the cultivation of the intellectual faculties connecting 'man with the common Master of the universe.'" (See "The Literary Character." Ed. iv. p. 196.)

See Essays (1870) on the "Use and Limit of the Imagination in Science," by Tyndall. "Brief but Definite Statements of the Relation of Life and Consciousness to Matter and Force." In these the author's main object was to dissipate the repugnance, and indeed terror, which in many minds are associated with the thought that science has abolished the mystery of man's relation to the universe; and, secondly, to remove the hindrance which popular notions regarding the origin of life oppose to scientific speculation.

Regarding the imagination of Faraday, see a letter to him from Dr. Mayo (March 6, 1844) in Bence Jones's Life and Letters of that philosopher, in which, after alluding to the relationship between analytical inquiry on the one hand, and theory and hypothesis on the other, he writes: "For no man uses the language of hypothesis more successfully than you do, as the associating agent in your analytical inquiries. In this respect your intellectual operations supply a striking proof of the value of a vivid imagination in a philosopher." Again, Dr. Bence Jones, in summing up Faraday's characteristics as a philosopher, observes: "His second great characteristic was his imagination. It rose sometimes to divination, or scientific second sight, and led him to anticipate results that he or others afterwards proved to be true."

On the use of poetry and science to each other, see the preface to Procter's "Poetry of Astronomy," also the remarks on the same subject in Cardinal Wiseman's "Points of Contact between Science and Art" (quoted at p. 104).*

Note (34). P. 49.

Disease Conveyed by Milk.

The communicability of phthisis by milk is suggested by Louis, who in his classical work on phthisis, when alluding to the treatment of the first period of chronic phthisis, after dissuading from the use of milk unless the stomach be very irritable, writes: "I more particularly dissuade persons from its use at Paris and in other large towns, because no doubt asses fare as cows; and the latter animals are said by veterinary surgeons to die phthisical in large towns. I cannot help, for this reason, suspecting the qualities of the milk, and abstaining from its administration in such places."—*Syd. Soc. Trans.*, p. 545–6. See also Note in Appendix, No.

The possibility of conveying injurious elements by means of milk is illustrated by the well-known fact that the milk of nursing women who are in ill health, or who have taken certain medicines, may affect the infant at her breast; and it is well known that sucking children may be affected if the mind of their mother be disturbed. This is again illustrated by what is recorded of Caius, "What made Dr. Caius in his last sickness so peevish and so full of frets at Cambridge, when he sucked one woman, froward of conditions and of bad diet; and contrariwise so quiet and well, when he sucked another of contrary dispositions? Verily the

* He closes the lecture as follows: "Science thus not only comes in contact with Art, but blends with it, and combines inseparably; the two are as one when they follow out their highest joint aim, that of rising to the most perfect humanly attainable perception of the uncreated beautiful and the divinely true."

diversity of their milks and conditions, which being contrary one to the other, wrought also in him that sucked them contrary effects."*

The influence of the mind of the mother on the sucking child by means of the milk is well illustrated by Sir A. Cooper in his work on the breast as quoted by Carpenter (see "Principles of Hum. Physiol.," p. 813, 7th Ed.), who instances cases of intestine fever, griping, convulsions, and other disturbances, even death in the child, produced by grief, anger, fright of the mother when suckling. Cases of a like kind from Dr. Von Ammon's writings are alluded to. Such may occur even among the lower animals. Narcotism of infants from the milk of nurses who have taken opium, as quoted from Barbier, is alluded to by Pareira, Ed. 3rd, p. 2120.

In the observations on the medicinal and poisonous properties of the fluids and solids after the use of medicines and poisons to be found in Pareira's Mat. Med., vol. i. p. 104, instances are quoted of the sick being treated by means of the milk from animals to which the drugs had been administered. Dr. Paris, in his "Pharmacologia," speaks of drugs such, as alkalies, purgatives, mercury, opium, &c., being administered by the milk of nurses to whom they had been given. Poisoning also has been traced to the milk of cows which have eaten deleterious herbs. A paper entitled "Suspicion d'empoisonnement par du Lait," by MM. Chevallier, Cottereau, et Buyard, will be found in the "Annales d'hygiène publique et de médecine légale," T. 35, 1re partie. We know that the blood and flesh of poisoned animals may have poisonous properties. See Locock in the Cyclop. P. Med., vol. iii. p. 10.

The subject of transmission of tuberculosis by milk, as by consumption of tuberculous matter as food,† is considered by Dr. C. Creighton in his work "Bovine Tuberculosis in Man," and the researches of Virchow, Klebs, Chauveau, Villemin, Cohnheim, Gerlach, Fleming, Orth, and other experimenters and writers on the communicability of Bovine Tuberculosis ("Perlsucht" or "Meerlinsigkeit") to animals by experiments are referred to. In ch. viii., on Intestinal Lesion, are some interesting remarks on sanitary defects of the cow, in respect to both typhoïd fever and tuberculosis.‡

Dr. Budd in a paper referred to the production of "Charbon by the use of Milk," and in a recent work, viz., Ballinger on "Diseases of the Ox," there is allusion to the communication of tuberculosis to pigs by means of scrofulous milk.

See a paper by Labourdette, with report by Bouley, on his Introduction of Medicinal Substances through the Milk of Animals, in the Bulletin de l'Académie T. xxiv. (Discussion by Trousseau, Piorry, Chatin, &c.). I have seen it stated that the milk and flesh of cattle grazing on some of the herbage of S. America have been found poisonous. For an account of the poisoning of several people and of a cat at Malta by milk from cows, supposed to have fed on one of the euphorbiaceous plants, see the *Medical Times and Gazette* for January 31, 1863. Allusions are then made to other cases of the kind.

Note (35). P. 49.

Researches of Dr. V. Carter and Mr. H. Power.

Of this fever Dr. Vandyke Carter writes to me as follows: "Relapsing fever being a disease which recently caused an immense amount of suffering and loss of

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* Pepys, in his Diary (iv. p. 272), mentions this anecdote, which he says Dr. Whistler told him on the authority of Dr. Thomas Muffett, a celebrated naturalist, and Fellow of our College.

† A compendious list of the labours of many both English and foreign experimentalists on the artificial production of Tuberculosis in animals by inoculations and the injections of various irritants, is given by Dr. Woodman in his notes to Wunderlich's work on "Temperature in Disease" (see pp. 143—4).

‡ See Dr. West's book on the "Diseases of Infancy and Childhood," Ed. 3rd, pp. 376 and 414, regarding the morbid changes undergone by milk; the authority of Klencke, Carswell, Vernois, Becquerel, Mayer, Peddie, and others, being quoted.

human life in W. India, and which has often ravaged countries and cities in Europe, all knowledge regarding it is valuable, and any means of increasing knowledge not to be disregarded. Comparative experiment is such a means, for it has served: 1. To show an increased range of communicability of the disease. 2. To enable early diagnosis, and even the foretelling of the fever. 3. To detect it in latent forms. 4. To show the casual nature of the relapse. 5. To enlarge clinical acquaintance with the fever by allowing of more frequent observations than is practicable in man. 6. To elicit the true character of secondary fever, so often fatal to man. 7. To permit of an acquaintance with morbid changes at stages of disease seldom or never accessible to scrutiny in human experience. The bearing of these details upon the prevention and medical treatment of relapsing fever will be obvious upon consideration; and the data seemed worthy the sacrifice of a few small animals, which, but for a humane object, would not have been bought, and have been saved from a more lingering death."

Side by side with the experiments of Dr. Carter may be placed the observations of my friend Mr. W. H. Power, who, in his investigation into the cause of the endemic outbreak of "Fever" on board the ship *Cornwall* in 1879, found the muscles of a boy who had died considerably occupied by a hematoïd worm, very like the trichina spiralis, but not encysted and less opaque. This led Mr. Power to examine the muscles of certain other patients who had died of typhoïd fever, and to the discovery therein of a parasite similar to, but smaller than that met with in the case of the *Cornwall* fever cases. Dr. R. Cory assisted Mr. Power in the microscopical examination required in the investigation, and the Report to the Loc. Gov. Board contains careful microscopical drawings, and also charts of the temperatures taken during life.

Referring to the above researches by Power, Mr. Smee, in his Hunterian Oration, 1881, "Suggestions as to Lines for Future Research," p. 29, when speaking of the assumed causes of typhoïd fever, remarks that they favour the idea that enteric fever is not disseminated by sewer gas. In this communication Mr. Smee quotes some interesting observations of Dr. Paine, who in his report on the sanitary condition of Cardiff has some valuable remarks on a severe epidemic of epizoötic of foot-and-mouth disease which occurred there in 1875, containing descriptions of the chemical and microscopical changes undergone in different stages of the disease by the milk of the animals, and also an account of concurrent attacks of affections of the throat of children. Dr. Paine expatiates on the altered condition of milk to be often met with during the prevalence of infantile diarrhœa, and refers to the opinion that tuberculosis or phthisical disease may be communicated by the milk of the cow. See allusions to this communication of disease by milk on page 48, and in Note of the Appendix, No. 34.

Mr. Smee also gives the details of experiments, showing that the presence of an unusual amount of oxygen in water will produce a rapid destructive influence on animal life, and he speaks of destruction of the incubation of the ova of fish from exposure to the influence of light or sudden rise of temperature. Mr. Smee contributes much information as to the causes of death from the different classes of disease at different ages of life, and prints tables constructed from the Registrar-General's returns for the years including 1861–70.

Note (36). P. 49.

Hydrophobia.—Smallpox.

I have in my possession some documents bearing on the way in which the spread of rabies in Norway has been met by the Government. In correspondence with Dr. Hornemann, State Councillor at Copenhagen, and President of the Danish College of Health—the permanent Medical Council to which all medical and hygienic questions are referred by Government, and which has certain judicial functions as to questions of responsibility for actions, &c.—that gentleman wrote to me,

January 29, 1879, as follows: "First, I must state that the Danish General Board of Health, or Royal College of Health, has no President, but a *Decanus*, renewed every year, so that I am no President, but only one of the oldest members of the Board. Besides this General Board of Health, which is only consulting, we have a Veterinary Board of Health to attend to all epizoötic diseases. From the documents I hope to send you, you will see that all special and extraordinary steps against hydrophobia were taken by the Government and that Board. A report on the hydrophobia in Denmark in 1874, '75, and '76 is just now published in the *Transactions of the Royal College of Health*, and reprinted in No. 5 of the medical paper (*Ugeskrift por Logen*, or Medical Weekly Report) which I hereby send you. From this report you will see that the disease first appeared in the year 1874 in Jutland, apparently introduced or coming from Holstein and Slesvig; and as the first cases (amongst dogs) were a little doubtful, and very few, the Government did not put the existing law, or the Epizoötic Act of December 29, 1857, into execution, but only ordered, through the local authorities, to kill all suspected dogs, and that the healthy dogs should be muzzled. But next year (1875) the disease reappeared amongst dogs in Jutland, and was transmitted to the island Fyen, and from Fyen, in the beginning of 1874, to Sealand, &c.; and in some, cases (four) of hydrophobia amongst the inhabitants were observed and communicated to the Royal College of Health. The College (or Board) therefore insisted upon the necessity of allowing the law in its full strength to be carried out for the whole country; and, in consequence of that law, all dogs in the kingdom were locked up or chained, and all loose dogs were killed. So the disease was checked, and in 1877 no new cases appeared. (But the number of foxes seemed augmented, and their boldness much increased.) I hope you will, by means of a translator, find out what is to be observed in the medical paper I hereby send you, and in the documents I will send you as soon as possible."

In connection with the subject of the extermination of contagious disease by summary method, as resorted to in Denmark, I may here adduce the following instance recorded by Jenner, which Dr. Baron published in his "Life of Jenner": "From the year 1762 to 1792 the number that died of smallpox in the Danish dominions amounted to 9,728. About the year 1802 vaccination was first introduced, and the practice became general, but not universal; however, 58 persons only died of the smallpox to the year 1810. Vaccination, by command of the king, was now universally adopted, and smallpox inoculation prohibited; and from the year 1810 to the year 1819 not a single case of smallpox occurred." This preventive efficacy of vaccination, this power of eradicating the most loathsome of all the scourges of humanity, has been well termed the "romance of science" by Dr. Guy, in his highly interesting Lectures on Public Health, delivered at King's College Hospital. See "Public Health: a popular Introduction to Sanitary Science." 1870. (Renshaw.)

I will here refer to some valuable statistics recorded by Jenner, showing the salutary power of vaccination in counteracting smallpox, and its promotion by different Governments, Sweden and Denmark adopting authoritative statutes for its extermination.* I may mention the statement that the yearly loss of lives in India from smallpox amounts at the present time to no less than 100,000. (See *Lancet*, March 27, 1810.)

This statement seems almost incredible, but perhaps not more so than the computation of which I have a note, that a British vessel is shipwrecked with every tide of the sea, or that in England, on the average, 1,000 people lose their lives every year in coal mines.

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* It is on record that our Government in 1721, August 9, permitted experiments regarding the effect of inoculation, which were sanctioned by our College, to be made on six criminals at Newgate. In five the eruption took on the fifth day; in the sixth case it did not appear, and it was ascertained that the person had had smallpox some months before. In the library of the Soc. of Antiquaries is a letter describing the above-named experiments "in corporibus vilibus." It is marked $\frac{206}{9}$ among the MSS.

Note (37). P. 51.

Antidotes to the Poison of Serpents.*

It seems almost evident that up to this time we have no certain antidote to the stings and bites of venomous creatures, animals which have been man's enemies from the earliest times, and whose injuries have been alluded to in the history of all times. Homer (Il. iv.) made the wound of Menelaus from one of the Trojan arrows to be cured by suction and the application of local remedies which had formerly been provided by Chiron, and Philoctetes wounded by either serpents or his own poisoned arrows bequeathed to him by Hercules.

Hippocrates and Celsus mention the dry-cupping-glasses for the extraction of poisonous matter from wounds at the time of the Trojan war.

The Roman armies were wont, we are told, to contain camp followers whose function it was to suck the bites of serpents. Tacitus alludes to such; and we learn that the Psylli, a people on the shore of the greater Syrtis (and a people mentioned by Herodotus, iv. 173, by Hecatœus, Ptolemy, and Strabo), were supposed to have a secret art against the poison of serpents (like the snake-jugglers of Cairo). Some of them were taken by Cato the Less in his train into the depths of the African desert. Octavius was said to have used these poison-suckers to restore his victim Cleopatra to life, though in Plutarch's Life of Antony, containing the description of the death of Cleopatra and her two women, there is no mention of any attempt to rescue her by suction of the wound.† It is stated that the Psylli imported African snakes into Italy and other countries for gain. Plutarch observes that they had certain charms by which they stupefy and lay asleep the serpent.‡ Huc, in his "Chinese Empire," ii. p. 29, describes a class of Chinese doctors called "suckers of blood," who "are, in fact, living cupping glasses." They fasten their lips hermetically on the humours and abscesses of invalids, and, by drawing in

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* Pausanias remarks that the poison of snakes is rendered venomous by their feeding on the juices of the balsam-tree.

† One's memory is recalled to the alleged cure of the wound of our King Edward I. by Eleanor, his Castilian wife, by means of suction, after the attempt on his life by a poisoned dagger in the hands of a boy commissioned by the Turkish emir at Joppa. Sharon Turner, in his Hist. of Eng. in the Middle Ages, says that the only authority for this piece of affectionate heroism was Roderic Santius, a Spanish authority, who wrote 200 years after the event, no English chronicler mentioning it. For a quaint description of the wounding and cure of the king see Fuller's "Holy Warre," B. iv. cap. 30. Alluding to the story about "Elenor his lady," which he disbelieves, he remarks, "So sovereigne a medicine is a woman's tongue anointed with the vertue of loving affection."

It seems that in Henry VIII.'s time poisoners were, by Act of Parliament, condemned to be boiled to death; and in Germany, in the 17th century, the same punishment existed for coiners and counterfeiters. See Twain's "Prince and Pauper," p. 387.[1] In ancient Rome, according to Tacitus, cases of poisoning were tried by the emperor himself. See Notes, p. 343, to Church and Brodribb's Trs. of the Annals.

‡ Celsus, v. 27, speaks of the Psylli snake-charmers as mentioned by Rawlinson in his "Herodotus," iii. 150, who observes that the snake-players of the Court of Barbary are worthy successors of the Psylli. Both the snakes and the men appear to be equally frantic during their performances, which are far more disgusting than in Egypt.

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[1] The punishment of "boiling to death" was chiefly resorted to in cases of poisoning, but was used also in cases of counterfeit coining and certain other misdeeds. It appears to have been repealed by Statutes 1 Ed. VI., and 1 Mary, Stat. 1. The reader may remember the boiling of the wizard Earl Soulis in W. Scott's "Minstrelsy of the Border" (see also notes to the same for similar instances). Instances exist of the same punishment existing on the Continent in the fourteenth century.

their breath, make a vacuum, and cause the blood and humours to rush into their mouths."*

Pliny (Lib. 7, c. 2) states that mention was made by Crates of a race of men in the Hellespont called Ophiogenes, who, by their mere touch, could cure those stung by serpents; and that Varro described some who by their saliva† could cure the stings of serpents. He refers to the Psylli of Africa. Lucan, in his Pharsalia, or "Civil War," ix. 911, 925, graphically describes them and their antidotal powers (see also Dion. Cass. 41, 14).

In the *Times* for October 25, 1881, is a leading article, in which it is stated that in Bengal alone 10,064 persons died from snakebite in one year,‡ and previously reference had been made in the same paper to the effect of injections of permanganate of potash into the blood found by Dr. Lacerda to be an antidote to snake-poison. Corroborative cases are adduced by a Brazilian in the same paper, Oct. 28.

On the 29th of October, a letter signed "F.R.C.S." appeared in the *Times*, showing that Sir J. Fayrer in 1869 (see his work "Thanatophidia of India," p. 94) had tried the same, but unsuccessfully. Later on also he and Dr. Lauder Brunton had tried it, and found that, though it would destroy the poison outside the body, it was almost useless when injected after the poison had been taken. Fayrer had concluded that no real antidote to the effects of snake-poison existed. H. B. Condy, whose interest in the use of permanganates, both as a medicine and as disinfectants, is well known, subsequently (Oct. 30) drew attention to the suggestion which, in 1862, he had made with regard to their use in destroying the poison of reptiles. And in a subsequent communication that Dr. Vincent Richards, a well-known authority on Indian poisonous snakes, had commenced a series of experiments to test the efficacy in cobra poisoning of Dr. Lacerda's plan of injecting permanganate of potash. He states that the experiments, although not absolutely conclusive, have yet, so far as they have gone, led to much more hopeful results than any previously instituted, and believes that the ground for hoping for a practical remedy has at last been found. The progress of Dr. Richards's experiments will be watched with much interest. In the number of *Nature* for October 20, 1881, p. 592, is a notice of a communication by Dr. Filho to the Archives of the Nat. Museum of Rio de Janeiro, containing the results of experiments on the poison of the rattlesnake. Among other results, the blood of one animal poisoned is found able to communicate poisonous effects to another one; and alcohol is stated to be the best antidote known. The literature of the treatment of snake-bites is very considerable. See Neale's "Medical Digest" (N. Syd. Soc.), p. 189.

For report of the commission in India appointed to examine into the virtue of intravenous injection of ammonia in cases of snake poison, *apropos* of Dr. Halford's mode of treatment, see *Medical Times and Gazette*, April 17, 1875, p. 421.

Notes (38 and 40). Pp. 55 and 57.

Vivisection.

As the subject of experimental physiology or vivisection is one engaging increased attention, and becoming, to use a hackneyed phrase, one of the burning

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* In the report of the Stafford House Committee for the relief of Turkish soldiers (Russo-Turkish War, 1877–78), see p. 115, the curious circumstance is related by Surgeon Casson of his attendance, in the Kars district, on a wounded officer with a bullet somewhere in his elbow. He writes, "Attending upon him I found a wild-looking old Circassian, who was sucking the wound, in the vain hope of thus extracting the bullet—the simplest and safest way, he assured me, of performing the operation."

† In the London Pharmacopœia for 1677 the "saliva jejuni" enters as a medicament.

‡ And 359 were killed by tigers.

questions (the "brennende Fragen") of the day, or, as Professor Virchow observes, very much "in the air," I thought it would not be inappropriate if I were here to supplement what I have already said on the subject by quoting a "catena" of authority, citing the words of those whom all would agree to consider as most worthy to form a just opinion on the matter.

I will in the first place quote the illustrious Bacon.

After alluding to the deficiency in his time of the study of comparative anatomy (limited to human anatomy), Bacon speaks of vivisection thus:—"Of that other defect in anatomy (that it has not been practised on live bodies) what need to speak? For it is a thing hateful and inhuman, and has been justly reproved by Celsus. But yet it is no less true (as was anciently noted) that many of the more subtle passages, pores, and perforations appear not in anatomical dissections, because they are closed and latent in dead bodies, though they be open and conspicuous in live ones. Wherefore that utility may be considered as well as humanity, the anatomy of the living subject is not to be relinquished altogether, nor referred (as it was by Celsus) to the casual practices of surgery; since it may be well discharged by the dissection of beasts alive, which, notwithstanding the dissimilitude of their parts to human, may, if judiciously performed and intepreted, sufficiently satisfy this inquiry." (*See* Book IV. ch i. of the "De Augmentis."*

Following Bacon I will quote the opinion and words of the great and good Sir Chr. Wren.† We know what an active part Wren took in perfecting the infusion of medicinal liquids into the veins leading to the "transfusion of blood." He also performed the notable operation of removing from a live dog the spleen, and this with safety and success. In describing the operation he writes as follows:—"Nor is it a small convenience to the anatomist, that he may in the bodies of brutes make divers instructive experiments that he dares not venture on in those of men; as, for instance, that late noble, and by many not yet credited experiment, of taking out the spleen of a dog without killing him: for that this experiment may be useful we may have occasion to show," &c. He continues, "That dexterous dissecter, Dr. Joline, did the last year, at my request, take out the spleen of a young setting-dog. I did part of the experiment myself, and held the spleen in my hand whilst he cut asunder the vessels reaching to it, that I might be sure there was not the least part of the spleen left unextirpated; and yet this puppy, in less than a fortnight, grew not only well, but as sportive and as wanton as before,"‡ &c. The operation and method of cure are described in all the details, which are very curious, as to the place and kind of incision, the parts to be avoided, the applications for healing of the wound, &c., by Wren. He enjoins "letting of blood" from the leg after the operation, and washing away of clotted

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* It was only by means of experiments on living animals that the illustrious Descartes convinced himself of Harvey's views on the circulation.

† The following remarks by Addison are, in the "Parentalia," applied to Wren. "That when, without any incentive of vanity, a person of great abilities is zealous for the good of mankind, and as solicitous for the concealment as a performance of illustrious actions, we may be sure that he has something more than ordinary in his composition, and has a heart filled with goodness and magnanimity."

‡ The spleen was removed without any ill effect by Hewson (see Syd. Ed. of his works, p. 289), and in the Phil. Trs. from 1667, ii. p. 521, is an account by Oldenbrugh of a bitch that had her spleen cut out and afterwards bred puppies. Hewson concluded that the spleen was not the only organ capable of forming red particles. The diseased organ has been removed several times of late years in the human subject, first by Mr. Spencer Wells and Mr. Bryant.

My former esteemed and lamented colleague, Mr. Gray (whose work on anatomy has lately been translated into Chinese), in the historical introduction of his work on the structure and use of the spleen (p. 27), refers to a dissertation by Deisch, "de splene cansibus exciso," Halæ, 1735, describing attempts to determine the function of the organ. He mentions that its absence in a healthy human subject was noticed by Poplius (1740).

blood from the abdomen, if necessary, by injections. See the "Parentalia," 1750 (pp. 237—8).*

Among others of acknowledged high principle and humanity who have largely had recourse to experimental physiology, may be mentioned the honoured and devout Haller, the disciple of the immortal Boerhaave, the antagonist of Voltaire, the philosopher, poet, critic, linguist, physiologist and physician.

Referring to objections against experiments on animals, Le Gallois, writing in 1812, observes :—

"Je désirerois bien, avant de finir cet avant-propos, disculper un peu les physiologistes qui font des expériences sur les animaux vivans, des reproches de cruauté, qu' on leur a si souvent addressés. Je ne prétends pas les justifier entièrement ; je voudrois seulement faire entendre que la plupart de ceux qui leur font ces reproches pourroient bien eux-memes en mériter de semblables. Par exemple, est ce qu'ils ne vont pas, ou qu'ils n'ont jamais été a la chasse ? et comment le chasseur qui, pour son plaisir, mutile tant d'animaux, et souvent d'une manière si cruelle, seroit il plus humain que le physiologiste qui le voit forcé da les faire périr pour son instruction ?

"Que les droits que nous nous attribuons sur les animaux soient légitimes ou non, il est certain que peu de personnes se font scrupule de détruire par toutes sortes de moyens ceux qui leur causent quelque incommodité, fut-elle légère ; et que nous ne nourissons la plupart de ceux qui nous entourent que pour les immoler à nos besoins. J'ai peine à comprendre comment nous aurions tort de les tuer pour nous instruire, quand nous croyons avoir raison de les tuer pour nous en rapaître, et surtout quand, par un raffinement de gourmandise, nous ne leur donnons la mort qu'apres leur avoir fait subir des operations douloureuses et des tourmens de longue durée. Je conviens qu'il seroit barbare de faire souffrir en vain des animaux, si le but des expériences pouvoit être atteint sans cela. Mais c'est malheureusement une chose impossible. Les expériences sur les animaux vivans, sont un des plus grands flambeaux de la physiologie. Il y a l'infini entre l'animal mort et l'animal le plus foiblement vivant. Si le plus habile mécanicien ne peut connoitre tout l'effet d'une machine qu'apres l'avoir vue en action, comment le plus savant anatomiste pourroit—il deviner par la seule étude des organes le jeu d'une machine aussi prodigieusement compliquée que l'est le corps animal. Pour en pénétrer les secrets, il ne suffit pas d'observer le jeu simultané de toutes les fonctions dans l'animal en santé, il est surtout important d'etudier les effets du dérangement ou de la cessation de telle ou telle fonction. C'est à déterminer par cette analyse la fonction de tel ou tel organe, et sa corrélation avec les autres fonctions, que consiste tout l'art des expériences sur les animaux vivans. Mais pour parvenir à le faire avec quelque précision, on est dans l'indispensable nécessité de multiplier les victimes, à cause du grand nombre de circonstances et d'accidens qui peuvent rendre les résultats nul ou incertains. Je dirois volontiers des experiences physiologiques, ce que l'on a dit des bienfaits : *Perdenda sunt multa, ut semel ponas bene. Seneque.*"

A good deal has been said by so-called anti-vivisectionists about Bell undervaluing experiments on animals as a means of acquiring physiological knowledge. Mr. Cæsar Hawkins (who assisted Bell in his experiments), in his address to the Royal Medical and Chirurgical Society in 1856, shows that Bell's results were deficient in conclusiveness compared with those of Majendie, owing to his aversion to witnessing pain even for the sake of science, and therefore the incompleteness of his experiments. He observes :—"It was not till Mr. John Shaw, with myself or other assistants, had prepared everything for him that our chief ventured to

* The following reference to transfusion of preparations made from blood was made in the Harveian Oration of 1764 by Dr. Cadogan, who, "after alluding to the wild hypothesis of the day by which even the best men were beguiled, proceeds to remark : "Hic Harvæi reperto abusus, transfundendi sanguinis ab uno animale in alterum ideâ delirabat. Ille mirabilibus Chemiæ captus, omnia per Chemiam fieri, et mixturis quibusdam ab illâ arte petitis cruorem humanum, forsan in usum transfusionis, componere volebat. Ad hunc modum errores humani infinitâ mole ac numero, aucti et coacervati sunt.' Of Cadogan Johnson said : "All that is good he stole, the nonsense is evidently his own.'

appear and observe, and frequently not till after the animals had been stunned and deadened to pain; nor would he desire more than three or four of the spinal nerves to be exposed for experiment. Majendie, on the other hand, was not satisfied till the whole spinal column was open to his observation, and therefore he saw more clearly."

Mr. Hawkins in his address pays high tribute to the brilliant imagination of Bell, which helped him, as is well known, a great way towards an understanding of the nerves of the face; though owing to his humanity he failed to arrive at the just conclusions which were attained by the more complete experiments of the very accurate and assiduous observer Majendie, and by Mayo and Mr. John Shaw. Mr. Hawkins shows how Majendie's claims to be considered a great physiologist rest, in addition to his researches on the nervous system, upon his beautiful experiments on absorption by the veins, on the mechanism and cause of vomiting, on the epiglottis, on the entrance of air into the veins, on the action of emetics, of strychnia and other poisons, and on the nutritive properties of different foods.* He remarks of him:—"With no pretension to comprehensiveness of view, or genius for combining and generalising his facts, Majendie's unwearied industry and painstaking, his accuracy of observation, and, above all, his faithful and trustworthy record of all he did and saw, and his readiness to overcome objections, not by argument, but by renewed inquiry, are evident throughout his life; and it has been said by one who appears to have known him, that it was sufficient to gain his esteem to prove to him that he had adopted a wrong view."

As regards Sir C. Bell, a consideration of his "Letters" shows that he was no doubt averse to operating on animals, and that he was generally overwhelmed at the idea of having to perform an operation on one of his own species, and greatly depressed if any operation failed. Still there can be no doubt that, in spite of this tender feeling, he availed himself of experiments on lower animals. Thus, writing in December, 1809, referring to his observations on the brain, he remarks:—"I must make experiments, and that is what I hate to do." Again, in 1810, when he thinks he has obtained a method of inquiry into the function of the parts of the brain from consideration of the anatomy of the parts, he speaks of the necessity of sustaining the foundation of a great system "by repeated experiments."

In 1814 he describes the experiments he made by a galvanic apparatus to ascertain how far the action of nerves and muscles will agree with the divisions of nerves which he had made by dissection. Again, in 1821, Mr. John Shaw is described as being in Paris explaining Sir C. Bell's new method of investigating the functions of the nervous system, and showing also the experiments on the two great nerves of the face, by which, along with others, the fact had been demonstrated that in correspondence with the distinctions in their origin the nerves of motion are distinct from those of sensation. Again, in 1823, when illustrating the subject of strabismus, which he thought to be dependent, in certain cases, on abberration of one of the oblique muscles, the following entry in Lady Bell's journal was made:—"Bought a monkey for squinting purposes."

Bell describes in detail the experiments which he had occasion to make on living animals, opening the spine, pricking the nerves, and watching the effects on the action of the muscles. "I must make experiments, and that is what I hate to do," he said. "He did not," as Dr. McDonnell has observed, "yield to this feeling—he subdued it; he set self aside, and made the necessary experiments, and in doing so he did what has been accounted noble in human conduct since the earliest ages of mankind." See allusion to these experiments by Professor Michael Foster in Note 32, page 132.

I have before spoken of Dr. Hope (see p. 46) and his observations, and alluded to the high moral character which he bore.

Of Dr. Hope's experiments, chiefly on the ass, his widow and biographer

* The experiments on animals of Majendie and others on the part played by selection in digestion were most valuable, and performed in reference to the suggestion of the French Government that the gelatin of beans should be used in food as a substitute for albumen.

writes as follows :—"These experiments, whether considered in reference to the importance of the practical points which they tend to elucidate, the ingenuity with which they were devised, or the cautious and sagacious manner in which they were conducted, deservedly rank as the most important experimental researches connected with medicine which have been instituted for many years, and have conferred, by universal consent, the very highest reputation on their author."

Coming now to more recent times, Dr. McDonnell, in his address to the Surgical Society of Ireland, Nov., 1877, "What has Experimental Physiology done for the Advancement of the Practice of Surgery?" observes that the great mass of mankind have too much sense to indulge in opprobrious epithets against experimental physiology. "They will ever continue," he observes, "to repose confidence in our great profession : they will feel the practical absurdity of regarding men as wantonly cruel whom they see and know to be kindly and humane ; they will see the folly of looking with distrust and suspicion, as regards their relationship with the lower animals, on men whom they would trust in reference to their soldiers, their sailors, the sick poor in their hospitals, and their wives and children in their homes. As for the well-intentioned but thoughtless fanatics who have got up this persecution, be not scared at their cry. If you cannot feel confidence in their good sense, you may have unbounded confidence in their selfishness. How many of them are there, do you fancy, who if, for instance, they had reason to think their bodies were pervaded by thousands of trichinæ worms creeping about in their muscles, would not come supplicating assistance from those who have learned from experiment, and experiment only, the life-history of this animal ; and if not yet the method of cure of their loathsome disease, at least its mode of prevention? How many would allow their children to continue victims of epilepsy if they thought they had a bare chance of getting them cured by consulting a physician whose experimental researches had made him specially learned on that subject? Fear them not, for they are as shabby as they are selfish. They may rail against experimental physiologists, but they will never dream, when the day of operation arrives, of having their limbs amputated with hot knives, because experiments on animals have taught surgeons other and better methods. In their hour of agony they will not refuse the relief of the subcutaneous use of morphia, because Mr. Rynd's first trials were made on sporting dogs."

A lady, referring in the *Contemporary Review* for 1877 to the use of experiments on animals, having said, "If that terrible Power will in truth scourge us with a hundred diseases unless we thus propitiate him, then would I, for one, deliberately pray, let these dread diseases overtake me, and let me die, *sooner than share any benefits* from such foul rites, or even say to this new Moloch of science, 'Thou art my God.'" Mr. McDonnell replies as follows : "Let it not be supposed that I quote these words to mock them. The fearless, truth-loving, vigorous-minded lady who wrote them would never have penned them had she not felt them, as regards herself, to be true. I would, however, remind her that there is something which touches generous natures like hers even more deeply than their own suffering. If it was her lot, as it is ours day after day, to feel the feebleness, the impotence of our art to grapple with diseases ; if it was her duty again and again to have to pronounce the fatal word, when asked, 'Can nothing save my child?' if she had to witness the powerful frame of a stout-hearted man convulsed and bowed down with sorrow when the dread sentence is passed upon his wife, 'Yes, it is cancer ;' or to look upon the agonised face of a mother who watches her baby (which she will entrust to no other) as it lies upon her lap, and with a power of observation, by experience rendered painfully acute, perceives the movement of the lips, the twitching of the eyeball, the pallor and subsequent lividity of the face, the restless motion of the head, and helpless cry that usher in the general convulsion—then I believe she would at least have some sympathy with those who have proved themselves willing not only to suffer pain themselves, but to inflict it on the lower animals, in order to strive to make even one single step towards unravelling the vast entanglement in which the mysterious phenomena of

disease are involved. She would admit that the workings of the terrible Power she alludes to are indeed inscrutable; for she would see myriads of animals destroyed by painful deaths for the maintenance of their fellows; she would see few great things accomplished in this world without pain, and travail, and sorrow—the greatest truths making progress not unaccompanied by torture and persecution, the liberties of mankind won not without bloodshed; she would see few, if any, of the great achievements which accompany human progress gained on the whole with less pain and bloodshed than those which have rewarded the efforts of the experimental physiologist, and sanctified his work."

In his address Dr. McDonnell alludes to the first use of the subcutaneous injection of morphia and other drugs by Dr. Alexander Wood, and of Mr. Rynd, whose observations were made on dogs; to the experiments of Brown-Séquard and others, on the deprivation of blood of the tissues of the body, which paved the way for Esmarch's mode of amputation without loss of blood; and to his own experiments on animals bearing on this operation. As he observes, "I should not have had the hardihood to bind the arm of a patient after the manner of Esmarch, and keep it for twenty minutes or half an hour as completely bloodless as though it was the arm of a decapitated corpse, unless I had satisfied myself by experiments, made first on animals and later upon myself, that it could be done with safety." He notices the practical results as regards preventing fever and septicæmia in wounds and amputation obtained by Musitanus in 1702; by Rover, by Maisonneuve in 1866, by Hunter, Lee, Bennett, Ducrest, Castelnau, and Sedillot, and the later experiments on animals by Billroth, Weber, Breuer, and Chroback.

In 1879 Dr. Pye Smith, in his address to the Br. Med. Assoc., also Dr. Greenwood and Dr. Cary, spoke at length on vivisection. In 1881 Dr. Struthers, of Aberdeen, gave a lecture (noticed in *Lancet* for March 5th, 1881, p. 387) on the subject. In this he alludes to the doings of sportsmen and their friends, and administers a reproof to all agitators who let the sportsmen off while they reprobate the physiologists.

Since writing the above I have seen the abridgment in the *Lancet* for March 20, 1880, p. 441, of a paper by Dr. Ch. Richet, of Paris, on "Vivisection and its use in Therapeutics and Hygiene." In this mention is first made of the assistance derived by Harvey and Lower in their researches. Then the reseaches by experiments on animals of Claude Bernard, Oraja, and Portal on poisoning by carbonic oxide, produced by its combining with the red corpuscles of the blood, and preventing their being acted on by oxygen; these researches teaching us practically the means of counteracting the effects by artificial respiration, inhalation of oxygen, and transfusion of blood. Following we have notice of the discoveries as regards interference with the conditions of respiration by Lavoisier, Regnault, Reiset, C. Bernard, and Paul Bert; all we know in hygiene of the quantity of air necessary to support life being the result of experiments on dogs and rabbits. After this we have a notice of the utility of experiments showing the effects of diet on digestion and nutrition, and the combinations of food necessary to health, especially on numbers associated and massed together. In connection with the nervous system allusion is made to the experiments of Galvani, Aldini, Volta, Majendie, M. Hall, Remak, and Du Bois Reymond. The question is asked, "Would Galvani have made his discoveries had he refrained from dissecting frogs? would the electric current have been applied to atrophied limbs if it had not been found that the action of the current in dogs was salutary and not dangerous?" As regards "*Experimental Pathology*," a science dating from Hunter, instances are given of the studies obtained by appeal to experiment of the cause and treatment of uræmia, and nephritis the result of retention of the urinary secretion; of the treatment of sympathetic ophthalmia, arising from watching the effects of division of the ciliary nerves; the treatment of cataract and affections requiring iridectomy; of the formation of callus, of pseudarthrosis or osseous graft, and periosteal regeneration. Full allusion is made to the famous experiments of Claude Bernard on the great sympathetic and the rabbit's

ear,* tending to the more complete establishment of the vaso-motor theory, which plays so great a part in modern medicine and surgery. We then have notice of the experiments on animals by Brown-Séquard relating to tetanus and epilepsy, and of the properties of certain active agents, such as chloral, which could only have been ascertained by experiments, by which C. Bernard and Nussbaum were able to show how by the combination of chloral and morphia the anæsthetic effects of each singly could be increased. The conclusion runs as follows :—"If all those who have been relieved—verily made to live again—by modern medicine and surgery could speak, they would confound those who load vivisection with calumny, and they would hold that their own life and sufferings weighed more in the balance than the sufferings of those animals which have been sacrificed to the lasting benefit of mankind."

It has been said by an important personage (see Note 31, p. 131) that if the opinion of learned men could be obtained it would be found that no result would ever be acquired from vivisection adequate to the torture it inflicted. I will now give an abstract of certain addresses which have quite lately been delivered by men who should be, if any can be, considered as "learned," and who are as wise as learned. I will in the first place quote (and I can only make short quotations from lengthy and comprehensive addresses) from the address of Professor Simon, of Dr. Michael Foster, now secretary to the Royal Society, and of Dr. Fraser, which were delivered at the International Medical Congress held in London in August, 1881, that "Carnival of Medical Science," as it has been termed.

Prof. Simon observed: "Consider for a moment what this (the supervision of experiments on animals) means in regard of the members of our profession whom it affects. Contrast with it the almost unbounded trust with which the world, from time immemorial, has regarded the character of our profession. Consider the relation of inmost confidence in which members of our profession everywhere in the kingdom are admitted to share in the sanctities and tendernesses of domestic life. Consider our immense daily responsibilities of human life and death. Consider that there is not a member of our profession to whom the law does not allow discretion that in certain difficulties of childbirth he shall judge whether he shall kill the child or save the mother. And, in contrast with all this, is it to be seriously maintained that society cannot trust us with dogs and cats? that our foremost workers (for it is essentially they who are affected) cannot be trusted to behave honestly towards their brute fellow-creatures unless they be regulated and inspected under a special law, in much the same prevenient spirit as if they were prostitutes under the Contagious Diseases Act."

Prof. Michael Foster remarked: "At the present day careers are opening up, and a fair amount of useful work is, I trust, being done, or rather, perhaps, would be done, had not in this country physiology fallen upon evil days of a kind unknown in the 18th or any other century. A zeal, not according to knowledge, has, whatever commendable impulses may have nurtured it, given rise to legislative action, which has gone far to cripple physiological research in this country. Our science has been made the subject of what the highest legal authority stated in the House of Lords to be a *penal Act.*† We are liable at any

* In 1858 I drew special attention in vol. xli. of the "Transactions of the Medico-Chirurgical Society" (see p. 397) to experiments on injury of the cervical sympathetic in animals by Dupuy, Petit, H. Müller, Reid, Brown-Sequard, C. Bernard, Kussmaul, Tenner, Schiff, &c., and brought together illustrations of their application in certain cases of disease in the human subject.

† Willis has observed: "By the act of our sage legislators, however, we are now liable to a heavy fine if, in our efforts to wring from Nature some of her secrets, we put a frog or a toad or a stray cur to death without a special licence to set about such nefarious proceedings! How would Harvey have sped on his researches if he had had an Act of Parliament to tie his hands? Anatomists are not Inquisitors taking delight in torture to get at opinions; but scrutators of the laws of life, the discovery of one of which were cheaply bought by the sacrifice of a whole hecatomb of the lower animals."

moment in our inquiries to be arrested by legal prohibitions, we are hampered by licences and certificates.* When we enter upon any research we do not know how far we may go before we have to crave permission to proceed, laying bare our immature ideas before those who are, in our humble opinion, unfit to judge them; and we often find our suit refused. We sigh in our bondage, like the Israelites of old; we are asked to make bricks when they have taken away from us our straw. . . . . For we surely are all agreed that experiments are the chief weapon with which we can fight against the powers of darkness of the mysteries of life."

Dr. Fraser, in his address on Materia Medica, &c., showed the advantage and importance of experiments on animals referring to the action of remedies. He specially instanced the experiments by Majendie on the upas poison and strychnia, which enabled him to lay the foundation for the doctrine that remedies exert their actions upon special structures, one afterwards developed by Claude Bernard. Majendie's experiments on the action of strychnia upon the spinal cord led him to prepare this substance as a remedy in paralysis. He shows how the true action on the heart of digitalis was determined by experiments upon animals by Bernard, Dybkowsky, Pelikon, Meyer, Boehm, and Schmiedeberg. Professor Fraser stated *that he had lately been refused a licence to perform subcutaneous injection of certain drugs on rabbits and frogs.*

At one of the sections of the International Congress (1881), Prof. Virchow, in a remarkable address on the Value of Pathological Experiments, also spoke at length on the subject of vivisection, demonstrating not only its utility, but its indispensability, and showing that most of the opposition to it, as he had shown, indeed, at Amsterdam meeting, often arose from ignorance. "None of those," he said, "who attack vivisection as an aid to science, have any conception of the true importance of science, nor of the value of this means of acquiring knowledge." After alluding to the obligation of Harvey to vivisection, he remarks, "The purity of a truth-loving and educated mind is still needed, even at the present day, to absolve Harvey from the reproach of heartlessness, perhaps of brutality, with which our anti-vivisectors are so generous."

Among other benefits to mankind from vivisection, Virchow lays stress on our knowledge of the vital properties of the organs of circulation, a subject not touched upon in Harvey's experiments (the cause of the activity of the heart, the share which the arteries, veins, and capillaries have in the distribution of the blood), knowledge arrived at by experiments on animals, as by E. Weber (the vagus nerve), and C. Bernard (sympathetic nerve).

Virchow concludes as follows:—"The statement that medical students are inwardly 'brutalised,' is just as fanciful as it is a calumny that the teachers of vivisection have suffered any loss of morality. But least of all is there any need to fear for science itself. That holds of science which Bacon says of the sun, "Palatia et cloacas ingreditur, neque tamen polluitur."

Following the meetings of the International Congress were those of the British Medical Association, held at Ryde (I. of W.) in August, 1881. Of these I will quote the proposal of Professor Humphry, of Cambridge, which was seconded by Mr. Husband, and adopted, *with only one dissentient voice*, by no less a

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* In noticing the report of the Inspectors under the Vivisection Act for 1879, the *Lancet* (June 26, 1880, p. 1009) remarks: "We think it is very desirable that a return should be obtained which should illustrate a little more directly the injury which the mode of carrying out the provisions of the Act is doing to physiological and therapeutical science in this country."

And, "It is well known that in many cases the conditions under which the licences are obtained interfere very much with the object. An investigator has the opportunity and leisure to carry on a set of important experiments, and applies for a licence. So long a delay elapses before the licence is obtained that the opportunity is past, the leisure is gone; the licence is for a limited time, and has expired before an opportunity recurs."

number than 300 medical practitioners, teachers, and professors. The proposal was as follows:—

"That this Association desires to express its deep sense of the importance of vivisection to the advancement of medical science, and the belief that the further prohibition of it would be attended with serious injury to the community, by preventing investigations which are calculated to provide the better knowledge of the treatment of disease in animals as well as in man."

After exposition of many of the great advantages to mankind which have arisen from the use of experiments on animals, he dwelt at length on, and confuted, the supposition that such experiments of necessity hardened the heart and demoralised, and went on to remark: "If there be demoralisation connected with this matter, it is the demoralisation connected with false statements and imperfect knowledge. I do not know that there is anything in the course of my life which has shaken my feelings with regard to the uprightness, the integrity, and, above all, the fairness of Englishmen, so much as the manner in which this subject of vivisection has been paraded before the public, fortified with exaggeration, with carelessness, with false statements. Certainly no demoralisation associated with vivisection is at all to be compared with the demoralisation and damage which is done to the minds and thoughts of the community by the statements which are made against it."

Again, "Take away the knowledge which we have received through vivisection, and conceive what a chaos would be our knowledge of the human body, and our ideas of the treatment of the human body! You can scarcely conceive to what we should be reduced. Every man in the whole history of medicine—every man who has made real advances in the knowledge of the workings of the human body—has done it through vivisection. From Galen and Vesalius to Harvey, to Hunter, to Hope and Brodie—for this, the most practical of modern surgeons, was a vivisector—every one of these men, and they are few among the many, has made his greatest discoveries through vivisection."

Subsequently the *British Medical Journal* (August 27) had the following observations:—

"When such eminently qualified men as Professor T. R. Fraser, of Edinburgh, Dr. Lauder Brunton, and Professor Lister, are refused certificates for carrying on investigations which they declare to be of the highest value to medical science, then it is time that the medical profession should support them in their praiseworthy efforts to obtain that liberal interpretation of the obnoxious Act which will admit of good work being done even under difficulties."

Again: "The International Medical Congress and the British Medical Association will not have failed of their purpose if the resolutions in favour of the continuance of vivisection passed in the Materia Medica and Physiological Lectures of the former, and—under the able guidance of Professor Humphrey—in a general meeting of the latter, bring those in high places to a consideration of the thoroughly illiberal policy which they are carrying out towards medical men and humanity at large. Surely the powerful voices of Simon and Humphrey will be listened to, and redress given at once. If not, medical men must agitate and combine until they obtain complete freedom to carry out their investigations in the spirit that animated Harvey, Hunter, and Claude Bernard."

Among the clergy who have raised their voices or written in favour of a wise and humane use of vivisection, I would mention Dr. Magee, the Bishop of Peterboro (see his speech in the House of Lords, July 15, 1879, on Lord Truro's "Cruelty to Animals Bill," and his letters in the *Spectator*, July 26th following), Canon Duckworth (see his speech at Westminster Hospital on the occasion of Dr. Dupré's Inaugural Address, at the Westminster Hospital Medical School, October, 1879, reported in the *Br. Med. J.* for October 4), and the letters he subsequently wrote, Oct. 18 and Nov. 1, in defence against a scurrilous circular; and the late Rev. Dr. Coghlan, incumbent of St. Peter's, Vere Street, London, who, in 1877, published a sermon, "Man and the Lower Animals." From this sermon I extract the following passages:—

"This leads me to the *New* Testament. What do we find there? Not much about the lower animals in the Gospels. Nothing that I remember; except one. That one is remarkable. Our Saviour sends the demons into the herd of swine.

"Having read almost all the Blue Book carefully, it seems to me that, from the evidence of the Secretary of the 'Society for the Prevention of Cruelty to Animals,' our Saviour would have been liable to punishment under the Bill suggested by that most excellent Society. The evidence of the Secretary was quite candid. As I read it, I wished that some one had asked him whether or not, under his Bill, Jesus Christ would have been convicted in the matter of the swine. The Saviour certainly drove the swine mad. The tortures of each one in drowning you can imagine if you like to do so. Our Saviour let it be so. Well, then, what about inoculating sheep with sheep-pox to test the power of some hindrances to the prevalence of small-pox in man? I do not appeal to your selfishness. I appeal to your sense. I appeal also to your professed love of the Bible. Let us put it into plain English. The Saviour inoculated with madness (or as I believe sent evil spirits into) a herd of swine. Take it how you will, it is remarkable, to say the least of it, that the Saviour's only miracle of *severity* is this one. He never gave what we should call 'needless pain' on any other occasion. '*Needless* pain.' I should like to know what that is. Whose pain? Under what circumstances? For what purposes? I hear nothing of the cruelty of the military or naval commander who, *in the discharge of his duty*, causes the loss of *human* life, involving in innumerable families, a complication of human suffering. I hear no outcry. But I do hear—or I heard somewhat more than a year ago, an outcry (for it came to that) against men about whose tenderness there could be no reasonable doubt. Are physicians and surgeons cruel? Ask yourselves that question. Do not go into abstractions. Do not sign petitions until you ask yourselves that question. Ask yourselves the question, thinking of any physician or surgeon whom you know, Is he cruel? Would he give 'needless pain'? I think that you will say 'No.' But you may add 'who is the *judge*'? If your first answer were well-weighed, I should say that the physician, surgeon, or 'man of science' is the judge. I will not touch the question whether or not knowledge should be searched after, whether it be practical or not. (I should like to know who could say what research is practical and what is not.) Nor do I say that the iniquities of nine-tenths of mankind justify the iniquities, as they are supposed to be, of the remaining tenth. I simply protest against the remaining one-tenth being held up to execration. I protest against legislation for the medical and surgical professions, as if the members of these professions were exceptionally cruel! One sentence, I think, will settle this point. They need not go to the lower animals. They can make their experiments on you and on me, if they please. When we are ill we are powerless in their hands. We could not venture to say 'No' if the physician ordered us to swallow anything. We dare not say 'No' if a surgeon of eminence ordered any operation. They could experimentalise on *us* to any extent. They never do so. Then why insult them by legislation? That cruel things have been done from time to time is beyond doubt. I believe that they are exceptional cases in this country. They are made to 'do duty' over and over again, like 'the army' on the stage in a play, consisting of ten, going round and round to represent hundreds!

"*But we must fall back upon a principle.* That principle, to my mind, is that God has handed over to us the lower animals, and we have to answer for our treatment of them, as we have to answer for every other power given to us.

"No other view, as far as I can see, justifies what the most anxious advocates of animals and protesters against cruelty will do when they hunt and shoot, when they set traps, and destroy what we call 'vermin.'

"It is, and must be, a matter of consideration *as to the higher end.* The lower animals are placed in subjection under us, and our dealings with them are, and must be, matters of detail and of individual conscience. It has been maintained—not by physiologists—but by, at least, one of the most eminent living divines, that we have no moral duties towards the lower animals.

"Even if this be true, it does not at all interfere with what I have been saying this morning. I have not grounded the importance of care in our treatment of animals on any duty of ours towards *them.* I have grounded it on the fact that we are bound by the Christian religion to cultivate certain dispositions in *ourselves.*

And so it is obviously a duty to avail ourselves of every opportunity of fostering such dispositions, and to make use of every test by which their existence may be ascertained. The lower animals afford us such opportunities. They supply us with these tests. And, therefore, it is our duty so to use them. It certainly is possible so to use them. It may have been *intended* that we should so use them."

I would here state that in April, 1880, the question of the practice of vivisection was discussed by Petition Commission of the German Reichstag (see *Lancet*, May 15, 1880, p. 777), Virchow taking part in the debate, and pointing out the importance of the practice to science. "The occurrence of excesses was not contested, but it was urged that their control should be in the hands of the local authorities, and not effected by imperial enactment." The commission resolved "that, in the interest of scientific investigation, vivisection seems to be indispensable in the physiological schools; that the change in the laws of the kingdom which the petitioners wish is undesirable, that the petitioners should memorialise the local authorities on the subject of the alleged abuses."

Dr. G. Hamilton has a carefully written paper entitled "Thoughts on Vivisection" in the Trans. of the College of Physicians of Philadelphia, vol. v. (1881), in which he balances cautiously the pros and cons, and concludes that "the entire subject is still *sub judice*."

Here I would advert to the observations by Professor Owen's plea for vivisection, at Folkestone (Aug. 6th, 1881), on the occasion of the uncovering the bust of Harvey (see pp. 27, 118).

And I would cite the letter of Mr. Charles Darwin, in answer to one of Prof. Holmgren, of Upsala, which appeared in the *Times* for April 18, 1881, touching on the abstract right to inflict pain on the lower animals, modified by the use of anæsthetics; in which he vindicates to himself the power to curtail the liberties and pleasures of animals, birds, and insects, in cages, and to the experimental physiologist the power, under proper conditions, of using vivisection.

Mr. Darwin considers that those who obstruct the use of such powers are ungrateful to the benefactors of mankind; and that by vivisection alone the vast benefits of physiology not only to man but to the lower animals can be secured.

The *Times* of May 9th, 1881, coincides, in a leading article, with Mr. Darwin's temperate views, and alludes to him as "one whose love of humanity and the lower animals is well known." It observes that the existing Act is "a fair compromise between the liberty of honourable science and the emphatic public opinion that science had been previously made an occasional screen for unscientific brutality."

It suggests that it would have been preferable had the administrative machinery been consigned to the control of "professional authorities like the College of Physicians and Surgeons and the Royal Society, with the Home Office as an appeal court."

Referring to researches on the lower animals carried out by Leuckart, Mosler, and himself, with the object of determining the origin of certain animal parasites (the varieties of human entozoa), Dr. Cobbold (see his interesting Opusculum on Tapeworms, 1866, p. 40) observes, *àpropos* of experiments which proved the source whence the human body derives the unarmed tapeworm, and also whence cattle derive the eggs necessary for the development of the measles, that "as it is by such means that our science is advanced and the welfare of the human race is provided for, no person can fairly object to the legitimate employment of these experiments."

Again, *apropos* of experiments on the rearing, the source and development of parasites, Dr. Cobbold observes (see his work on Parasites, 1879, p. 152): "Never in the history of biological science have more valuable issues followed the method of experiment upon animals. Not only has human life been thus saved, but animal life also. State-medicine and sanitation have received an immense impulse. The good that has already resulted is simply incalculable; nevertheless, in the eyes of a set of ignorant fanatics who infest this country, all

experiments 'involving cruelty to animals' ought to be prevented at any cost. The further progress of biological science in England has hereby sustained a severe shock." The experiments were made upon the pig, cat, calf, heifer, birds, and hedgehog. The experiments of numbers of other observers, especially Davaine and Thudichum, are considered.

An interesting case has lately occurred showing the good use which experiments on animals may serve. It was lately related by Dr. A. Neisser, in the "Annales d'Hygiene Publique." The patient was a man with general psoriasis. One half of the body was treated by outward application of chrysarobine, the other half by application of pyrogallic acid, as a substitute for chrysophanic acid. Shivering, vomiting, collapse, came on, and death, preceded by coma It was not known by which agent death had been caused, and it was decided to determine the point by experiments on rabbits. These proved that the catastrophe was due entirely to the pyrogallic acid, which acts by extreme acidity for oxygen when in contact with alkaline fluids. Again, in Phipson's "Journal of Medicine," vol. i. p. 194(1880), Dr. Catillon has related some highly instructive experiments upon dogs, on rectal alimentation, proving that for nutrition to be properly performed by the intestines, digestive ferment must be associated with the food to assure the formation of peptones. The above experiments are quoted from the *Monthly Magazine of Pharmacy*, for May, 1881, which also notices a discussion at the New York Academy of Medicine *apropos* of a paper by Dr. A. Flint, and a paper by Dr. Leube in 1872.

Note (39). P. 55.

Charles I. and the Medical Profession.

The interest which the king took in matters connected with our profession is seen by a letter from Bacon to the Chancellor of the Duchy (1624), on a patent of the king's for a separation of the Company of "Potycaries" from the Company of Grocers and their survey, and the erecting them into a corporation of themselves, under the survey of the physicians. Bacon said it was a work "which the king made his own. and did and as I hear doth take it much to heart. It is *in favorem vitæ* when the other part was *in favorem lucri*. He goes on to say, "You may perhaps think me partial to Potycaries, that have been ever puddering in physic all my life." He proceeds naïvely to remark that the Potycaries, after he had put the Great Seal to the patent, presented him with an hundred pounds.

Note (40). See Note (37), p. 132.

Note (41). P. 60.

Biology.

The word "Biology" has now gained a firm footing among us in the sense in which it is used, but its correctness in this sense has been disputed. Thus Baden Powell (op. cit., p. 172) remarks: "While on this subject I cannot omit to take this occasion of recording a protest against the now prevalent but barbarous use of the term 'Biology.' *Βίος* never means 'life,' in the sense of 'vitality;' it means the 'life' of a man as progressing in *time*—his birth, actions, and death. Plato has '*βίος ζωῆς*,' the lifetime of life (Epinom., 982). Unfortunately the term 'Zoology,' which would be the proper one for this branch of science, has been already appropriated to what ought to have been called 'Zoography;' but there is still 'Zoonomy,' the science of the *laws* of life, open to adoption, and at any rate much better than 'biology,' which, if it mean anything, would be a *theory* of the facts of *biography*."

Again, Sir A. Grant remarked in his "Aristotle," p. 147 (1877), "The word 'Biology' is perhaps only about fifty years old, having first come into prominent use in the 'Positive Philosophy' of Augustus Comte. It is now quite naturalised in the vocabulary of science, and there is an article on 'Biology' by Professor Huxley, in the recently published edition of the 'Encyclopædia Brit.,' which begins, 'The Biolo-

gical sciences are those which deal with the phenomena manifested by living matter.' Yet still, in the eyes of a scholar, this modern compound is an unfortunate one. The Greeks had two words for life, Zöé and Bios—the former expressed life derived from the inside, as it were—the vital principle, the functions of life, the sense of living; the latter expressed the external form and manner of living, such as a man's profession or career. Zöé was applicable to the whole animated kingdom; Bios was restricted to man, except so far as, half metaphorically, it was applied to the habits of beasts or birds. Thus, Aristotle divided Zöé into the species 'vegetable,' 'animal,' and 'human'; but Bios into the species 'life of pleasure,' life of ambition,' and 'life of thought.' From all this it will be seen that 'Biology' could not be used to denote a science of the phenomena of living matter in general without a sacrifice of ancient Greek associations. 'Biology,' in short, is more appropriate to express what we generally call Sociology; and, on the other hand, 'Zoology' should have been used to express what is now called 'Biology.' But the fact was that the word 'Zoology' (derived from Zöon, an animal, not from Zöé, life) had been already appropriated as a name for natural history. Hence, without regard to classical propriety, the word 'Biology' was forced into service to meet a want, and to express, what had never been expressed before, the science of life in all its manifestations, from the lowest ascidian up to the highest development of humanity, so far as that development can be considered to be a natural evolution out of the physiological laws of life."

Note (42). P. 61.

Professor Rolleston.

"Debemus morti nos nostraque." George Rolleston, M.D., F.R.S., Professor of Physiology in the University of Oxford, after a long and anxious illness, at the age of 52, "naturæ debitum exsolvit," June 16th, 1881; and the pious offices to his remains were discharged at Oxford June 20th in the presence of a very large number of deeply-sorrowing and attached friends, and members of the University and city. The following brief notice of his career will not be out of place. Dr. Rolleston was a native of Maltby in Yorkshire, and was educated at Gainsborough, and at the Collegiate School in Sheffield. After being elected Fellow of Pembroke College, and following his medical studies at St. Bartholomew's Hospital, he went out during the Crimean War as assistant-physician to the British Civil Hospital at Smyrna. On his return, and after being for a time connected with the Hospital for Children in Great Ormond Street, London, he returned to Oxford as Lees' Reader in Anatomy at Christ Church. Subsequently he was elected to the Linacre Professorship, founded in 1860, and to a Fellowship at Merton College in 1872. He was for very many years an active member of the Council of the University, and also of the Oxford Local Board, and for many years also was a member of the General Medical Council. As has been said of him, "he was a speaker of great force and no little fire, and possessed much of the general fascination of true genius." "He was as stern a champion as he was an ardent devotee of truth."

In addition to numbers of thoughtful and important communications to Journals and Transactions of many scientific societies, he was the author of "Forms of Animal Life," and co-author with Canon Greenwell of "British Barrows." Dr. Rolleston was a keen politician, and in this respect (as was well said shortly after his death in one of the Oxford papers), "although he loved authority and order much, he desired freedom, and the growth which he thought belonged to freedom, more."

When the Oxford "Museum" was completed* the Dean and Chapter of Christ Church, as has been described in the paper alluded to, "acting in the most generous public spirit, decided to allow the anatomical collection under Dr. Rolleston's care to be moved for University rather than the narrower collegiate pur-

* For a description of the origin and character of the New Oxford Museum, see a little volume by Dr. Acland and Mr. Ruskin, published (1859) by Smith, Elder, and Co., containing interesting letters, appendices, and illustrations.

poses to the new Institution. It was then hoped and believed that this Institution would gradually extend until it was able to exhibit and advance every scientific department that can illustrate the Kosmos in the most perfect manner. The Radcliffe Trustees, in the same hope, transferred their Scientific Library to the Museum. The young anatomist found his biological series, and all the work-rooms that had been provided for him, in close proximity, on the one hand, to the Palœontological Collections of Buckland, to the Departments of Physics and Chemistry, and to the literature of all these allied sciences. He exceedingly prized the common daily intercourse and fellowship of his colleagues in all the scientific departments which this change brought to him. From that moment his m nd was turned without ceasing to the contemplation and the practical study and illustration of man, as man, by every possible method—his descent, his development, his relation to other beings, their relation to each other and to the inorganic world. Every department of anatomy, however minute, of physiology, however abstruse, and of ethnology, however complex, from time to time yielded a store-house of material to his vigorous grasp. Every research from those of Prichard, Max Müller, or Darwin, to those of Lister or Parker, seemed in turn to be taken up by him with equal energy. That this is no form of words, the use which he made of the Bodleian and Radcliffe Libraries, the deep interest he took in both, and the illustrations and quotations in his unceasing speeches on public occasions absolutely prove. Had his life been spared, and had not circumstances for a time retarded the growth of the Museum, Oxford would certainly have had ere long every means at her command which literature, practical work, and exhibited collections could furnish for the illustration of the human race, of the relations of man to all living beings, and of man as a higher and responsible being capable of communion with his Maker. Even now, though his life is thus early cut off, enough has been established to make retrogression impossible. His ethnological collection is already valuable and rare."

Shortly after Dr. Rolleston's funeral the Public Orator of the University (the Rev. W. W. Merry) in his oration in the Sheldonian Theatre (at the time of the yearly commemoration), referred to him in the following words :—"Qua autem oratione, quove desiderio prosequar Georgium Rolleston, professorem physiologiæ Linacerianum, virum excultissimi ingenii, integritatis incorruptissimae, amicum veritatis et propugnatorem impavidum? Qui vero in plurimarum rerum inquisitione et investigatione unum modo nesciebat, aut sibi parcere, aut quidquam actum credere 'dum quid superesset agendum.' Hodie tamen recentior nobis est dolor quam ut tam caro capiti vale supremum dicamus."

And, again, the Vice-Chancellor (the Rev. Dr. Evans), in October following, thus bore testimony to his merits : "Mediâ anni parte et mediâ fere ætatis suæ, post longam ægritudinem obiit Georgius Rolleston, Physiologiæ Professor Linacrensis, vir singularis ingenii, probitatis et industriæ—literis pariter ac scientiâ insignis—studio præterea et labori adeò deditus et sui negligens, ut non solùm totum vitæ spatium sed (nimis, eheu ! "magnæ prodigus animæ") vitam ipsam impenderet. Multa et egregia sui monumenta reliquit ; nullam autam laudem præclariorem quàm quod scientiæ physicæ *fide salvâ* incubuerit et per naturam ad naturæ Deum suspexerit."

An appreciative article in the *Lancet* for June 25th, 1881, concludes as follows : —"Oxford has the greatest cause to recognise and to remember Dr. Rolleston's character as a teacher. He has had many devoted pupils, gradually finding their way to posts of trust in various scientific institutions and hospitals in London and elsewhere. He taught all who were capable of being taught to work with great and comprehensive aims, even while engaged in small and laborious details. And with his teaching he instilled also a sense of duty, and especially has this been felt by those of his pupils who have since become teachers. Among the rewards of his labours, the one, perhaps, which he most highly appreciated was when his friends and pupils from various parts became contributors towards the completion of his anatomical collections. Warm-hearted, impetuous, with wide sympathies and generous impulse, Rolleston was a delightful companion, an entertainining and a liberal host, and a constant friend. He was a most energetic worker, rising and being often in the museum at five a.m. So that he was accus-

tomed to say that between Professor Clifton, whose delicate experiments required the quietude of the night, and himself, the museum was rarely untenanted for an hour."*

In his sermon before the International Medical Congress (alluded to at p. 174), Dr. Liddon made a touching allusion to the life, works, and last words of Dr. Rolleston; as also to the unselfish career of the late Dr. Humphry Sandwith.

Of Professor Rolleston it may be truly said, "Multis ille bonis flebilis occidit." He left a wife (a daughter of Dr. John Davy and niece of Sir Humphry) and several children to deplore his death.†

Note (43). P. 62.

Newton on a "First Cause."

With reference to the views of Newton on this subject, I would here quote a few words from a little work lately published, "Materialism, Ancient and Modern" (by a late Fellow of Trinity College, Cambridge). Referring to the impression held by some that the rapid advance of science has in some way shaken the basis of the belief respecting the origin of man and the universe, entertained (with few exceptions) from Socrates to Newton, and that faith was being secretly undermined by the current of scientific discovery, he says: "It may allay these apprehensions to remember that they were not entertained by him to whom the extension of science must be chiefly attributed, whose own discoveries were the most important of all that have been made in the realms of science, the most important it may be in themselves, but certainly the most important in this, that they gave an impulse and a true direction to investigation by displaying the brilliant results which attend an adherence to a sound method of investigation. Sir Isaac Newton, when he contemplated 'the great ocean of truth which lay unexplored' before him, did not appear to entertain any apprehension that, if he had been permitted to navigate it, he would have been in danger of making shipwreck of his faith in the cause of its existence. The expression of which he made use leads us to suppose that he foresaw a constant advance of scientific discovery; but if we consider the principles of research which he had laid down and acted upon with such unprecedented success, we must feel convinced that he could not conceive it possible, from the domain of law and order being more and more widely extended, that men would find stronger and yet stronger evidence that the universe is governed by chance or aimless laws, and less and less probability that it is subordinate to the direction of intelligence."

Canon Birks, Professor of Moral Philosophy in Cambridge, remarks: "As a general rule, the chief discoverers in natural science have been Christians of a modest, reverent, and religious tone of mind. Copernicus, Kepler, Bacon, Boyle, Pascal, Newton; and in the past and present century, Euler, Cavendish, Cuvier, Brewster, Sedgwick, Whewell, Faraday, have all combined ardour in physical research with a spirit of reverence for Christian truth. They have entered into Bacon's prayer, that no unlocking of the secrets of nature may cause blindness to the higher mysteries and messages of the Word of God; and the axiom of Newton, that the object of physics is to trace phenomena up to their causes, climbing to those more and more simple and general, 'till we come to the First Cause, which is certainly not mechanical.'"

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* In one of the obituary notices of Dr. Rolleston it is stated that his loss "will be deeply regretted by the archæological world, as he was a leader among the small band of men who feel a vital interest in the antiquarianism of science.

† The well-known and well-remembered conflict between Bishop Wilberforce and Prof. Huxley, at the Oxford Meeting of the British Association in 1860, on occasion of the discussion between the latter gentleman and Prof. Owen regarding the "hippocampus major" of the brain in man and the ape, was alluded to in the *Times*' obituary notice of Prof. Rolleston, as tending "materially to concentrate all the qualities of his nature on the highest biological questions."

Note (44). P. 62.

Faraday on Religious "Belief."

Faraday, in his Royal Institution Lectures on Mental Education, 1855, says: "I believe that the truth of that future life cannot be brought to man's knowledge by any exertion of his mental powers, however exalted they may be: that it is made known to him by other teaching than his own, and is received through simple belief of the testimony given. Let no one suppose for a moment that the self-education I am about to commend, in respect of the things of this life, extends to any considerations of the hope set before us, as if man by reasoning could find out God. It would be improper here to enter upon this subject further than to claim an absolute distinction between religious and ordinary belief I shall be reproached with the weakness of refusing to apply those mental operations which I think good in respect of high things to the very highest. I am content to bear this reproach, &c. . . I have never seen anything incompatible between those things of a man which can be known by the spirit of a man, which is within him, and those higher things concerning his future, which he cannot know by that spirit."

Faraday also observes: "But though the natural work of God can never by any possibility come in contradiction with the higher things which belong to our future existence, and must, with everything concerning Him, ever glorify Him, still I do not think it at all necessary to tie the study of the natural sciences and religion together."

[MS. quoted by Dr. Bence Jones at page 1 of his Croonian Lectures on "Matter and Force."]

Sir H. Holland, who knew Faraday exceedingly well, alludes to him in his "Recollections of Past Life" (see p. 218). After speaking of his name as being scarcely more eminent from the great discoveries attached to it than from those private virtues and affections which endeared him to all who knew him, he goes on to observe: "His love for science was as pure as all his other affections, wholly unalloyed by jealousy, seeking only for truth. His earnestness and natural eloquence as a lecturer will ever be remembered by those, young as well as old, who crowded to listen to him in that building which was his home for more than fifty years (the Royal Institution). The infirmity which came upon him during the last year or two of his life, touched not the moral part of his nature, which remained unaltered to the very last."

Note (45). P. 62.

Bacon on "Creative Power."

Lord Bacon, in his essay on "Atheism," observes: "I had rather believe all the fables in the Legend, and the Talmud, and the Alcoran than that this universal frame is without a mind. And therefore God never wrought miracle to convince atheism, because His ordinary works convince it. It is true that a little philosophy inclineth man's mind to atheism; but depth in philosophy bringeth men's minds about to religion. For while the mind of man looketh upon second causes scattered, it may sometimes rest in them, and go no farther; but when it beholdeth the chain of them, confederate and linked together, it must needs fly to Providence and Deity."

Mr. Ellis has contrasted the religious earnestness of Bacon* with the tone of Galileo and others. He observes: "Galileo's works are full of insincere deference to authority, and of an affected disbelief in his own discoveries. Surely he who loves truth earnestly will be slow to believe that the cause of truth is to be served by irony. But," he rightly goes on to observe, "we must not forget the difference between the circumstances in which the two men were placed."

To quote from "Verses on Various Occasions:"

> "But o'er the elements
> One Hand alone,
> One Hand has sway.

* Spoken of by one writer as "the broad-browed Verulam."

What influence day by day
In straiter belt prevents
The imprisoned Ocean, thrown
Alternate o'er the ever-sounding shore?
Or who has eye to trace
How the Plague came?
Forerun the doublings of the Tempest's race?
Or the Air's weight and flame
On a set scale explore?

"Thus God has will'd
That man when fully skill'd
Still gropes in twilight dim,
Encompassed all his hours
By fearfullest powers
Inflexible to him,
That so he may discern
His feebleness,
And e'en for Earth's success
To Him in wisdom turn
Who holds for us the keys of either home,—
Earth and the world to come." *

Note (46). P. 64 (see note 44).

Religion and Science.

Baden Powell (op. cit.) remarks: "The highest inferences to which any physical philosophy can lead us, though of *demonstrative force*, as far as they reach, are confessedly of very *limited extent*. It is a mistake to confound with the deductions of science these more sublime conceptions and elevated spiritual views of a Deity,—a personal God,—an omnipotent Creator,—a moral Governor,—a Being of infinite spiritual perfections,—holding relations with the spirit of man;—the object of worship, trust, fear, and love;—all which conceptions *can originate only from some other source than physical philosophy*. These are conclusions which science must confess entirely to transcend its powers, as they are beside its province to substantiate."

On the separation of Religion and Science, Faith and Reason, Professor Fowler (loc. cit., p. 190) remarks:—"But, however it may have been with particular individuals, I cannot question that the general tendency, predominant, especially in England, till quite recently, to draw a distinct line of demarcation between the sphere of religion, on the one side, and philosophy and science on the other, and to combine a sincere belief in the traditional teaching of the Bible or the Church with a perfect independence in the sphere of speculation, is due, in large measure, to the teaching and example of Bacon. Whether this produce be or be not legitimate, this is not the place to inquire."

Bishop Harvey Goodwin has written as follows (see an address entitled "The Analogies and Contrasts between Human and Divine Science"†), "When, for example, a man of high scientific position announces to us, as a result of his investigations, that our great-great-great-grandmothers were hairy creatures, presumably not very easily distinguishable from certain half-human-looking brutes which may be seen in our own time in the Zoological Gardens—it is not much to be wondered at if many of us should begin to feel that physical science was treading upon somewhat delicate ground. Our fathers, perhaps, we might have

* See an interesting essay by Sir H. Halford on the "Unity of the Creative Power throughout Creation" (1867), in the "Fragmentary Papers" edited by his son, 1875, p. 19, &c.

† Reprint from Trans. of Cumberland Association for Advancement of Literature and Science, pt. ii.

left to take care of themselves ; but to give our mothers beards, and to suppose that they had sloughed them off only in comparatively later times, in deference to a growing taste on the part of their mates, may fairly be regarded as rather hard to be swallowed, and somewhat unpleasant when it has been. Nevertheless I am persuaded that in the case of all such rash speculations our 'strength is to sit still.' No such speculations need ruffle our tempers, still less need it make us feel alarm lest important moral or religious truths should be in jeopardy ; one may be quite sure that false hypotheses and unwarranted generalisations will not live long ; that if they have any seed of truth in them that seed will take root and survive ; and that if they are wholly false they will sooner or later perish altogether." *

Sir James Paget has lately published a highly-interesting and thoughtful Address to Students preparing for Ordination (Rivington), entitled "Theology and Science," of which the main object is to show that Science in its modern form is not opposed to intellectual and inferential Theology or to the Christian Religion. The author points out that controversies of Science and Theology arise in inferences from imperfect knowledge : the vast majority of men refusing, in all doubtful matters, to wait for knowledge, but arranging themselves in parties. He observes that when two beliefs seem incompatible both may be true : opposition of parties being due to the fact of both being ignorant of some intermediate truth which, when gained by increasing knowledge, will combine the truths they now hold apart. The imperfection of knowledge does not justify the levity with which the knowledge of one side is often regarded by the other. He points out the good which after all existed in controversy, which should be regarded with patience ; "as the growth of knowledge has harmonised many truths that seemed in discord, so will it attain to the clear evidences of the unity of theology and science." †

On the relative value of the two philosophies of the ages of the old world the following remarks are noteworthy : "Cicero brings everything, as much as possible, to a practical standard. If the question arises between the study of morals and politics, and that of physics or metaphysics, he decides in favour of the former, on the grounds that the latter transcends the capacities of the human intellect ; that in morals and politics we are under obligations from which in physics we are free ; that we are bound to tear ourselves from those abstract studies at the call of duty to our country or our fellow-creatures, even if we were able to count the stars, or measure the magnitude of the universe."—The above passage I quote from "Browne's History of Roman Classical Literature" (p. 356).

Note (47). P. 64.

Final Causes.

"In vain the sage, with retrospective eye,
Would, from the apparent 'what,' infer the 'why.'"

The difficult subject of "Final Causes" has been very differently handled.

Much was said by Bacon about the consideration of "final and first causes," and the corruption of philosophy by uniting it with theology, by which "not only a fantastical philosophy, but also a heretical religion" arises. "It is therefore," he says in one of his Aphorisms (Lib. I., No. 65), "most wise soberly to render unto faith the things that are faith's." ‡

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* "Truth, like a torch, the more it's shook, the brighter it shines."

† Mr. John Morley, in one of his essays, has said that the type of S. Vincent de Paul is plainly as indispensable to progress as the type of Newton. (See "Critical Miscellanies.")

‡ Claude Bernard, after observing that it is for metaphysics and not biology to attempt to penetrate into the nature of life or of its principle, observes : "Le *pourquoi* des phénomènes est situé dans les régions de la fantaisie. Le *comment* est le seul terrain de la médecine experimentale." See "Rapport sur les Progrès de la Médecine," p. 82.

Professor Fowler's remarks on Bacon's rejection of the Inquiry into Final Causes may be fitly quoted somewhat at length, considering the interest of the subject. He remarks (loc. cit., p. 143): "The 'Final Cause' is one of the 'four causes' of Aristotle, and signifies 'the wherefore' (τὸ οὗ ἕνεκα), or 'the end' (τὸ τέλος) for which a thing exists. Aristotle assumed that every object has such an end ('Nature does nothing in vain'), and, apparently also, that we are competent to ascertain it. These assumptions were common amongst his successors, and were generally accepted in Bacon's time. No account of any natural object or operation was supposed to be complete unless it assigned its end or final cause. Now Bacon did not propose to banish this inquiry altogether, but to relegate it from Physic, which he supposed to be concerned solely with Material and Efficient Causes, to what he called Metaphysic, which was to inquire into Formal and Final Causes. The consequence of its consideration in Physics, he maintained, had been to expel from that branch of knowledge the inquiry into physical causes, and so to give men an excuse for resting in these 'specious and shadowy' causes, instead of pressing on their inquiry into causes, the existence and action of which they could verify. In Metaphysic such an inquiry might be proper, but in Physic it was impertinent (De Augm. iii. 4); for in physics we want to know how and from what conditions a thing is produced, not what object it subserves in the economy of nature. Moreover the inquiry into Final Causes results in no works or inventions (an idea always uppermost in Bacon's mind), being like a virgin consecrated to the service of God (De Augm. iii. 5).

"This metaphor, which I believe Bacon employs quite seriously, and not with the slightest intention of banter, may perhaps best disclose to us his point of view We may, he conceived, legitimately attempt to ascertain (and the attempt, though it may here and there fail in particular instances, will be crowned with more or less of success) the ends and objects of the various parts of nature, their relations to one another, and the harmony of the whole, and so rise to some conception, however faint, of the power, wisdom, and goodness of Him who framed the universe. 'That there is a God, that He holds the reins of things, that He is all-powerful, that He is wise and fore-knowing, that He is good . . . . may be proved to demonstration even from His works' (De Augm. iii. 2). But then this inquiry must remain consecrated to the service of God. As soon as it intrudes into the province of Physics it is attended with no results; nay, rather, as it diverts the mind from the inquiry into efficient and material causes, the proper object of physics, it becomes positively baneful.

"I conceive, therefore, that in the sphere of what we should call natural theology, Bacon would have approved and encouraged the inquiry into Final Causes, but that he proposed to banish it altogether from the domain of Physics. Such an exclusion was, I believe, far too rigid and absolute. It is certainly a curious commentary on his procedure that, at the very time when he was composing the 'Novum Organum,' Harvey was employing the very mode of reasoning in the famous researches which resulted in the discovery of the circulation of the blood.

"Nor would any one, I presume, now deny that the idea of a *function*, which implies so much of Final Cause as is included in the word *adaptation* as distinct from *design*, is a conception absolutely essential to the successful prosecution of at least one science, that of physiology. And, even in the higher sciences of psychology, ethics, and politics, there are few inquirers who can avoid from time to time asking the question, What purpose does such and such a constituent subserve in the mental, moral, or social economy? In chemistry, mineralogy, and those branches of science to which the word 'physics' is often restricted, such inquiries are much rarer, but I question whether there is any single science, other than mathematical, from which the idea of adaptation can be strictly and consistently excluded. How we are to interpret the fact of adaptation is a different question, and one which, by the majority of scientific inquirers, will now be answered in a very different fashion from whatever occurred to any but a few isolated thinkers in previous generations. It is enough here simply to allude to the theory of Evolution, and to works such as those by Mr. Darwin, Mr. Wallace, and Mr. Herbert

Spencer. To prevent, however, any misconception of my own opinions, I may, perhaps, repeat what I have already said in another place, that the main drift of the arguments employed in Natural Theology is not affected by the modern theory of Evolution. If I may be allowed to quote myself, 'I am far from denying that the Argument for Final Causes, if it takes sufficient account of the evolution of organisms, and their power of adapting themselves to external circumstances, and if it be based on the contemplation of nature as a whole, instead of on that of individual objects, may not admit of being stated in such a form as to occupy once more an important position in any scheme of Natural Theology. Bearing in mind these qualifications, it may be perfectly legitimate to speak, with reference to the universe at large, of design and a designer, whatever may have been the agency, and however mysterious and prolonged the process, by which an intelligent Creator may have worked. Theories of evolution may be so stated as not to impart, but indefinitely to exalt, our ideas of the power, wisdom, and benevolence of the Being in whom Nature had its source.'

"In defence, however, of Bacon's indiscriminating rejection of the consideration of Final Causes in physical inquiries, it ought to be pleaded that the use of this topic in ancient and mediæval philosophy, as well as in the writings of his contemporaries, was often arbitrary, fanciful, and absurd, to the last degree. 'The handling of final causes' had certainly 'intercepted the severe and diligent inquiry of all real and physical causes,' and it might well be maintained that their temporary expulsion, could it have been effected, would have been a real service to science. As it was, I believe that the protest of Bacon and Descartes, who was as little tolerant as Bacon himself of this mode of explaining physical phenomena, exerted a decidedly wholesome influence on the scientific procedure of their successors.'

Baden Powell, in his work on the "Order of Nature,"* p. 60, says of Bacon: "His opinion of final causes, and his often-quoted remark—respecting their barrenness in a scientific sense, and regarding them as not neglected, but 'wrongly placed'—if properly attended to, would have anticipated and superseded volumes of modern discussion; while the observation that physical causes do not really withdraw us from the administration of Divine Providence is a little vitiated in its free and full application when, instead of regarding them as the very exponents of that Providence, he talks of the belief in it as the *last resource*, 'ad Deum et Providentiam *confugiant*.'

"His admired maxim, that a superficial philosophy inclines men to atheism, a deeper to religion, applying directly to the very dubious physics and metaphysics prevalent in his age, has yet a practical truth in it for all ages, provided men are led to look for that religion solely in a region beyond that of positive science; not as mixed up with objects of sense and affections of matter, but as existing in the world of spirit.

"And when he pursues the subject further towards indicating the class of truths to which natural theology and the use of reason alone are competent to conduct us, he draws some distinctions which are marvellously in advance of the speculations commonly current even in later times,—that natural light, and the contemplation of the works of creation, may teach the existence, but by no means the nature, and still less the will, of the Deity; that no such investigations can ever bring us to a knowledge of Divine mysteries; that 'the senses perceive natural truth, but are blind to Divine, as the sun lightens the earth, but obscures the stars;' that natural science is for the destruction of atheism, not the construction of religion; that the light of nature may teach us the Divine power of wisdom, but not the Divine image or likeness—are propositions which stand the test of the highest advances of modern philosophy.

"In defining the respective provinces of reason and of faith, and urging the importance of keeping them separate, and observing that the neglect of such distinction leads only to the serious injury and perversion alike of philosophy and

* Sir T. Browne spoke of Nature as "that universal and public manuscript;" also as "the art of God."

of religion ; and again, that to derive religion from philosophy is to seek the living among the dead, to derive philosophy from religion to seek the dead from the living—he gives utterance to a lesson which has been reiterated in vain to successive races of Bible philosophers and Scripture cosmogonists."

"It is strange," said Dr. Acland in his Harveian Oration, "to find a man so practical as Harvey, so careful in observation, so exact in experiment, yet involved in these speculative doctrines of the Aristotelic school. It is strange to reflect that Bacon should have indignantly thrown aside these doctrines and yet should have indulged in particular speculations in physics as unfounded as any that can come from the ancient school ; and that Harvey, who in his investigations of the circulation of the blood gave a model of sound scientific procedure, should yet hold by the speculative doctrine of Causation which Bacon had rejected. It is an instructive thing for us who are living in an epoch as transitional, and far more critical than that of Harvey. Calm judicial qualities are rare. The mass of scientific details which a man must master, the impatience of old notions, the dread of theological interference with progress on the one hand, and the just fear that man is to be in future allowed to hope for nothing that he cannot scientifically prove, make any general survey of metaphysical, religious, and scientific combinations mistrusted or suspected by all parties. Yet this is to be deplored. Though one philosopher on behalf of science may seek to eject from rational belief all that cannot be proved, and though the logic of another may urge us to renounce on behalf of theology such trust in the Infinite as is mainly supported by analogy with the Finite, yet assuredly this state is essentially transitional. If the disciples of Aristotle followed one part of their master's teaching to the neglect of the other, and were consequently chastised in epigram by Bacon's satire, we need not be guilty of similar excess, and seizing on Bacon's stricture on the *Abuse* of Final Causes, forget his exposition of the *Use*."

And again :—"Bacon, who is sometimes put forward as a keen opponent of the belief that we can see evidence of design in nature, objects only to the misuse of the method—misuse which must occur whenever persons fancy that they are studying the means when they are but asking the purpose. As strongly as any man, Bacon holds up the contemplation of ends in nature as work worthy of a philosopher in its proper time and for its proper purpose."

Further :—"The evidence of intention is metaphysical, and depends on probabilities. It is not positive. It is inferential from many considerations."

Dr. Acland also alludes to the disquisition by Boyle on the "Final Causes of Natural Things," and to the observations of Dugald Stewart on the subject.*

Grave objections have, in recent times, been taken to the supposed utility of the argument. Thus Sir Francis Palgrave, in his "Merchant and Friar" (see chap. vi., Knowledge) makes Roger Bacon observe that "Natural Theology descants upon the impress of wisdom and power exhibited in the created world. But the natural theologian wholly refuses to read the indelible characters in which the punishment inflicted for disobedience against God is written on this mundane globe. Idolising human nature, the natural theologian blots out the testimonies of our corruption." Again, "Natural theology is a miserable compromise between faith and infidelity. Had I contemplated this mortal frame as a natural theologian, I could not have proceeded beyond the proof that the body was organised by a designing and disposing Intelligence, and what is gained by such a proof? Was there ever any human creature in his right senses by whom that position was denied? Natural theology spends its force in refuting tenets which no one holds, in assailing an enemy who does not exist, an absolute atheist, and evades at the same time every consideration which is distasteful to our natural conceit and pride." "The heavens do declare the glory of God, but not His will ; they are all-perfect, all-harmonious ; but that brightness and excellence which they exhibit in their own creation, and the divine benevolence therein seen, are of little moment to fallen

* For a notice of these remarks on Final Causes and Design see the *Med. Chir. Rev.* for October, 1860.

man." "How will the sun and moon and stars teach us our duty?" "Natural theology will never suggest any dependable principle of self-restraint, any enduring sense of good-will towards men, or any abiding determination to uphold the glory of God on high. It offers no example, denounces no threats, promises no rewards."

I will also mention in connection with this subject the work by the Rev. Dr. Irons, entitled, "On the Whole Doctrine of Final Causes, with an Introductory Chapter on the Character of Modern Deism," 1836. The author lays stress on the difference between the ancient doctrine of Final Causes and the modern one; the former being an argument *to* final causes, being founded on the simple inquiry into the ultimate tendencies of things; the latter being built on the hypothesis that from the adaptations and tendencies of things we may argue to their First Great Cause. He determines that the "modern writers on theology, whether advocates of Design, or believers in Revelation, are just as much at a loss to prove the unity of God by natural reasoning as were the ancients;"—"that the certain knowledge which we have of some Cause of all things, which is Intelligence, is not sufficient to furnish the rudest outline of a theology purely natural;"—"that the whole argument of Paley from Design is a fallacy," and "that the infidel deist defends it with as much zeal as any philosophising believer." Voltaire had said, fifty years before Paley, that a clock proves a clockmaker, and the universe a God.* "A man," he says, "who knew nothing of our division of time, and had never seen a watch before, would not, from merely examining it, see the Design in it, nor argue to a Designer, as Dr. Paley did;" and again, "the most learned Christians and the acutest philosophers have looked with suspicion upon the pretended theology of the doctors of Design." Pascal, the thoughtful and truly Christian Pascal, altogether boldly rejected "Natural Theology;" and Voltaire was a staunch advocate of it. He observes that Descartes, and probably Dr. Brown, looked upon the argument from design as of an impious character. He quotes the saying of Bacon, "Thy creatures have been my books, but Thy Scriptures much more! I have sought Thee in the courts, fields, and gardens, but I have found Thee in Thy Temples."†

John Stuart Mill was in favour of the argument as to the existence of God, from Final Causes, as alluded to recently in an article in the number of the *Quarterly Review* for October, 1880 (p. 411), referring to the opinions of Mr. John Morley, who in his notice of the works of Diderot describes the existence of God as the great, the insoluble enigma, and superciliously dismisses all the arguments by which theism is sustained, and notably the one from design or final causes. Mr. Morley characterises the deism of Diderot and others, which recognises the existence of a Being of sovereign intelligence as "the halting-place towards atheism, which has been the favourite goal of English physicists from Newton down to Faraday."

I will here quote passages from the writings of Cardinal Newman which are to the point. At the end of his chapter on "Notional Assents," in his "Essay in Aid of a Grammar of Assent" (5th Ed. p. 72), he remarks: "Here we are thrown back from the question of order to that of Causation. A law is not a cause, but a

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* Dr. Acland, in his H. Oration (p. 13) alludes to the quaint employment of the illustration of the watch by Nieuwentyt in his "Religious Philosopher" (translated by J. Chamberlayne), arguments "so entirely appropriated by Paley:" and Dean Church has pointed out to me a passage in Cicero, "De Nat. Deorum," ii. 34, § 88, containing an anticipation of Paley's famous watch argument.

† This passage formed part of a prayer found after Bacon's death among his papers. This "prayer or psalm" Addison quoted as resembling the devotion of an angel rather than of a man. It is given at length in the recent edition of his works (Spedding, Ellis, and Heath), vol. xiv., p. 229, following his hastily-written will.

"Lo, these are parts of *His ways;* how little a portion is heard of *Him*," were the words formerly inscribed in the Christ Church Museum at Oxford. (See p. 21 of Dr. Liddon's sermon, quoted at p. 174.)

fact; but when we come to the question of cause, then, as I have said, we have no experience of any cause but Will. If, then, I must answer the question, What is to alter the order of nature? I reply, That which willed it. That which willed it can unwill it, and the invariableness of law depends on the unchangeableness of that Will."

"And here I am led to observe that, as a cause implies a will, so order implies a purpose. Did we see flint celts in their various receptacles all over Europe, scored always with certain special and characteristic marks, even though those marks had no assignable meaning or final cause whatever, we should take that very repetition, which indeed is the principle of order, to be a proof of intelligence. The agency, then, which has kept up, and keeps up, the general laws of nature, energizing at once in Sirius and on the earth, and on the earth in its primary period as well as in the nineteenth century, must be mind and nothing else, and mind at least as wide and as enduring in its living action as the immeasurable ages and spaces of the universe on which that agency has left its traces."

Again, in his "Arians of the Fourth Century," the same author (p. 76, Ed. 4), speaks of "the popular argument from final causes" as "but an *Economia* suited to the practical wants of the multitude, as teaching them in the simplest way the active presence of Him who, after all, dwells intelligibly, prior to argument, in their heart and conscience."

He also, when referring to Design, has written as follows: "1. By Design in Creation is generally meant the application of definite means for the attainment of a definite end, or the aim at a final cause. There is a difficulty, I consider, in accepting the 'argument from design' in this sense as a strictly logical proof of a creative Mind in the universe.

"2. But design also means *order*, as when we speak of beautiful *designs*, in decorative patterns, in architecture, mosaic, needlework, &c. In this sense of *order* Design is in every part of the universe, and a proof of an intelligent mind."

Sir T. Watson, when resigning his Presidency of the Clinical Society (see *British Medical Journal*, Jan. 16th, 1869, p. 44), made the following observations: "I am one of those who hold to the doctrine—always within its proper limitations, the limitations assigned by Bacon—the doctrine of final causes, so despised by modern philosophy. I believe that those subtle essences which human research and ingenuity have succeeded in deriving from various substances in nature, and which, when applied to the human body, sometimes even in very minute quantities, have a potency so marvellous as to abolish pain, to compel sleep, to extinguish fevers, to stop for long, perhaps for ever, the recurrence of paroxysms of epilepsy which had continued to recur for years,—were implanted in those substances by the Creator, among other uses it may be, for these very services to mankind;* and that there lie concealed in other substances, and especially in the vegetable kingdom, many analogous healing powers, which it is the part of man's mission and privilege, and will be his great reward, to search after and to discover."

Note (48). P. 64.

The Views of Haeckel—Evolution.

The following references and quotations will, I think, justify the remarks on Haeckel. In the preface to his work "Evolution of Man," he speaks of the history of evolution being the heavy artillery in the struggle for truth, and of whole libraries of church wisdom and false philosophy melting away as soon as they are seen in the light afforded by the history of evolution.

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* Agreeing with the following motto, which I find on the frontispiece of the London Pharmacopœia for 1627: ΦΑΡΜΑΚΑ ΘΕΟΥ ΧΕΙΡΕΣ, and alluded to by the Fellows in the "Epistola Dedicatoria" to the King, Dr. H. Atkins being president. In answer to the question, Dr. Greenhill tells me that he does not think the above words are a quotation, but rather an allusion to the names given by the old physicians to certain popular medicaments—*e.g.*, Θεοῦ χείρ, Κυρίου χειρ, Χριστοῦ χειρ, &c.

In vol. i. pp. 111-12, we have the passages, "The very ancient fable of the all-wise plan according to which 'the Creator's hand has ordained all things with wisdom and understanding,' the empty phrase about the purposive 'plan of structure' of organisms, is in this way completely disproved." "The favourite phrase, 'the moral ordering of the world,' is also shown in its true light." "Thus viewed, the 'moral ordering of the world' is evidently a beautiful poem which is proved to be false by actual facts. None but the idealist scholar, who closes his eyes to the real truth, or the priest, who tries to keep his spiritual flock in ecclesiastical leading-strings, can any longer tell the fable of 'the moral ordering of the world.'" "A 'moral ordering' and 'a purposive plan' of the world can only be visible, if the prevalence of an immoral rule of the strongest and undesigned organisation is entirely ignored."

At page 114, "Whilst it was formerly usual to marvel at the beneficent plans of an omniscient and beneficent Creator, exhibited specially in these phenomena, we now find, &c."

At p. 116 the author sneers at Prof. Agassiz for speaking of "an embodiment of a creative thought of God," and questions whether he really believes in his own "theosophic phrases," and his "mystic nonsense," and speaks of his passing "the juggler's piece of his anthropomorphic Creator as true coin."

Again, at p. 464, when referring to the respect due from us to the history of the Amphioxus, "as being of our own flesh and blood," he remarks, "At any rate, the Amphioxus has better right to be an object of profoundest admiration and of devoutest reverence than any one in that *worthless rabble* of so-called 'saints' in whose honour our 'civilised and enlightened' cultured nations erect temples and decree processions."

At p. 17, vol. ii., he speaks of the human vanity and arrogance of regarding man as the real main-purpose and end of all earthly life, &c.

At p. 445, "It is simply because the organism of the ape appears a caricature of man, a distorted likeness of ourselves in a not very attractive form, because the customary æsthetic ideas and self-glorification of man are touched by this in so sensitive a point, that most men shrink from not recognising their descent from apes. It seems much pleasanter to be descended from a more highly developed, divine being, and hence, as is well known, human vanity has, from the earliest times, flattered itself by assuming the descent of the race from gods or demi-gods. The church, with true sophistical distortion of ideas, of which she is so great an adept, has managed to extol this ridiculous pride as Christian humility; and those people who reject with haughty horror every suggestion of descent from lower animals, and consider themselves children of God, those very people are exceedingly fond of boasting about their childlike humility of spirit."

Again, p. 446, he declares he would rather be "the mere highly developed descendant of a primæval ape ancestor, who in the struggle for existence had developed progressively from lower animals, as they from still lower vertebrates, than the degraded descendant of an Adam, God-like, but debased by the Fall, who was formed from a clod of earth, and of an Eve, created from a rib of a man." *

Note (49). P. 66.

Agency of "Will."

I have pleasure in here quoting the words of a very old friend. After alluding to the laws of which physical science treat as being definite principles ante-

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* Even the Pagan could say:—

"Os homini sublime dedit : cœlumque tueri
Jussit, et erectos ad sidera tollere vultus."—*Ovid. Met.* i. 85.

And Manilius, the ancient astronomical poet (Lib. iv. 905), thus describes man as the lord of creation :—

". . . stetit unus in arcem
Erectus capitis, victorque ad sidera mittit
Sidereos oculos, propiusque aspectat olympum," &c.

cedently impressed upon matter, regulating its action, determining its development, and thus implying an intelligent source from which they are derived, he observes "that into every process with which we are conversant there enters, in combination with the material forces which contribute to produce the result, another force which, so far as we can ascertain, is in no sense material—*i.e.*, Will. So that—*e.g.*, a harvest field is not only the result of material causes, such as the properties of the atmosphere, soil, plants, &c., but also of human will exerted in the selection of the soil and seed, and in the construction of the various implements employed. Why then are we to exclude the Divine Will in originating, combining, and controlling all these forces? The manufactories and workshops of our country abound in machinery the most complicated and most delicate, in which may be seen little fingers, as it were, of iron issuing from their various recesses to do work of the finest and most exquisite description. In this they are executing the designs and obeying the direction of a will, it may be, far removed from them, perhaps long since departed from this world, in which it so diligently carried out the suggestions of a busy and inventive brain. So incalculable is the influence of will in the direction of material forces." (See an address by the Rev. J. L. Roberts, Vicar of Spratton, Northamptonshire, "The Pastor in Relation to Sceptical Thought." Rivington.)

According to an old saying, "Astra regunt homines, sed regit astra Deus."

Note (50). P. 66.

Design in "Nature."

On this point the Duke of Argyle, in his "Reign of Law" (see chapter on the Creation by Law) observes, after alluding to the co-operation of different natural forces working together for the fulfilment of an obvious intention, "Of the nature of those forces we know nothing; nor is it easy to conceive how they have been so co-ordinated as to produce effects fitting with such exactness into the conditions requisite for the preservation of organic life. If there were any evidence that by the same means new forms of life could be developed from the old, I cannot see why there should be any reluctance to admit the fact. It would be different from anything that we see; but I do not know that it would be at all less wonderful, or that it would bring us much nearer than we now stand to the great mystery of Creation." The author here points out that "Mr. Darwin's theory is *not* a theory on the origin of species at all, but only a theory on the causes which lead to the relative success or failure of such new forms as may be born into the world." "It is," he says, "the more important to remember this distinction, because it seems to me that Darwin himself frequently forgets it."

Mr. (now Lord Justice) Fry, in the reprint from the *Spectator* alluded to at the foot-note to page 65, entitled "Darwinism and Theology," when alluding to the objection in some minds to the lengthened periods involved in the theory of evolution arising from the "mechanical conception of the cosmical laws, as though God had wound up the world and left it to go" (p. 8), speaks of the truer conception in which we come to know that, however remote the initial step may have been, it is only by an ever-present and sustaining spiritual power that outward things are maintained." He draws an analogy between the difficulties of Darwinism and religion, showing that in the revelation of God to man, God has proceeded by a system, and that through long periods of time. He remarks (p. 11), "There is no difference between the sum of the creative force and wisdom required by the theory of development, and that required by the popular notion of what I may call an out-of-hand creation, but the force and wisdom are differently distributed; in the popular notion they are all expended at the first step; in Darwinism the first step demands little, the subsequent steps demand the large balance." Again (p. 21), "Every theory of evolution proceeds upon this, that there is something given from which something else can be unfolded: and who gives the first thing, if there be no God? so that the logical necessity for a first cause stands precisely as and where it did. There are two possible theories of creation, and two only: the one that the world had an author,

the other that the world made itself. Both these alternatives have their difficulties, and yet every man must choose the one or the other. But in so choosing he will not be helped by the adoption or rejection of evolution. For if God made the world, He may have done so either out of hand or gradually: if the world made itself, it may, for aught I know, have pursued either method,—so that Darwinism has not altered the problem. Those who believed that there is no necessity for a God, and prefer to believe that the world made itself, will believe so still; those who believed that the world did not make itself, but had a Divine Author, may still rest in their belief untroubled by any new difficulty or any new fear."

Lord Blachford, in his review of Canon Mozley's Essays in the *Nineteenth Century*, June, 1879, observes, when noticing his remarks on Darwin, "Those who reflect on the processes of production and reproduction have before now observed that, on the materialistic theory of the physical world, the monad must be even a more astonishing work of art than a man. If unassisted monads caused the whole of animate and inanimate nature, they must have been so constituted as to be capable of causing it; and when we try to think what the constitution must have been which involved such a capacity, we find it must have been something more wonderful than any known work of nature. The ultimate particles of which the earth and its inhabitants are composed, and out of which alone (it seems) they have arisen, must have contained within themselves a mechanism of affinity and development which enabled them not merely to knock about and jostle and stick to each other, but to combine into a variety of forms not only symmetrical and active, but possessed of the astonishing power of continual reproduction, under those elastic laws of similarity and variety out of which growth and animal and spiritual action have evolved themselves."

Linnæus said that the world was one vast museum, and it illustrated the nature and attributes of the Deity.

The following passage by Cicero, "De Nat. Deorum," Lib. ii. 37, is interesting in connection with this subject. I think it must have been the one referred to by Mr. W. Graham in his work, "The Creed of Science," 1881 (see p. 30), when he alludes to Cicero in his refutation of the opinions of Democritus, and makes him say that it is more credible that the letters composing the Iliad should have come into their proper places by chance, than the atoms should have produced the cosmos without a marshalling agency.

Cicero remarks: "Hic ego non mirer esse quemquam, qui sibi persuadeat, corpora quædam solida atque individua (ἄτομα) vi et gravitate ferri, mundumque effici ornatissimum et pulcherrimum ex eorum corporum concursione fortuitâ? Hoc qui existimat fieri potuisse, non intelligo, cur non idem putet, si innumerabiles unius et viginti formæ literarum, vel aureæ, vel quales libet, aliquò conjiciantur, posse ex his in terram excussis annales Ennii, ut deinceps legi possint, effici; quod nescio an ne in uno quidem versu possit tantum valere fortuna." Farther on he observes: "Quòd si mundum efficere potest concursus atomorum, cur porticum, cur templum, cur domum, cur urbem non potest? Que sunt minus operosa, et multo quidem faciliora."

With this may be mentioned the quotation from the stoic philosopher Manillius, who appeals to the beauty, order, and immutability of the heavenly bodies as a refutation of the atheistical notions of Democritus and Epicurus. (See Lamb's Aratus, i. 482-530.)*

Coleridge charmingly observes of "the great Book of God's Servant Nature," that "in its obvious sense and literal interpretation it declares the being and attributes of the Almighty Father, none but the fool in heart has ever dared to gainsay.

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* The Roman satirist Persius jeers at the ancient philosophers' objections to the idea of a pure creation out of nothing. One of his characters (see Sat. iii. 83-4), gibing at the affected and "crabbed Solons" of the age, observes:

"*Ægroti veteris meditantes somnia*, Gigni
De Nihilo Nihil, in Nihilum Nil Posse Reverti."

A commentator, the Rev. F. Home, remarks that the philosophers could admit a *former*, but not a *creator*, of the universe.

But it has been the music of gentle and pious minds in all ages, it is the poetry of all human nature, to read it likewise in a figurative sense, and to find therein correspondence and symbols of the spiritual world." (See "Statesman's Manual," 1816, p. xiii. of the Appendix.)

Sir T. Browne had in his "Religio Medici" said as follows (sect. 12): "For in this Mass of Nature there is a set of things that carry in their front, though not in Capital Letters yet in Stenography and short Characters, something of Divinity, which to wiser Reasons serve as Luminaries in the Abyss of Knowledge, and to judicious beliefs, as Scales and Roundles to mount the Pinacles and highest places of Divinity. The severe schools shall never laugh me out of the Philosophy of Hermes, that this visible World is but a Picture of the invisible, wherein, as in a Pourtract, things are not truely, but in equivocal shapes, and as they counterfeit some real substance in that invisible Fabrick."

Note (51). P. 68.

Pliny's Equanimity.

A letter of the learned, wealthy, and generous Pliny (the younger) to Tacitus thus describes the death of Pliny the elder (Lib. vi. Ep. 16): "He was at Misenum, in command of the fleet. On August 23, at 1 p.m., after bathing, &c., and whilst studying, a cloud of unusual size and shape was pointed out to him by his sister; he ascended an eminence to see what it might be, but was too distant. Therefore he left, with note-book in hand, in a galley, asking his nephew (Pliny the younger) to accompany him, who, however, did not do so. He launched quadremes to assist the inhabitants in getting away. He himself steered to the point of danger, dictating his observations as he went along, &c. Soon afterwards ashes fell on the deck, and stones and pumice-stone; the reflux of sea and fragments of volcano presented obstacles to progress; he hesitated whether to go on: finally, decided to steer for the villa of Pomponianus—'Fortune favours the brave; steer for the villa of Pomponianus.' This was at Stabiæ, divided from the coast near Vesuvius by an arm of sea. His friend there was consoled by Pliny, who, to show his unconcern, bathed and supped with cheerfulness. Meanwhile, from many parts of the volcano (Vesuvius) issued flames, which were heightened by the darkness of the night. He retired to rest, and snored. Soon the court from which the chamber opened was choked by cinders, pumice, &c. He was awakened, and went to Pomponianus. Consultation whether to go or not. Repeated shocks of earthquake occurred. Half-burnt pumice in the air menaced danger. Decided to go into the open fields. Tied cushions on their heads. Although it was now day elsewhere, the darkness here was most dense. Walked to the coast but could not embark. He spread a linen cloth and lay upon it, asking for draughts of water. Then flames and sulphurous smell put his companions to flight. He arose by the assistance of two staves and fell down dead, suffocated, as I imagine, by the dense vapour, and the functions of his stomach being disordered, which were naturally weak, and liable to obstructions and difficulty of digestion. On the third day his body was recovered entire." The above tragic event was well described also by the Roman historian Dion Cassius, who wrote many years after Pliny.

The philosophic sportsman also may be remembered, in whose presence three large boars were allured and taken in the toils of his attendants without interruption of his studies.

Note (52). P. 69.

Dr. Marshall Hall.

The work and labours of Dr. Marshall Hall connected with the nervous system will be remembered by all. They have lately been alluded to by Dr. Michael Foster in his address on Physiology to the International Medical Congress, August, 1881. After speaking of "*reflex action*" of the nervous system, and alluding to the labours of Wills, Hales, Boyle, R. Whytt, Prochaska, J. Müller, and the establishment of the doctrine of reflex action as a definite part of physio-

logical and medical teaching by the labours of Marshall Hall, he remarks, "It was his (M. Hall's) numerous researches, and, perhaps even more, his enthusiastic, ingenious advocacy, and the skill with which he applied the results of the new doctrine to the practical art of healing, which brought about a revolution in our conceptions of the nervous system."

I would here desire, in passing, to mention how much his method of assisting the apparently drowned is valued. This will be seen from the following notice of the National Lifeboat Institution, lately printed: "The National Lifeboat Institution continues to use every effort to distribute and make widely known throughout the British Isles and the colonies its admirable instructions for the restoration of the apparently drowned. When it is remembered that in one year no less than 2,600 persons were drowned in the rivers, canals, and lakes of England and Wales, excluding Scotland and Ireland, and that this probably is the average number drowned every year in those waters, it will at once be seen that these very important, but simple, instructions cannot have too large a circulation. Their leading principles are founded on those of the late Dr. Marshall Hall, combined with those of Dr. H. R. Silvester, and are the result of extensive inquiries which were made by the Institution in 1863–64 amongst medical men, medical bodies, and coroners throughout the United Kingdom. They are now exclusively in use in Her Majesty's fleet, in the coast-guard service, at all the stations of the British Army at home and abroad, in the lighthouses and vessels belonging to the Corporation of the Trinity House, the metropolitan and provincial police forces, the London Board Schools, and the St. John Ambulance Association. They have also been translated into all the European languages, and have appeared even in the Chinese language. We may add that large illustrated placards of these instructions, and small copies of the same, are supplied by the National Lifeboat Institution, Adelphi, London, at a cost little beyond the actual price of the paper on which they are printed."

I would here mention a little book called "Prone and Postural Respiration in Drowning, and other forms of Apnœa or Suspended Respiration," by Marshall Hall, M.D., edited by his son. It consists of papers which had appeared in a pamphlet, the *Lancet*, and some MSS., and is dedicated to Dr. Webster, of Dulwich, "and to those students of St. George's Hospital" [viz., Dr. E. Long Fox (of Clifton), Mr. C. Hunter (since dead), and Mr. (now Dr.) Bowles, of Folkestone], "who with such zeal, ability, and perseverance worked out the problem of postural respiration."

It is stated that the operation for pulmonary insufflation, which used to be known as that of Hooke's, had been adopted by Vesalius. Goodwin principally suggested it as a remedy in asphyxia (see Le Gallois, op. cit. p. 335).

Referring to Dr. Marshall Hall's physiological test for detecting strychnia in cases of suspected poisoning by that alkaloïd, which I have alluded to at page 51, Dr. Aquilla Smith, of Dublin, has furnished me with the following remarks. He observes: "The principle on which Dr. Hall founded his test appears to have been applied in detecting atropine some years before by Dr. Runces, of Berlin, who proposed a new method, 'which consists in boiling the stomach or intestines of the animal poisoned, and evaporating the aqueous solution to the consistence of an extract, and applying it with a camel-hair pencil to the eye of an animal, by which dilatation of the pupil is produced.' He prefers a cat for the experiment, the shape of its pupil affording the best opportunity of witnessing the phenomenon." See "Medical Botany." By John Stephenson, M.D., and James Morss Churchill, F.L.S. Vol. 1, Article I., Atropia Belladonna. 8vo. London, 1828.

Note (53). P. 69.

The Nation's Knowledge.

Virchow, in his address on the "Freedom of Science in the Modern State," p. 126, has well observed, when alluding to the existence of a line of demarcation between the speculative province of science and the domain which she has actually won and fully settled: "The practical questions which are bound up with this consideration

are obvious. It is self-evident that for what we regard as certain scientific truth, we are bound to claim a full reception into the treasury of the nation's knowledge. This the nation must accept as its own; this it must feed on and digest; with this it must carry on its work. Herein lies precisely the twofold benefit which science offers to the nation. On the one hand is that material progress, that enormous advance, which our modern age displays. All that has been done by the steam-engine, the telegraph, photography, and so forth; chemical discoveries, the technic arts of colour and the like; all this is based essentially on the fact that we men of science have brought the principles to perfection; and when they are thoroughly prepared and made sure, so that we know for certain that 'this is a truth of natural science,' they are handed over to the community. Then others can work upon them and create new inventions, of which no one had an inkling before, which no one ventured to dream of, which came as new powers into the world."

It has been said by Bishop Berkeley that "prevailing studies are of no small consequence to a State, the religion, manners, and civil government of a country ever taking some bias from its philosophy, which affects not only the minds of its professors and students, but also the opinions of all the better sort, and the practice of the whole people, remotely and consequentially indeed, though not inconsiderably." This passage is quoted by Baden Powell in his work, "The Order of Nature," &c., 1859, p. 213, when referring to the indirect and remote influence of science on the opinions and ideas of the age.

Note (54). P. 69.

PORTRAIT OF SIR THOMAS WATSON, BART., &c., &c.

. . . Λουκᾶς ὁ ἰατρὸς ἀγαπητός.

Well hath the Master's hand depicted here
The worth we love, the veteran we revere!
Genius by genius, mind by kindred mind,
Science by science, truthfully defined.
The features speak; the canvas seems to live
With all the glow that finished art can give.

* * * * *

Apollo answered, and with smile benign
Said, "Painter and physician, both are mine.
This, with a Nestor's wisdom I inspire;
And that, with all a Zeuxis could desire.
By my divine 'afflatus' I reveal *
The soul to paint; the sacred power to heal.
Patron of Arts, God of the Silver Bow,
To me their skill, their excellence they owe.

He said; then soaring to Olympus height,
Around the picture threw a flood of light.
Watson! when closed a long and bright career;
When missed and mourned by friends and colleagues her;
Be thine, no sacred duty left undone,
To hail the rising, in the setting sun.
In "hope rejoicing," take the "promised rest,"
And leave thy monument in every breast. SENEX.

The above lines are, I believe, by a Fellow of the College.†

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* *Nemo vir magnus sine afflatu aliquo divino unquam fuit.*

† The sentiment in the last stanza corresponds with the last paragraph of Dr. Watson's address to the College of Physicians when elected President for the fifth time (March 26th, 1866). He concludes, "At my age, as year after year is mercifully added, it becomes ever more and more needful and becoming to withdraw, in some measure at least, from the cares and distractions of professional and

Note (55). P. 75.

The Popular Estimate of the Medical Faculty.

The diversity of sentiment which has obtained from time to time amongst those whose opinions were best entitled to respect and consideration regarding the value of services rendered by practitioners of medicine would form material for an interesting chapter. That our profession should, as much as, or even more than, other professions, suffer disparagement, open or covert, and be even caricatured at the hands of malignant satirists, is to be expected; and that we should be assailed by caustic epigram and the exaggerated lampoons of wit, defined as being, but too often, "educated insolence," is not unnatural.

The following epigrammatic verse from the Greek of Nicharchus is quoted in *Notes and Queries*, N.S. II., 445:—

"No, Pheidon never physicked me,
Was never near my side;
But when fever came I thought of his name,
And that was enough—I died."

Plato is known to have had an antipathy to physicians. This, as Dr. Meryon (in his Hist. of Med., vol. i. p. 24) suggested, was probably owing to "the inflated pretensions of many of its members, making a handle of their disrepute to display the shrewdness and tact which invariably characterise a cutting sarcasm." It would probably be difficult to find unjust strictures upon us in the works of Greek writers, but many such might be adduced from those of the Romans. Cato the Censor professed to despise physicians, and seemed to think that his own knowledge was sufficient (for he was the author of a work on the use of remedies).* His contempt for them was apparently owing, for the most part at least, to his dislike to Greek customs and Greek learning; probably in part the result of the speculative sciences being despised by the Romans in comparison with political affairs and practical government, just as we are told that Cicero, for the same reasons, disparaged the great geometrician Archimedes with his rule and compasses, and thought little of his discoveries. Juvenal undoubtedly was actuated by the same feeling, for in his Third Satire (v. 121), after alluding to the starving myriads of foreigners, "superior to the Romans only in vice and flattery," "a flattering, cringing, treacherous, artful race," "making all parts their own," which poured forth and battened on the soil of his native country,† he classes the physician with the geometer, the cook, and conjuror.

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outward life, and the fleeting interests of this world, and to cultivate, in comparative retirement and repose, thoughts and feelings which have for their object that bourne which is inevitable, and which cannot be far distant.

"Illi mors gravis incubat
Qui notus nimis omnibus
Ignotus moritur sibi."

* Cato was of the opinion that he could kill himself by holding his breath.

† Dr. Meryon, in his Hist. of Med. (p. 55), has remarked as follows: "At the commencement of the Christian era the inhabitants of Rome appear to have been very much in the same condition, as far as their sensual pleasures were concerned, as are those of London and Paris at the present day. They enjoyed and abused the advantages of wealth, and suffered, as men suffer now, in consequence. Every luxury that art can invent and wealth command was indulged in, and the capital itself was inundated with practitioners of various degrees and sects; some promising largely, like Asclepiades (the eloquent and learned friend of Cicero), whilst others mystified the public by propounding new doctrines, which were as senseless and unreasonable as many which are proclaimed at the present day, and some, even then, deserved as little credit as originality. Astrology and every other form of quackery was practised, nor were men wanting who, like Endemæus and Thessalus, vilified their brethren with the imputations of fallacies to the total disregard of honesty and truth."

Another ancient writer, Syrus Publius, in levelling his contemptuous missives at us has said, "Male secum agit æger, medicum qui hæredem facit."

Chaucer, in the Prologue to his "Canterbury Tales," has a sly and playful thrust at the "Doctur of Physike." He speaks of him as "grounded in astronomie." The authors known to him are Esculapius, Rufus, Dioscorides, old Hippocras, Hali, Gallien, Serapion, Rasis, Avicen, Averroïs, Damascene, Constantin, Bernard, Gatisden, Gilbertin. He says, "His studie was but litel on the Bible," and he describes his rich dress, simple diet, and love of gold.

"For gold in physike is a cordial;
Therfore he loved gold in special."

Shakespeare makes Timon of Athens (iv. 3) say to the banditti:

"Trust not the physician,
His antidotes are poison, and he slays
More than you kill."

In later times Rabelais said, "Medecine est une farce à trois personages, le malade, la maladie, et le medecin," and Voltaire's opinion was that a physician "was one who poured drugs of which he knew little into a body of which he knew less." Montaigne, again, had a great contempt for physic, arising mainly, as it would appear,* from the fact of his own ancestors having lived to a great age, and his deriving from them an antipathy to it. But he was much influenced in his opinions by seeing what he thought to be (and no doubt justly, considering the state of the medical profession in his country at his time) the abandonment of Nature and her rules, asserting that he neither honoured nor esteemed the prescriptions of physic, as he saw no race of people so often sick and so long before they are well as those who are slaves to physic. In one place he alleges against physicians their tendency to alter jealously each other's prescriptions, showing their consideration for their own reputation and profit rather than that of the patient.

Molière and Cervantes, as everybody knows, skitted and laughed at us, and made us subjects of quick and lively sallies and a theme of scorn.† Among our own countrymen Philip Massinger had similar views. In his "Emperor of the East" (see vol. iii. p. 316 of Gifford's Edition of his Plays), after alluding to the happiness of the poor in eluding the physician, he speaks of the great and noble as being exposed as preys to his rapine. Another has the couplet—

"Fond of lawsuits, little wealth,
Fond of doctors, little health."

Butler, in his "Hudibras," makes physicians the butt of his sarcastic shafts, and observes—

"For men are brought to worse distresses,
By taking physic, than diseases;
And, therefore, commonly recover
As soon as doctors give them over."

The following proverbs are in the same spirit—viz., "Gott hilft, und dem Arzte

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* See the end of his Essay "Of the Resemblance of Children to their Fathers."

† The effect upon Molière of the then existing condition of medicine and the absurd reasoning of its professors is alluded to by Mr. H. Morley in a note (p. 114) to his "Translation of Jerome Cardan's Life," where he specially instanced "Sganarelle's Theory of Lucinde's muteness in the Médécin Malgré Lui," act ii. sc. 6. Gifford, in his Notes to Massinger's Play, above quoted, says, "I doubt whether Massinger ever fell into Molière's hands; there is, however, as Mr. Gilchrist has well observed, so striking a resemblance between a passage in the *Malade Imaginaire* and this before us that it is difficult to believe the coincidence accidental." The passage in Molière referred to is in acte iii. sc. xiii. Massinger's "Emperor of the East" contains a large amount of badinage on the doctor and the quack doctor, "which for the last two centuries has poisoned us in the closet, and entertained us on the stage."

dankt man;" and "Dieu est celui qui guérit, et le médecin en emporte l'argent."* Burton, in his "Anatomy of Melancholy" (see vol. i. p. 359), ascribes physic to the operations of the devil.

Bishop Latimer wrote on the subject as follows: "Ye see by the example of Hezekiah that it is lawful to use physick. But now in our days physick is a remedy prepared only for rich folks and not for the poor, for the poor man is not able to wage the physician. God indeed hath made physick for rich and poor, but physicians in our time reck only their own profits—how to get money, not how they might do good unto their poor neighbour. Whereby it appeareth that they be for the most part without charity, and so consequently not the children of God; and no doubt but the heavy judgment of God hangeth over their heads, for they are commonly very wealthy, and ready to purchase lands, but to help their neighbour that they cannot do. But God will find them out one day, I doubt not."

Addison, in an amusing and quaint chapter in the *Tatler* (see No. 240, written in 1710), disclosing the various ingenious and tricky arts of the quack to obtain notoriety, observes that he never knew a physician recommending himself to the public who had not a sister art to embellish his knowledge in medicine; that in all ages (Apollo being the god of verse as well as physic) the most celebrated practitioners of our country were the particular favourites of the Muses, poetry being to physic "like the gilding to a pill." He remarks that, "for the good of my native country, I could wish there might be a suspension of physic for some years, that our kingdom, which has been so much exhausted by the wars, might have leave to recruit itself." He concludes by praising abstinence as the best means of bringing people to old age. His recipe was, "Take nothing."†

Bacon makes also some strictures on the practice of physic, combined with some excellent remarks and precepts on the subject (see his Essay No. 30, "Regimen of Health"),‡ showing how much a man has his own health in his own hands. He concludes as follows: "Physicians are, some of them, so pleasing and conformable to the humours of the patient, as they press not the true cure of the disease; and some others are so regular in proceeding according to art for the disease, as they respect not sufficiently the condition of the patient. Take one of a middle temper; or, if it may not be found in one man, combine two of either sort; and forget not to call as well the best acquainted with the body as the best reputed of for his faculty."

Bacon also has the following remarks (De Augm. W., iv. 389):

"Although a man would think, by the daily attentions which physicians pay to their patients—their visitations, nursings, and prescriptions—that they were pursuing the cure diligently and following it up by a certain path; yet let a man look more deeply into the prescripts and ministrations which physicians use, and he will find the most of them full of vacillation and inconstancy, devices of the moment without any settled or foreseen course of cure; whereas they ought from the very first, as soon as ever the disease is fully discovered and known, to resolve upon some regular plan of treatment, and not to depart therefrom without grave reason. It is order, pursuit, sequence, and skilful interchange of application, which is mighty in nature. And these things, although they require greater judgment in prescribing, and more constant obedience in observing, yet make up for it abundantly by the magnitude of the effects they produce."§

S. Rogers, in his Porsoniana, states that Professor Porson thought meanly of the medical sciences, and hated consulting physicians.

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* See *Notes and Queries*, No. 111, p. 119, N.S.

† Very different to the answer given by a physician to some individual who, thinking to obtain a prescription without fee or reward, asked him what he "should take." The reply was, "Take advice."

‡ Bacon's essays, the "Sermones fideles, sive Interiora Rerum," were called by the Italians "Saggi Morali."

§ In another place, however (Adv. of L., B. ii.), he remarked that "the poets did well to combine music and medicine in Apollo, because the office of medicine is but to tune this curious harp of man's body, and to reduce it to harmony."

The above quotations and references are only a few out of many adverse to the claims of medicine upon the consideration of mankind which may be found in writers.*

Such pleasantries as "The Mourning Æsculapius," by Steele, in the *Tatler* for July 21, 1709 (No. 44), a skit on Dr. Radcliffe's proposal to a beautiful lady whom he had cured, and his rejection by her, are natural enough. See "Richardsonia," regarding Richardson and Mead. Hutchinson's Biogr., "Radcliffe."

It is a more pleasing task to enumerate a few of the expressions of those who are more favourable to its pretensions.

To go far back, Homer (see Il. xi.) alludes to the physician as being "πολλῶν ἀντάξιος ἄλλων," eminently worth many others "to cut out arrows and apply mild remedies," † or, as Pope has it,

> "A wise man skilled our wounds to heal,
> Is more than armies to the public weal."

And Machaon, as a physician, is termed "blameless," and "the shepherd of his people." In the Odyssey again (iv. 231), the poet, alluding to Egypt as being a bounteous land, and fertile in many excellent as well as fatal drugs, speaks of the physicians as being each of them "skilled above all men, for they indeed are of the race of Pæon." This superiority by reason of skill or knowledge reminds one of the saying of Robert of Gloucester, "Vor more that a man can, the more worth he ys."

Hesiod, in the "Hymn to Apollo," lauds the physicians as having learnt from Phœbus the "art of delaying death"‡ Of the Greek dramatists many sing the praises of Physic, as does Euripides, who in the Orestes (238) refers to the hope and consolation ministered by the physician; this most important office is in accordance with the dictum of Celsus, "spes et confidentia plus valeat quam medicus."

We are told that Philip of Acarnania, the physician, was honoured by Alexander and the whole army for curing the king.

The son of Sirach, in Ecclesiasticus (written circa B.C. 200), ch. 38, a chapter full of beauty and pathos, containing touching instruction to the sick, and describing the duties to be observed towards the dead, speaks of the honour due from the king, as well as others, to the physician, whose head shall be lifted up, and who shall be held in admiration by great men. Among the Roman authors, one writes: "Inter Homines sapiens, inter sapientes medicus."

Cicero wrote: "Homines ad Deos nulla rê proprius accedunt quam salutem hominibus dando" (Pro. Lig. 38).

Seneca, who could speak of man as "Res sacra," in his "De Beneficiis," lib. 6, c. 15 and 16, said of the physician and of the teacher that nothing but universal friendship and goodwill can sufficiently repay the benefits he bestows.

To come to more recent times, Fuller, in his "Worthies" (ix. p. 25), thinking the faculty worthy of honourable distinction, specifies the three requisites for a physician's practice as being "an eagle's eye, a lady's hand, and a lion's heart." But of those having the power of judging respecting the patronage or countenance which should be accorded to the practitioners of physic, or whose decisions would be entitled to respect and weight, no one has spoken more kindly and appreciatively of our profession than has the great and thoughtful moralist, that "Monarch of Literature," Dr. Johnson.

In his "Life of Garth," the active Whig, he remarks that, "whether what Temple says be true, that physicians have had more learning than the other

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* We are told that among the Fijians the name for a "doctor," when translated, is "Carpenter of Death." For this doleful designation Dr. McGregor writes (see *Br. Med. Journal*, June 25, 1881) that he has substituted a new title, namely, "Man of Life."

† As a foot-note to this line in Buckley's translation of the Iliad (p. 204) are some interesting references to ancient writers on remedial measures, surgery, &c.

‡ As Van Helmont remarks, "Medicus enim mediator inter vitæ Principem et mortem."

faculties, I will not stay to inquire; but I believe every man has found in physicians great liberality and dignity of sentiment, very prompt effusion of benevolence, and willingness to exert a lucrative art where there is no hope of lucre."*

Sir Thomas More, that "learned man," freely satirised members of the medical profession, only mentioning two with respect, one being Hippocrates, whose epitaph More translated from the Greek. He likens the "medicus" to a general ofan army in his power of killing. For tart anecdotes regarding the shortcomings of the faculty, see "Philomorus," 1878, pp. 227—30.†

Again, Johnson, in his "Life of Akenside," has the following remarks :—

"Physicians do more good to mankind without prospect of reward than any profession of men whatever."

"A physician in a great city seems to be the mere plaything of fortune; his degree of reputation is for the most part totally casual; they that employ him know not his excellence; they that reject him know not his deficience. By an acute observer who had looked on the transactions of the medical world for half a century a very curious book might be written on the 'Fortune of Physicians.'" (See vol. viii. of his works, p. 471.)

Johnson "always hated and censured Swift for his unprovoked bitterness against the profession of medicine,‡ and used to challenge his friends, when they lamented the exorbitancy of physicians' fees, to produce him one instance of an estate raised by physic in England."§

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* The saying may be remembered, "All that honour Æsculapius deck not his shrine with jewels." No doubt there are examples of flagrantly exorbitant behaviour on the part of some, as in the case of the insolent physician of Louis XI., "Master James Coctier," who, as described by Philip de Comines,[1] in the space of five months extorted 10,000 crowns every month and a rich bishopric from the stern and avaricious tyrant. The subject of honoraria or donatives to physicians among the ancients is dwelt upon by Dr. Greenhill in his art. "Medicus," in the "Dict. of Greek and Roman Antiquities." It seems that two brothers in the time of Claudius left between them at their death, notwithstanding large sums they had spent in beautifying the city of Naples, no less than £234,375. Well might it in this case be said that "Dat Galenus opes." The largest fee for medical advice in modern times, I believe, was that of Scanzoni, who, in 1859, attended the Empress of Russia in her confinement, and is said to have received £5,000 for his fee.

† Sir T. More told one "medicus" that he ought to add to his name and style himself "mendicus."

‡ Swift was not, however, always ungrateful, for, writing to Pope, after the death of his friend and physician, Dr. Arbuthnot, and of Gay, he remarks that their death "have been terrible wounds near my heart. Their living would have been a great comfort to me, although I should never have seen them, like a sum of money in a bank, from which I should receive at least annual interest, as I do from you, and have done from Lord Bolingbroke."

Regarding Dr. Arbuthnot, the following notice is from the pen of the Earl of Orrery, when referring to some of his letters to Swift. He observes: "Although he was justly celebrated for wit and learning, there was an excellence in his character more amiable than all his other qualifications; I mean the excellence of his heart. He has showed himself equal to any of his contemporaries in humour and vivacity, and he was superior to most men in acts of humanity and benevolence. His very sarcasms are the satirical strokes of good-nature; they are like slaps on the face given in jest, the effects of which may raise blushes, but no blackness will appear after the blows. He laughs as jovially as an attendant upon Bacchus, but continues as sober and considerate as a disciple of Socrates. He is seldom serious except in his attacks upon vice, and then his spirit rises with a manly strength and a noble indignation."

§ Johnson helped Dr. Jenner in writing the proposals for his dictionary, and in so doing, he says, obtained what knowledge he had of physic.

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[1] See his Memoirs, vol. ii. p. 71.

D'Israeli, in his "Literary Characters" (p. 197), alludes to Abernethy, who, though of our own profession, justly remarked that we have the power "to confer that which sick kings would fondly purchase with their diadem—that which wealth cannot purchase, nor state nor rank bestow, to alleviate the most insupportable of human afflictions."

The late Dr. Percival, of Manchester, in his "Medical Ethics," before quoted, cites (see p. 149) the words of Pope, who, when writing to Mr. Allen concerning his obligations to Dr. Mead and other physicians, shortly before his death, says, "There is no end of my kind treatment from the Faculty. They are in general the most amiable companions and the best friends, as well as the most learned men I know." Again, the learned Dr. Parr, writing to Dr. Percival in 1794, thus expressed himself: "I have been long in the habit of reading on medical subjects; and the great advantage I have derived from this circumstance is, that I have found opportunity for conversation and friendship with a class of men whom, after a long and attentive survey of literary characters, I hold to be the most enlightened professional persons in the whole circle of human arts and sciences."

In his work "On the Influence of Authority in Matters of Opinion," 1875, Sir G. Cornewall Lewis has the following remarks, which are to the point. "There is," he says (see p. 85), "or at least has been, much popular prejudice against the learned professions; and this feeling has been fomented by satirists and writers of comedy, who have ridiculed their weaknesses and failings, such as their pedantry and their groundless pretensions to science. It is thought that, as lawyers and physicians live upon the follies, the quarrels, and the diseases of mankind, they have an interest in augmenting the pabulum on which they subsist. But the truth is, that the legitimate and recognised ends of these professions is to provide preventions by remedies for the ills to which human nature and human society are subject. The ills are inevitable, but they can be mitigated by prudence and good management. Now this mitigation is what professional advice undertakes to provide, and, in fact, to a great extent does provide. It is not to be expected that all the members of a large profession should be morally perfect, or that there should not be cases in which their advice is prompted by an interested motive. But that the public is, on the whole, essentially comforted by the advice of professional men is apparent from the earnest and universal desire to obtain their services, and from the pecuniary sacrifices made for the purpose of obtaining them. According to the Italian proverb—

Quei consigli son prezzati,
Che son chiesti e ben pagati.

Bacon said in his Adv. of L., B. ii., that "for the weakness of patients, the sweetness of life and nature of hope maketh men depend upon physicians with all their defects."

I may here quote the words of Byron in "Don Juan":—

"This is the way physicians mend or end us,
Secundum artem:—but although we sneer
In health—when ill, we call them to attend us,
Without the least propensity to jeer."

The Emperor Napoleon's estimate of the character of a Physician was expressed as follows: "According to my idea, a physician, like a general officer, should be a man possessing great powers of discernment and observation, which will enable him to discover the position and strength of the enemy. Such a practitioner dispossesses the foe without employing force which might dissipate the citadel. Now, I conceive that the application of the Lancet or the administration of Mercury, if carried too far, cannot fail of injuring the constitution which knowledge assisted by experience are designed to improve."*

* It is well known that Dr. Mead extricated his friend Dr. Freind from his duress in the Tower by his influence with a patient who was at Court. It is not so well known that Napoleon, as also the emperor of Austria and the King of Spain, showed their gracious clemency to persons for whom Jenner interceded. Sir

The great writer and philosopher Renan, in his panegyric of Claude Bernard when admitted in 1879 into the French Academy, spoke of the profession of medicine as "at once the most honourable of callings and the most absorbing of sciences."

I more gladly refer to the forcible and interesting sermon, "Teaching and Healing," by the Rev. Dr. Liddon, preached at St. Paul's Cathedral before the International Medical Congress, August 7th, 1881, in which he, among other points, illustrated the propositions that "Teaching and Healing" is the motto of our profession as it was of Christ's Life; that our profession is a keeper and teacher of intellectual truth, also of reverence, and of practical benevolence.

The above quotations may suffice to do more than counterpoise a vast number of opinions hostile, or blind, to the merits of our profession.*

Note (56.) P. 76.

Humoralism.

I have pleasure in here quoting some pertinent remarks from the Hunterian Oration delivered by Mr. Cæsar Hawkins. He observes: "It is encouraging, however, for our future progress to observe that modern physiologists and pathologists are not apt to look to a single cause for the actions of so complicated a structure as the animal body. They are not all vitalists, or solidists, or humoralists alone, nor do they wish to explain everything on *merely* chemical or electrical or mechanical principles. They know that the tissues may be at fault at one moment and the fluids at another; that capillaries, nerves, and circulating blood may be concerned in a local affection, and that although advancing science has explained much that was till of late mysterious both in health and disease, there may yet be some controlling power in the living body which may so modify the operation of physical causes as to leave much for ever hidden from their finite capacities, for which they can only employ the term 'vital affinities,' or 'vital actions,' which, to use the words of Dr. Alison, 'take place chiefly in that part of the system where the solids and fluids are most intimately mixed and are continually exchanging particles.'" The above language is as applicable now as it was in the year 1849.

Dr. A. Wilson, when referring in his work on Spasm, &c. (alluded to in Note 60), to the neglect by pathologists of attention to the muscular system, observes: "It is still with the flesh, as it long was with the blood. Both have been unduly neglected in modern pathology; but, as the great common material of the circulation has at length been admitted to a share in conducting the business of disease, let us hope that the claims of its close and constant associate will no longer be overlooked, and that the partnership of flesh and blood, maintained in the physiology of all ages, will not be dissolved by the physicians of the present day."

Note (57). P. 76.

Imperfections of Medical Science and Art.†

The following passage is here appropriate, from "Osterlen's Medical Logic" (Syd. Soc. Trans., pp. 72–3), in the preface of which work the author observes:

H. Halford also quotes another very happy result of the intercession of one of our profession who was the means of bringing about the beginning of the civilisation of the vast continent of India by his influence with the Great Mogul.

* I am told the following words, indicative of a combination of valuable faculties, occur in the epitaph of a physician whose name I do not know, "Audax, capax, sagax, efficax, pertinax."

† Lacordaire remarked, "How powerless is man for his fellow-creatures: of all his misery this is the worst."

"I am indebted, however, to J. Stuart Mill's excellent work for the greater part, the true pith and thread of my system; and the following is, in a great measure, but an application of his doctrines to the particular questions and objects of our department of science. It follows," he observes, "from all this, that the desire for such a deductive science is a perfectly natural and necessary one. What wonder is it if we long for a state of knowledge which would give us, by the aid of a few maxims and laws, an understanding of all that occurs in the living body? We should then, through an exact knowledge of what is taking place in our patients, be enabled to deduce with certainty from a few higher principles all the individual rules for our clinical practice. When we consider this want, the formation of so many theories and systems to satisfy it becomes intelligible. The same circumstance has been propounded as the essential condition or cause of the most dissimilar diseases: *e.g.* irritation or debility, according to Brown; inflammation, according to Broussais; so-called blood-crasis, certain derangements of the functions of different parts of the nervous system, according to many of the moderns. In like manner, the same essential type, the same ultimate effect, has been assumed as the basis of the mode of action of the most various agents and remedies: *e.g.* debilitation or invigoration, excitation or change of tone, &c. An entire misapprehension of the actual state of things could, however, alone have induced any such attempts. While these men were in reality not far from the starting-point, they believed themselves to be near the goal, and pretended to take or give what did not yet exist. Physics, mechanics, and in some degree chemistry, have gradually attained the rank of deductive sciences: not so physiology and the theory of diseases. In the former science men have succeeded in determining the similarity of several series of phenomena and processes, *e.g.* the laws of gravitation and of hydrostatics, of chemical affinity, &c., which are in consequence regarded as effects or results which must necessarily occur under determinate circumstances. We can, therefore, now predict what effects and results will occur under certain given circumstances with a definite assemblage of co-operating agents. But, on the contrary, so long as no such natural laws have been established—as is the case in the whole theory of life—and so long as we do not know what really occurs in any vital process or in the course of any disease, nor by the co-operation of what circumstances it occurs, any deduction in the above sense is impossible. It is useless to attempt to promote the comprehension of yet unknown phenomena and processes by grouping them with others almost equally unknown, or to attempt to explain them by adapting to them laws which regulate other groups of phenomena and processes before these last are themselves well understood and clearly demonstrated. Even the natural philosopher is unable to calculate with certainty, from the laws of atmospheric pressure and gravitation, and from the elasticity of gases, the distance to which a projectile may be thrown. Much less can he calculate from the laws of action of individual agents—*e.g.* of heat and of the process of evaporation, of the currents and electrical phenomena of the atmosphere—how a given state of the weather is to be brought into conformity to certain fixed laws; and this because the concomitant circumstances and influences are too complicated, the importance and office of each individual agency not sufficiently known to him. The laws of gravitation, &c., which he has so cleverly discovered do not enable him to determine with certainty the behaviour of three bodies which attract, or gravitate towards, each other; still less can he calculate with certainty, *à priori*, the orbit of one of the heavenly bodies, but must seek to discover and determine it by exact observation. In like manner, no chemist can say beforehand what will occur when certain complicated organic compounds are brought into contact with other substances: this, in such a case, must be determined by experiment. And how shall we pretend to say that in the theory of life, in which the phenomena and processes are confessedly obscure above all others, we know even so much as in the cases alluded to above, and that we are now in a position to venture upon a method of explanation which possibly for centuries to come cannot be fitly entered on?"

Dr. Arnold, in a letter to Dr. Greenhill, May, 1836, observes, "What our fathers have done still leaves an enormous deal for us to do. The philosophy of

medicine, I imagine, is almost at zero; our practice is empirical, and seems hardly more than a course of guessing, more or less happy. The theory of life itself lies probably beyond our knowledge; so, probably, is that of thought and perception. We talk of nerves, and we perceive their connection with operations of the mind; but we cannot understand a thinking, or a seeing, or a hearing nerve, nor do electricity or galvanic action bring us nearer to the point. But coming down to a far lower point, how ignorant are we of the causes of disorder, of the real influence of air, and of its component parts as affecting health, of infection, and of that strange phenomenon of diseases incident generally to the human frame, but for the most part incident once only, such as measles, small-pox, and the old Athenian plague, or incident only after a certain period, as the vaccine infection," &c.

Again, Osterlen remarks, loc. cit. page 433: "Now, if the present state of our knowledge scarcely enables us to calculate or predict anything with certainty, least of all shall we be able to do so with regard to the results of our art. Not as if the processes and occurrences in our patients were deficient in a certain conformity of their own, nor as if effects could here take place without their adequate causes, or could fail to take place in spite of the action of their causes, but because a number of causes and circumstances are here at all times in operation, the influence or laws of which have remained for the most part, if not entirely, unknown to us. In all cases, therefore, we can only attain to a kind of supposition of probabilities, and not to a demonstration of certainties; and even the probability of the former will, in a great measure, depend upon thediscernment and circumspection of the individual. To this must be added, that we physicians never are, nor shall be, masters of all the circumstances and influences under which or against which we have to act. We can do as little in this respect as the navigator or the statesman. If, then, there is any established certainty in medicine, we must not place it in the result of our curative attempts, but in the due understanding of what the preservation of health, or the completion of the cure, renders necessary Our security consists, therefore, in the recognition of the indications at the bedside, but not in their fulfilment. This makes it apparent that medicine might be infinitely more powerless and inefficient as an art than it is in reality, even if, as a science, it already held a high and secure position.

"It is more to be wondered at that physicians should themselves further this error by thinking proper to surround themselves with a halo of power which they do not possess, renouncing that to which their art truly entitles them, and may, in future, do so in a yet higher degree, as shall be presently shown. Nobody thinks of blaming or deriding the natural philosopher or meteorologist because he has not the power of averting tempests and storms, or of converting bad into fine weather; nor does he ever propose to deceive himself or others by the assumption of such an attribute of Divinity. Yet in our department of science deceptions, at least self-deceptions, of this kind are not rare, although we have also to deal with processes and events which, equally with those of the natural philosopher or meteorologist, take place and proceed according to their fixed unchangeable laws. And whatever the physician is capable of changing, modifying, and effecting in his peculiar province, he can only accomplish through his knowledge of these laws, and through his respect for their operations."

Professor Marx, in his "AKESIOS," translated by J. Mackness, M.D., observes: "In proportion as it is perceived that all the circumstances of life, both moral and physical, may be employed for the preservation of health, medical science approaches the problem of giving laws to life; the schools incite not merely to the investigation of nature, but to the practice of virtue, and the medical man has to pay attention not merely to what relates to professional study, but to the requirements of ethics. Humanity, in the widest signification of the term, is the object which is assigned to the medical profession; its inalienable qualification is to be cautious, indulgent, helpful to others in advice and action."

Descartes has said that "if it be possible to perfect mankind, the means of doing so will be found in the medical sciences."

Note (58). P. 77.

Uncertainty of Physical Science.

Solomon says that "the glory of God is to conceal a thing, but the glory of man is to find it out."

Canon Birks, in an address styled "The Uncertainties of Modern Physical Science" (May, 1876), shows how physical science shares, as it were, with physiology the "nebular state," with a nucleus of certain truth, encompassed and concealed by mist of unexplained phenomena, unproved guesses, and dim, hazy speculations. This, he observes, is very true with regard to the following—viz., the law of gravitation, the nature of matter, the existence of æther, the conservation of energy, the doctrine of evolution, the nebular theory, the dissipation of energy and solar percussive theory, the molten nucleus theory of the earth's formation, the astro-glacial theory of the great ice period.

As Bishop Goodwin observes, "While, however, this is true, and while we gratefully acknowledge not only the marvellous gift of intellect which has enabled us to comprehend to some extent the wonders of that universe, I think it is well that we should bear in mind that the ultimate foundation upon which the fabric of nature stands is almost, if not quite, as dark, and mysterious, and unknown as it was in olden days, before genuine science had commenced its mighty and glorious career."

Freeman, the historian, goes so far in one of his Essays (3rd Series) as to speak of the "howling wilderness of scientific uncertainty."

It has been remarked (see a pamphlet on "Wet and Dry Seasons of England from 1846 to 1860," by Mr. Charles Fulbrook, that "with exception of a knowledge of the course of the winds and depression of the barometer in tropical storms, and some other minor indications, meteorologists still remain as ignorant of the great laws which govern the weather as were the unscientific ancients." In consequence of this, our sailors and agriculturists will, of course, still remain among the most superstitious of our profession.

As an illustration of deficient scientific insight (if the assertion be correct), I may quote the statement made by Capt. Josiah Thomas after dinner on the occasion of the annual excursion of the Mining Institute of Cornwall (see *The Cornishman*, August 27th, 1881), when referring to the resources of Dolcoath mine, and holding it up as an encouragement to Cornish proprietors (locally called adventurers) to persevere in developing their mines. He observed: "At one time Sir H. De La Beche went underground in Dolcoath, after it had been exhausted for copper, and gave it as his decided opinion that it would never be a tin mine, and one of the Fox's of Falmouth, being of the same opinion as Sir H. De La Beche, advised his family to dispose of their interest in the mine, which they did, and so by their great knowledge of geology they lost nearly a quarter of a million of money."

Scientific theory is not, however, always thus at fault. See the description in *Nature* for October 6, 1881, p. 541, of the discovery of good rock salt, 75 feet in thickness, at a depth of 430 feet, in a Russian Dependency, according to the predictions and indications of the geologist Professor Erofeeff.

Note (59). P. 78.

Certain Recent Views of Dr. B. Sequard.

The communication to the *Lancet*, by Dr. B. Séquard is entitled, "Experimental Facts: showing that the admitted views relating to paralysis of cerebral origin, and to the physiology of the so-called motor tract in the brain, must be rejected." These facts are opposed to the following three universally received views:—1. That each half of the brain is alone the seat of centres for the voluntary movements of the limbs on the opposite side. 2. That the conductors used for voluntary movements coming from the brain descend along the crura cerebri and decussate either in the pons varolii (this is the view of most

physiologists) or at the lower part of the medulla oblongata (this is the view of most physicians). 3. That paralysis is the direct effect of a lesion in the parts of the brain supposed to belong to the voluntary motor apparatus. His present conclusions are that sensory impressions from both sides of the body may be conducted through one lateral half of the base of the brain.

Note (60). P. 78.

Narcotics used by the Ancients.

To show that the virtues of opium (*ὀπός*, juice, sap, dras, as some say, a name of Eastern origin), or of the poppy, well named in modern Spanish the "adormideza," have always been held in high estimation, it may be noticed that at the Eleusinian Mysteries, part of the objects of which were to open to man a comforting prospect of a future state, and which contained under their veil whatever faith in the Invisible and Eternal rested in the mind of an enlightened Pagan [see Collins' Cicero, p. 9], on the fourth day a procession took place with a basket containing poppy seeds and pomegranates.

How expressive in a medical sense are the following lines of Homer, in the "Odyssey" (iv. 219–220). "She," *i.e.* Jove-descended Helen, "straightway cast a drug into the wine, from whence they were drinking, that frees men from grief and from anger and causes oblivion of all ills. Whoever should drink down this, when it is mixed in a cup, would not shed a tear down his cheeks for a whole day, not even if both his mother and father should die, nor if they should slay with the steel a brother or a beloved son before him, and he should behold it with his eyes."*

Mr. Gladstone, in his "Homer and the Homeric Age," speaks of this drug as that "which drowns the spirit in effeminate indifference." The "Nepenthes," "a drinck of sovereign grace," as Spenser has it (F. Q., B. 4, C. iii.), which Helen had from a woman of Egyptian Thebes may have been the "cannabis" well known to both Greeks and Romans, described by Dioscorides and Pliny, and alluded to by Herodotus (iv. 73-75) as being used by the ancient Scythians. He says the people were wont, by way of purification after burial of the dead, in addition to other actions, to breath the fumes of the seed of hemp heated on red-hot stones, in consequence of which, "dizzy through the vapour, they shout with pleasure." In his notes on this description, Laurent alludes to the "hashish" made of the leaves and seeds of the hemp plant, and used now in the East with very deplorable results. He quotes from a French author the ordinance published to the French army soon after the opening of the Egyptian campaign, prohibiting the use and sale of hashish throughout Egypt.†

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* The manna of S. Nicholas which the alchemist in "Kenilworth" (vol. i., chap. i.) prepares had this effect: "The bird who partakes of it in proper proportion shall sit for a season drooping on her perch, without thinking either of the blue sky or of the fair greenwood, though the one be lighted by the rays of the rising sun, the other ringing with the newly-awakened song of all the feathered inhabitants of the forest."

† The cannabis is known in India as "increaser of pleasure," "causer of a rolling gait," "the laughter mover." The nature of hashish, quigal, and bang, all made from the cannabis, is described fully by Royle and Shaugnessy, the latter of whom describes some curious as well as useful effects of the cannabina. See also Dr. Moreau's work on Hashish and Insanity. Paris, 1845. The Egpytians and Asiatics now use the cannabis as pastiles or electuaries, and in smoking.

For a graphic and entertaining description of the effects of the Indian hemp see the article by Théophile Gautier, "Le Club des Hachichins," in the *Revue des Deux Mondes*, 1846, p. 520.

Our Indian Government, acting through the Marquis of Ripon, had lately closed several shops in which opium was sold.*

Several authorities have discoursed on the poisons resorted to by the ancients. For example, Dr. Heberden, "that ripe and good scholar, but an excellent physician," as Sir H. Halford called him,† in his essay on Mithridatium, refers to this general question. He remarks that it is surprising to find that the ancients knew of none except the cicuta (hemlock), aconitum, and those of venomous beasts, and knew of no antidote to those poisons. After alluding to the recorded cases of people being poisoned by various subtile agents, he remarks: "I would not be understood to deny the possibility of poisoning by such very small quantities, by the vapours arising from perfumed gloves‡ and letters, or that poison may lie concealed in the blood for a considerable time before it exerts itself.§ It is plain that there are such things in nature, from the terrible effects of that very little liquor instilled by the bite of a viper, from the vapours of charcoal,

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* The sale of "spirits" to the natives of Natal was lately prohibited, and an attempt was being made to induce the Indian Government to permit the extension of the same prohibition to natives introduced into Natal as labourers.

† Designated by S. Johnson as the "ultimum Romanorum." For a highly eulogistic letter of Heberden by Dr. Wells to Lord Kenyon, when writing upon the conduct of the College of Physicians, see Wadd's N. Chir., p. 221.

‡ What was the poison described by Tacitus as carried in the hair—"venenum nodo crinium occultatum"? Or that spoken of as carried in gloves, or at the pommel of the saddle, or in a ring, or in the "poesy," or at the hilt of the sword? Might it not have been the poison of venomous snakes, as suggested by some? Those conversant with the life of Bacon may remember the case in which he was engaged to conduct an inquiry into an attempt to destroy the Queen by the impoisonment of the pommel of her saddle, by means of a bladder containing the poison, and pricked full of holes, "her majesty being likely to rest her hand thereupon for a good time together, and not unlike for her hand to come often about her face, mouth, and nostrils."

§ Tacitus, in his Annals, speaks of poisons given having slow action, so as to cause symptoms like those of disease; also of skilled persons being able to fortify themselves by antidotes against the action of poisons, should any be given to them.

He also, when describing the poisoning of the boy, Britannicus, by Nero, during the festival of Saturnalia, by means of Locusta, the professed and convicted poisoner ("magnæ famæ ad hæc scelera accitam"), speaks of the poison having been previously tested, and describes the "virus" as "Cognitis antea venenis rapidum." Suetonius, in his "Life of Nero," cap. 33, spoke of the poison *being first tested on lower animals,* and described the event thus: "Coegitque se coram in cubiculo quam posset velocissimum ac præsentaneum coquere: deinde in hædo expertus, postquam is quinque horas protraxit: iterum ac sæpius recoctum percello objecit." I adduce this passage as being one among others *which shows in an interesting manner how far back experimental physiology or toxicology extends.*

The virus which Nero used was supposed by Sir H. Halford to have been extracted from the laurel.

The subject of secret poisoning, with notices of "causes célèbres," both in ancient and modern times, is considered in a chapter in Beckmann's "History of Inventions." It is therein stated, according to Professor Baldinger, that the slow poison of the French and Italians (*poudre de la succession*) owes its origin to sugar of lead. In many cases, no doubt, it is arsenic. Sir H. Halford, in his essay on the "Deaths of some Illustrious Persons of Antiquity," refers to the question of secret poisoning, &c. He states that Mr. Hatchett suggested that the poison which Hannibal took might have been the inspissated exudation of the acrid and powerful Euphorbia officinalis, a native of Africa. Walter Scott in a note to chap. i. of the 2nd vol. of "Kenilworth" describes the supposed power of Julio, the Earl of Leicester's Italian physician, as a poisoner. See in chap. xiii. of vol. 1 a description of the compounding by Wayland of the Orvietan or Venice Treacle, a sovereign remedy against poisons, with the opium obtained from Yoglan the Jew.

and the poison of a mad dog lurking in the blood inactive for a whole generation. But I think I may venture to assert that there never was anything yet discovered that we can apply with such effects." (The essay was written in 1745.) Sir H. Halford, in his interesting essay on the "Deaths of some Illustrious Persons of Antiquity" (May, 1833), observes that at the time of the death of Socrates, the Greeks knew, amongst others, the aconite, the black poppy, the hyoscyamus, and hemlock. From the fact of the hyoscyamus being still used at Constantinople and throughout the Morea under the name of nebensch, the author seems to think that it might have been the nepenthe of Homer. Halford agrees with others, including Juvenal, in attributing the death of Socrates to the cicuta, '*κώνειον*—as Sir T. Browne calls it, "the state potion." The "Moly," **Μῶλυ**, herb of virtue and magic power, given by Hermes to Ulysses as a counter-charm to the designs of Circe, according to Homer (Od. X.), has been thought to be the mandrake. It was most likely an entirely fabulous herb. The word *μῶλυ* appears, according to Latham, the philologist, to be foreign to the Greek language.*

A branch of poppies, "the red drowsy flower that breathes death," was usually carried, according to ancient mythology, by Morpheus, the God of Dreams and son of Somnus, the seeds of which he scattered over the eyes of mortals as he trod lightly over the earth on tip-toe. It is probable that the Pagan priesthood at times prophesied under the influence of opium, said to have been mostly obtained from Egyptian Thebes [hence the Tinct. Opii., formerly called Thebaic Tincture] or of Stramonium; in some cases possibly the prussic-acid-holding laurel leaf, growing around the temples, was used by those who professed to prophesy. It is said that the priestesses were often killed by the ceremony.

Adams, in his Commentary on P. Ægineta, treats fully of the different species of poppy known to the ancients, and gives reference to old authorities, Nicander, Dioscorides, Galen, Theophrastus, and the Arabians as to its uses (see vols. ii., 213, and iii., 249, 279).

The lettuce also was known by the ancients as a soporific; thus, after the death of Adonis, Venus, we are told, threw herself on a bed of lettuce to kill her grief and subdue her desires.

I have met with a passage in Boyd Dawkins's work, "Early Man in Britain," p. 293, curiously showing the antiquity of the poppy, describing the discovery in the neolithic gardens and orchards, as lake habitations (Pfahlbauten), places of unknown antiquity, of bread containing poppy and carraway seed, and also cakes of the latter. Paulus Ægineta, under the heading of **Μήκωνες**, speaks of

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* In an appendix to Professor Earle's highly-interesting "English Plant Names, from the Tenth to the Fifteenth Century" (see p. 82) is mention of *Temulum*, vingre, with a note showing *τὸ μῶλυ*, a garlic, to be a synonyme; and Theophrastus applies the word to a species of garlic. Liddell and Scott consider the word to be akin to the Latin *mollis*, and so to *μῶλος*.

Milton, in his "Comus," speaks of the Moly, and compares with its effects those of the Hæmony (*αἷμα*, blood; *οἶνος*, wine):—

> "And yet more med'cinal is it than that Moly
> That Hermes once to wise Ulysses gave:
> He called it Hæmony, and gave it me," &c.

Drayton speaks of a shepherd using Moly along with other rare plants; and it is mentioned in Browne's "Inner Temple Mask." Drayton illustrates its supposed uses by reference to Fletcher, Tasso, Spenser, &c. (See Warton's Notes on Milton.) Coleridge, in his "Statesman's Manual" (p. xxvi. in Appendix) comments on both the Moly and the Hæmony, and observes that Milton's passage has been strangely overlooked by commentators.

In the interesting recent work of Miss J. E. Harrison, "Myths of the Odyssey," is an illustration from a gem showing Odysseus armed with the herb of virtue, Moly, in his left hand, having a sailor's cap on his head. The author says, p. 71, "Most nations have their herb of virtue, and the Allermanns Warnisch of the Germans is a charm against love as well as magic. The siegwurz, a kind of gladiolus, was in olden times sacred to Woden, and had similar properties."

the seeds of the garden poppy being eaten with bread as a moderate soporific (see Syd. Soc. Trs. iii. 249).

The poppy was known to our early English writers. Thus Southey, in his "Madoc," has the following lines: "She gathered herbs which, like our poppy, bear the seeds of sleep," and observes that the expression is borrowed from Gower (who died 1402).* We are told that in Turkey travellers carry with them lozenges of opium stamped with words, "Mash Allah," the "Gift of God."

Reference to the practice of Hippocrates, in which, of course, opium and lettuce and the laurel are mentioned, quoted from Dierbach's "Die Arzneimittel der Hippocrates," and cited from the historical table of the Materia Medica given in vol. ii. of Pareira's work, may, by the way, be thought useful and interesting by the curious. Hippocrates is described as being an antipathic, as employing baths, diet, exercise, blood-letting, actual cautery, and knife, and as mentioning the use of the following remedies:—Sulphur, lime, carbonate of soda, alum, oxide and carbonate of lead, acetate (and sulphate) of copper, oxide of iron, and yellow and red sulphuret of arsenicum, and among vegetables the following: — Acacia, allium, ammoniacum, anethum, anisum, cardamomum, cassia, cinnamon, colocynth, conium, coriandru, crocus, cuminum, cydonia, elaterium, euphorbia, fœniculum, galbanum, gallæ, glycyrrhiza, gnidium, helleborus, hyoscyamus, juniper, lactuca, laurus, linum, malva, marrubium, mastic, mentha, morus, myrrha, olea, opium, opobalsamum, opoponax, origanum, piper, pix, pulegium, punica, quercus, rosa, rubia, rumex, rutea, sambucus, sagapenum, scammonia, scilla, silphicum, sinapis, staphisagria, styrax, turpentine, and veratrum. He used also the cantharis, castor, sepia, ova, cornua, serum, lactis, and cera.

I would here allude to the enumeration of both natural and cultivated Egyptian Medicinal Plants by Homer (Od. iv. 228-30). They are referred to by Prof. Rawlinson in his History of Ancient Ægypt, vol. i. p. 63.

In addition to direct remedies or drugs, the Romans used the bath as a *sedative* means, and not only resorted to it for the sake of cleanliness or amusement, or for ceremonial uses, as did the Hebrews or Egyptians. Thus the word "Balneum," we are told by S. Augustine in his "Confessions" [see p. 195 of Parker's Edition] is derived from the Greek "βαλανεῖον," "for that it drives sadness from the mind." He goes on to say, however, that he "was the same as before he bathed. For the bitterness of sorrow could not exsude out of my heart." This idea of the origin of the word "balneum" is alluded to in the Observations on the 26th Epistle, Bk. vii., of Pliny the Younger, by the Earl of Orrery, when referring to the expression, "Balnea imaginatur at fontes," applied by Pliny to a sick man. It is noted that Pindar speaks of the bath in this view when giving the highest praise to the charms of the harp. On the senses in which the word "balneum" is used see Dr. Greenhill's "Adversaria," in the "Brit. and For. Med. and Chir. Review," January, 1860, p. 274. It has been supposed that it was from the use of the hot bath that Medea, the enchantress, was accused of maliciously persuading the daughters of Pelias to try and restore their father to youth by boiling his limbs in a cauldron.† Homer (Od. x.) speaks of the "mind-destroying labour" of Ulysses being relieved by the warm bath given by one of Circe's maidens.‡

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* It appears from Professor Earle's work, mentioned in a preceding footnote, that in the fifteenth century the poppy was termed "chesbolle"—*i.e.*, ball of pebbly seeds—a graphic designation of the poppy-head; the "ches" in the compound expression being the same element as the "ches" in our word Chesil Bank, the pebbly bank at Portland Island. See Halliwell's Archaic Dict.

† For a history of baths amongst the ancients see Dr. Currie's Reports on the Baths in Hospitals.

‡ Concerning the antiquity of medical nomenclature, I find it stated by Sir J. Fayrer (see address alluded to at p. 78) "that the name 'haida,' or 'heiza,' used by Rhases nearly 1,000 years ago in describing the symptoms of cholera, is the same as that applied to it now by every Hindustanee-speaking native of India.

Dr. A. Wilson, my old and revered teacher at St. George's Hospital,* in his very pregnant little volume, alluded to in Note 56, on "Spasm, Languor, Palsy," &c. (1843, dedicated to his father, the celebrated anatomist) comments on the proper and timely use of narcotics (see chapter on Sleep). He remarks (p. 139): "One quarter of a grain of morphia has often prevented fever in its origin, or stayed it in its course. Hysteria, by exhaustion, fast becoming typhoïd, thus, in the muscles, as by a spell, is made to cease. *How full of wonder, how worthy of admiration, is the drug whose rule is sleep!*"†

He dwells (p. 134) on the supposition of the production of ordinary sleep by the periodical development of a narcotic agency as part of the regular business of the system, probably the compound vapour carbonic acid. In the same chapter on Sleep the author has some suggestive and excellent remarks on well-trained and truth-telling "nursing," and advocates the establishment of schools for nursing.

When speaking of opium, p. 68, Dr. Wilson has the following remarks, which I venture to quote:—"Opium, when in active circulation through the body, influences all nutrition, and modifies every secretion. Its effects on particular functions are so marked and various that, observing them separately, we fail to consider them in their combination. Opium is alterative in the widest sense of the term, and should never be prescribed for the use of a part, but in remembrance of its power over the whole. The more frequent application in medicine of the rule thus inferred from opium, would correct much that is now bringing reproach on its practice. There is a lamentable satire on physic in the habit prevailing among us, of overlooking, for the time, all contingent effects of the remedies employed in our one contemplated purpose of the case as we wish it to be. Thus with mercury, as with opium."

Sir H. Holland, in the chapter "On the Use of Opiates" in his work, "Notes and Reflections," makes valuable observations on the worth and the method of administration of opium and other like agents in various diseases. He cites the interesting remarks on its use in puerperal fever by Dr. Ferguson, and in mania by my former teacher, Dr. Seymour. In his *brochure* on the "Nature and Treatment of Dropsy," dedicated to Sir B. Brodie, Dr. Seymour (p. 88) describes cases of disease of the liver resulting from the improper use of opium.

A strong testimony to the value of opium used therapeutically‡ is borne in a recent

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* Whose father was in his time "acknowledged by all to be the *facile princeps* of London teachers of anatomy." See Struther's Historical Sketch of the Edinbro' Anatomical School.

† Sir T. More, in his Epigrammata, often indulged in reflections on the equality of the rich and the poor man produced by sleep and dreams. Bacon, in his Hist. V. et M., discourses much on the properties and uses of opium, and says that it was called by the Arabians "God's Hands."

‡ Of the abuse of opium as a luxury in its various forms, much has of late been written and said *pro* and *con*, specially *apropos* of the introduction of opium into China. For a graphic though painful description of some of the evils attendant on its use in Constantinople, a good example is to be found in Mr. T. Hope's Anastasius, i. 215, 216. The author speaks of the opium (termed in Turkish "madjoon") being chiefly obtained at the great mart called "Theriakee tchartchee," where, he says, insanity is sold by the pound. His account of the effects of its use are, however, considered by De Quincy as exaggerated. Some medical men in India describe opium-smoking as affording helpful immunity from the effects of malaria and snake-bites: and De Quincy asserts that whilst taking it he "never caught cold." Sir Rutherford Alcock, who has lived for twenty years in China, tells me that, in his opinion, opium is much less injurious than alchohol, as used in England, and is attended by much less misery, brutal demoralisation, violence, and danger. Every one who studies the effects of opium on the human subject must be acquainted with De Quincy's "Confessions of an English Opium-eater," proving, for the consolation and encouragement of opium-eaters, the fact that the drug "whose agency for pain or pleasure is so marvellous, may be renounced, and without

paper by Dr. G. Hamilton on Vivisection, alluded to at page 149 in the Trans. of Coll. of Phys. of Philadelphia. He observes (see p. 116), "At the present time, and during very many years, opium, or some of its derivatives, holds, in the opinion of the most able practitioners of medicine and surgery, such a position as a curative agent, applicable to almost innumerable abnormal conditions, that, in comparison, every other article of the Mat. Med. dwindles into insignificance."

The immortal Newton bore testimony to the value of sleep in the following (for many reasons) interesting letter, which, early in 1881, was brought before the notice of the public at a conversazione of the Society of Telegraph Engineers and Electricians by Mr. Latimer Clark. The letter, which had not previously been published, was addressed to Dr. Law, of Suffolk, and was dated London, December 15th, 1716. It ran as follows: "Dear Doctor,—He that in the mine of knowledge deepest diggeth, hath, like every other miner, ye least breathing time, and must sometimes at least come to terr. alt. (terra alta) for air. In one of these respiratory intervals I now sit doune to write to you, my friend. You ask me how, with so much study, I manage to retene my health. Ah, my dear doctor, you have a better opinion of your lazy friend than he hath himself. Morpheus is my best companion; without eight or nine hours of him ye correspondent is not worth one Scavenger's peruke. My practizes did at ye first hurt my stomach, but now I eat heartily enow, as y' will see when I come down beside you. I have been much amused by ye singular φενομενα resulting from bringing a needle into contact with a piece of amber or resin fricated on silke clothe. Ye flame putteth me in mind of sheet lightning on a small—how very small—scale. But I shall in my epistles abjure philosophy, whereof when I come down to Sakly I'll give you enow. I begin to scrawl at five mins. from nine of ye clk, and have in writing consumed ten mins. My Lord Somerset is announced." A commentator on the above observes that "the remarkable passage in the letter touching electricity shows us how the extraordinary sagacity of the philosopher detected the analogy between lightning and electricity, which Franklin proved long after by his famous kite experiment."

Dr. Graves, in his "Clinical Medicine," observes that "in Turkey, if a person happens to fall asleep in the neighbourhood of a poppy-field, and the wind blows over it towards him, he becomes gradually narcotised, and would die, if the country people, who are well acquainted with this circumstance, did not bring him into the next well or stream, and empty pitcher after pitcher on his face and body."*

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greater sufferings than an ordinary resolution may support; and by a pretty rapid course of descent." It appears that he took it more or less for the space of seven teen years, and for eight years to excess. At times he took as much as 8,000 drops in the day. His somewhat rhapsodical apostrophe to opium, which revealed to him "the abyss of divine enjoyment," "Oh, just, subtle, and mighty opium!" &c., should be read. Instances of safe discontinuance of the daily use of opium in large doses are given by Dr R. Lloyd in the *Lancet* for June 7, 1879. It is stated that at the Lambeth Infirmary patients who have taken large quantities of opium for many years are often seen: they can always safely discontinue the practice, taking nourishing diet and quinine, and no stimulants.

In a work recently published by Sir G. Strachey and Lieut.-Gen. R. Strachey, "The Finances and Public Works of India from 1869 to 1881," is much information on this subject. It is there shown that throughout the West of China opium-smoking is universal, and is looked upon precisely in the way we look upon tobacco-smoking, and that its moderate use is not more hurtful than the moderate use of alcoholic drinks.

De Quincy mentions the report that Dryden, and also Fuseli, were wont to eat raw meat for the sake of obtaining splendid dreams, and states that Homer had been supposed to have personally known the virtues of opium.

* In an abstract of a very complete history of the cultivation and preparation of opium in our Indian possessions, published by Dr. Eatwell, and fully alluded to by Pareira (Ed. 3rd, p. 2076), it is stated that amongst the thousands of people with whom the factories are filled during the receiving and manufacturing seasons,

For some interesting observations on the action of opium and of alcohol in inanition see Currie's "Medical Reports" on the effects of water, &c. (1797), a work full of noteworthy suggestions, and one too little known and read in the present day. It contains, perhaps, the clearest and most concise *résumé* of the doctrines which have been held, of fever.

Note (61). P. 80.

"Multum scire, et pauca agere."

Bacon said, "Variety of medicines is the child of ignorance; and if it be true. according to the proverb, that 'many dishes have made many diseases,' it is not less true that many medicines have made few cures."—*H. V. et M. W.*, v. 300 tr.

The following words of Sydenham, who had borne arms for the Commonwealth, and was for political reasons excluded from the Fellowship of our College, in the preface to the third edition of his works, are to the same end, and may be here cited. He observes:—"Whoever expects a great mass of remedies and formulæ in the following pages will be disappointed. The physician must apply those according to circumstances and his discretion. I only mention the indications he must satisfy, and that in respect to their order and their time. True medicine consists in the discovery of the real indications rather than in the excogitation of remedies. Those who have neglected this have put arms into the hands of the empiric, and taught him to imitate the physician. One objection against me will be made by the vulgar and unthinking only—viz., that of having renounced the proper pomp of physic, and of having recommended medicines so plain and simple as not to be reducible to the Materia Medica. Wise men know this—*whatever is useful is good.* They know, also, that Hippocrates recommended bellows for the colic, and nothing at all for cancer. They know, too, that similar treatment is to be discovered in almost every page of his writings, and withal that his merits in medicine are as great as if he had loaded his pages with the most pompous formulæ."

The above remarks are what might have been anticipated from one whose high praise was that he introduced the laudanum* and the cooling treatment of small-pox,† instead of the sweating treatment with scarlet cloth; and was mainly instrumental in bringing into favour the use of the Peruvian bark in ague. Yet we find Sydenham sometimes given to what appear to us strange practice and quaint opinions. Thus he speaks of restoration being obtained from the lively and vigorous warmth of another (young) person in bed by what may be exhalations or effluvia of a *balsamic nature;* of the blood undergoing change from impulses such as the effluvia from sick men, "even as ripe apples ripen the apples that hang next them." He speaks of the iliac passion being treated by mint-water and a whelp to the stomach; of the good of ptyalism in small-pox, so as to "evacuate" in place of the pustules; of bleeding in pleurisy to repress the inflammation of the blood ("a rich and luxuriant liquor"), and to divert the inflamed particles which have made an onset on the pleura and set up the disease; of the cough in fever being due to vehement commotion and tumult of the blood, whose elements are in faction, sedition, and rebellion, so that the humours ooze out from the general mass on to the tracheal membrane.

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no special illness is produced, even though many sit with hands and arms immersed from 6 a.m to 3 p.m. in the drug. Many stand knee-deep in the drug for hours daily, lifting it about with naked bodies, and only complain of some pleasant drowsiness toward the end of the day, owing, as the author thinks, to an effect produced through the lungs, the skin having nothing to do with it.

* Sydenham obtained the appellation "Opiophilos."

† It appears that the great Clarendon as a young man was considered to have been saved, when suffering from small-pox, by the cooling treatment. See also a grotesque narrative of the rescue of the Duke of Beaufort, ill of small-pox, by the cooling treatment, under Radcliffe's care.

Sydenham, who died "a victim to the ingratitude of a thankless world and the fury of the gout," is said to have remarked that he wished that all the articles of the materia medica which he required could be packed in the pommel of his cane. Radcliffe said: "When I was young I possessed at least twenty remedies for every disease, but when advanced in age I found twenty diseases without a single remedy." I would here quote from an interesting document, the official publication in Latin to medical men of the armies of the French Republic, which concludes with the following words:—". . . . naturas esse medicatrices morborum. Et summum artis multum scire, et pauca agere."

I cannot here forbear quoting the admirable words of Sir B. Brodie. He says:* "Make yourselves masters of the old remedies. Learn how to handle them, and what good they will do, and, as a general rule, have recourse to them in the first instance. If the old remedies fail, and you are at a loss as to what you should do, then, and not till then, have recourse to the new ones. If you always begin with new remedies you throw away the valuable results, not only of your own experience, but of the experience of those who have gone before you. You have to begin, as it were, *de novo*, and the first consequence of this will be that you will not cure your patients, and the second, that you will have none to cure."

The tendency in the human mind to overrate the importance of new remedies is commented on in the Historical Introduction to Friedreichs' Treatise on the Liver (vol. i. p. 7 Syd. Soc. Trans.)

Regarding what is often called the old-fashioned treatment, few things have been better said than the words of Dr. Latham in one of his essays, quoted by Dr. Martin in his excellent preface to the Syd. Soc. edition of Latham's works.†

I have it on very good authority that it was Dr. Latham who persuaded Dr. Chambers to adopt the use of the stethoscope, but he was more fully compelled to do so by Mr. Lane, who had been studying with Laennec in Paris, and who, on one occasion, pointed out, by means of the instrument, that a case of dyspnœa at St. George's Hospital was really dependent on hydrothorax, and not on emphysema of the lungs.

Dr. Latham told me that "Dr. Warren, remarkable generally for sound sense and high education, ignored the stethoscope. He always knew what physic could do and what it could not do. Dr. Baillie was also conspicuous for his knowledge of the precise effects and extent of the power of remedies." ‡

Of late years, of course, great advances have been made towards ascertaining and determining the precise *modus operandi* of remedial agents. Witness the volume, so full of erudition and research, on the physiological action and therapeutic use of "The Old Vegetable Neurotics," by our fellow, Dr. J. Harley.§ In his preface I find the following passage, which may here be suitably quoted. He observes: "Our first impressions on entering the wilderness of therapeutical inquiry must indeed be

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* See vol. iii. p. 311 of Mr. C. Hawkins's edition of his collected works.

† It is much to be wished that every member of our profession could read the admirable and touching "In Memoriam" of Dr. Latham, written by Sir T. Watson, in the ninth volume of the S. Bartholomew's H. Reports.

‡ May I not here suitably quote the words of the celebrated and generous Pitcairn, "qui de patriâ bene meritus est," the friend of Dr. Baillie, who remarked, "the last thing a physician learns in the course of his experience, is to know when to do nothing, but quietly to wait and allow nature and time to have fair play in checking the progress of disease and gradually restoring the strength and health of the patient"? Sir H. Holland (see Recollections, &c., p. 319) had observed that "the prescription of the physician, however learned in its Latin and pharmacy, is but a slender part of his professional duty. Of far greater import generally to the patient is his watchfulness over the economy of the sick chamber—its temperature, ventilation, cleanliness, and quiet; the various appliances, even of change of posture, fitted to relieve pain and procure rest—all, too, that the *lenis sermo* and *hilaris vultus* (I willingly quote Celsus) can justifiably do in soothing and giving hope."

§ The Gulstonian Lecturer of 1868.

discouraging, and the prospect of reducing anything to order at first sight hopeless. A lifetime will seem too short to effect any change, and we shall be inclined to turn back. But let us shut out the desert and the jungle from our view, and turn to the nearest object. Let us clear away the suffocating undergrowth from about it, denude it of the tangled climbers that conceal its trunk, and the moss which covers its branches. Let us lop off the parasites that deform it, and the foreign branches, it may be, which some previous hand has engrafted, and thus isolated and reduced to its natural simplicity, let us choose it as the special object of our study and care. Life may be long enough to know this single individual; and if we each one effect so much, what is now an uncultivated wild, with scarcely one well-ordered patch to rest the eyes upon, will soon show signs of culture, and, with continued labour, become in future generations a fair garden—a health resort—where, with simple directions, we may send our patients to cull the good gifts which a beneficent hand has planted and purposed for the relief of 'the thousand ills that flesh is heir to.'"

"CURÆ POSTERIORES."

Galvanism—Its Early History. (See page 48.)

With regard to the discovery of Galvani, "which has immortalised his name and been pregnant with such important results in the improvement of science," it has been stated (see Hamilton's Hist. of Med. ii. 291) that his wife, to whom he was tenderly attached, being in a "declining state of health, was in the habit of taking a soup prepared from frogs as a restorative. Some of those which had been skinned and prepared for the service of the kitchen chanced to be placed upon a table in Galvani's laboratory while he was engaged in making some experiments with an electrical apparatus which stood upon the same table with the frogs, which lay at some little distance from the prime conductor. One of the company who was assisting Galvani in his experiments accidentally touching the nerve of the thigh of one of the frogs with the point of a knife, the muscles of the limbs became instantly and powerfully convulsed; and as Madame Galvani (who was present and much struck with the singularity of the phenomenon) imagined, at the instant of every spark passing from the conductor. Observing this to her husband, he determined to investigate the fact, and accordingly, on bringing the point of the scalpel, which he held in his hand, in contact with the crural nerves of one of the frogs, he found, as his wife had pointed out, that the muscular contractions were renewed as often as a spark was taken from the conductor. As this might have resulted simply from the irritation of the scalpel, and not from the disengagement of the spark, to satisfy himself on this point he touched the same nerves while the electrical machine continued in a state of quiescence without exciting the slightest commotion. Upon this foundation he constructed the theory of the science which, with the various modifications which the labour of succeeding experiments introduced, still remains a lasting and noble monument of his industry and his talents." *

Connected with the history of this discovery is the curious (?inexplicable) narrative by M. Cotugno, published in an Italian work, "Journal Encyclopédique de Boulogne," 1786, No. VIII., five years before Galvani's account of his own discoveries, of a medical student who, in dissecting a mouse and touching the intercostal nerve with his knife, was not a little surprised at experiencing an electrical sensation sufficiently painful to benumb his hand." Dr. Hamilton (loc. cit., p. 288) observes that this fact awakened the curiosity of M. Vassalli, of the Royal Academy of Turin, who made in consequence a series of experiments on the subject, the details of which appeared in 1789.

Respecting this alleged anticipation of Galvani by Cotugno, as his name is not mentioned in the article "Electricity" in the "Encyclopædia Britannica," in

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* How truly was his discovery, "The baby figure of the giant mass of things to come at large."—Tr. and Cress. i. 3.

which I expected some allusion to so interesting a fact, if true, I was anxious to gather further intelligence, and consequently applied to Dr. De Cuturi, Commissary of the United Royal Hospitals of Pisa, a colleague whom I knew to be well conversant with the history of science and medicine in Italy. He was able to confirm the truth of the statement alluded to, as well from a letter of Cotugno,* which some years ago he had by him, as from the letters of Vassalli on galvanism,† which he had read in former days in the University Library of Bologna. "Cotugno," Dr. Cuturi says, "while he was pursuing his practical studies in the great hospital, being alone in his chamber, had his attention distracted by a rat, which he succeeded in catching, with the further purpose of vivisecting it from scientific curiosity. Scarcely, however, had he reached with the point of his scalpel to the diaphragm, when the little animal gave him a blow with its tail on his left hand, which was at once benumbed, and he published the matter in a letter, 'On the Electricity of the Mouse.' Owing to this, Cotugno was considered by some persons to be the forerunner of Galvani in the discovery of animal electricity, and, among others, was so regarded by Vassalli, of Turin, in the letters referred to on galvanism. It is very probable," Dr. Cuturi continues, "that the article to which you have alluded, published in the "Giornale Enciclopedica" of Bologna in 1786, No. 8, is a communication from Vassalli himself, or a deduction from the letter of Cotugno. As to the time which intervened between Cotugno's accidental experiment, illustrated in his letter, and the discovery of Galvani, which took place in 1789, it seems to me that there must be a chronological mistake, and hence the reason. Cotugno was a contemporary of Galvani, for Galvani was born at Bologna, 1737, and Cotugno was born at Ruro, in the Neapolitan kingdom, in 1736. When Cotugno, from the fact of the rat, had an inkling of the existence of animal electricity, he could not have been more than twenty-three years of age, and therefore it must have been about the year 1759–60. And the discovery of Galvani being in the year 1789, we must infer that nearly thirty years elapsed, instead of five, between the studies of Cotugno and the discoveries of Galvani. Putting aside, however, the chronological differences, you may take it for certain that the observations of Cotugno on animal electricity preceded the discoveries of Galvani."

Dr. Cuturi refers to the commentary of Galvani's, "De viribus electricitatis in motu musculari," as containing valuable details on the subject.‡

While alluding to the application of Electricity§ in the hands of the surgeon (see

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* The first to describe the aqueducts of lymph in the ear. He was one of the lights of the Medical School at Naples.

† Anton Maria Vassalli, a learned naturalist, born 1761, Professor of Physics in University of Turin from the last portion of the eighteenth century till the year 1825, in which year he died (July 5th).

‡ A coin in honour of Galvani has on it a device thus described, "Genius cubo coronato insidens tabulæ in qua extremitas ranæ posterior expansa est arcum Galvanicum admovet," with an inscription, "Mors mihi vita," and "Spiritus intus alit."

In November, 1879, a colossal marble monument by the sculptor Cencetti, which had been erected at Bologna in honour of Luigi Galvani, was unveiled in the presence of the Minister of Public Instruction and a large assembly of people. The sculptor had chosen "that moment so important for science and humanity when the Bolognese physicist, by accidentally touching with two different metals the lumbar nerves of a vivisected frog, alighted on the law of animal electricity."[1] In the addresses pronounced the speakers enlarged with much facility and force on the legitimate nature of the means by which Galvani was able to confer such signal benefits on yet unborn generations of his species.

§ This agent is felicitously characterised by Faraday as "a universal spirit of nature;" it is veritably an "animus rerum prudens."

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[1] *Lancet*, 1879, II. p. 740.

page 48), I cannot refrain from here taking note of the use to him likely to accrue from the recently discovered method of storing electricity. Dr. George Buchanan, professor of clinical surgery in the University of Glasgow, described in the *British Medical Journal* the application of Faure's secondary or storage battery to the removal of a nævoïd tumour from the tongue. The growth was very vascular, and invaded the tongue almost to the middle line. The tumour was removed by a platinum wire heated to incandescence by the use of this electrical jar without the loss of a drop of blood. He spoke of its surgical application in very high terms, observing that this contrivance, which enables one to carry stores of powerful electricity in a jar no bigger than an ordinary preserved meat tin, will render the use of electricity in surgery much more extended than heretofore. Professor Buchanan spoke also at the same time of the surgical use of Swan's electric light, of which Sir William Thomson suggested to him the application, and which he put to practical use on that day in the wards with excellent effect, employing for the purpose a Swan's electric lamp. Even in a ward of the hospital, where the bright sun could not be effectually shut out, the translucency of the stricture which it was desired to test for the purpose of diagnosis was made apparent to every student.

A still more recent and memorable instance of the use of Electricity in the hands of the surgeon is indicated by the following telegraphic communication, which reached London during President Garfield's severe illness consequent upon the bullet wound which he received from Guiteau, 2nd July, 1881, and which led to consequences which proved fatal on the 19th September. I have transcribed it from one of the daily papers :—

"Paris, Thursday, August 4, 9.30 p.m.

"I have received the following communication from a correspondent, who very rightly thinks it may be of interest to those who are engaged in the question of applying electricity to medicine :—

"'The determination of the exact situation of the bullet in the body of President Garfield has an interest which not only is international, but which will also be historical, for it has now been proved to be possible to detect the exact position of a bullet in the human body without even touching the flesh. Professor Hughes, who is now occupied as one of our English commissioners at the Electrical Exhibition at Paris, has for many years been engaged in examining a special property of electricity. Without going very minutely into the theory of the instrument which he has invented, and which is called an induction balance, it may be stated that he has discovered a means of detecting the presence in the neighbourhood of his small instrument of any mass of metal, and of estimating its direction with respect to the instrument."

On the 16th July in the present year the following telegram was received by Mr. Preece, of the Telegraph Office in London, from Mr. Graham Bell, at New York, whose invention of the telephone was really a primary step towards Professor Hughes's invention :—"Can Hughes suggest form of induction balance to locate leaden bullet in President? If so, cable at my expense.—GRAHAM BELL." Mr. Preece immediatly corresponded with Professor Hughes, and the latter gentleman, after a few experiments, replied on the same day to explain in what way his instrument must be modified to do what was required. The result of this correspondence was that Mr. Graham Bell applied the instrument to the President's body at different parts, and so he found different lines of directions, which must all pass through the bullet. The intersection of these must, of course, show the exact point where the bullet is situated.'"

The following notice of Professor A. Graham Bell's bullet-finder is extracted from the *Lancet*, vol. ii., 1881, p. 846 :—

"Professor A. Graham Bell has exhibited to the Académie des Sciences at Paris the instrument which was devised to discover the position of the bullet in the body of the late President Garfield, and which, although in that case unsuccessful, seems to promise to be occasionally of service. It is a modification of Hughes's inductive balance, and consists essentially of two flat coils parallel and partially superposed, so that the extremity of one corresponds nearly to the axis of the other. One is made of large wire, and constitutes the primary coil; the other, of fine wire, is the

secondary coil. Both coils are embedded in a mass of paraffin, and placed in the centre of a wooden planchette furnished with a handle. The vibratory currents derived from a voltaic pile traverses the primary coil, while the circuit of the second compasses an ordinary telephone. In these conditions no sound can be perceived through the telephone; but if any metallic body is brought near the overlapping part of the coils a sound is heard, the intensity of which depends on the nature and shape of the metallic body, and on its distance from the coil. The most favourable shape is a flat disc parallel to the surface of the skin, the least favourable is a disc placed perpendicularly to the skin. Since there are practical difficulties in arranging the amount of superposition of the coils which is most advantageous, it is convenient to intercalate in the primary and secondary circuits respectively two additional coils analogous to the first, but much smaller in size, the common surface of which can be readily arranged, and in this way the telephone can be quickly reduced to perfect silence. If it is desired to determine the depth at which the metallic body lies, this can readily be done, provided its form is known. The apparatus, being applied to the skin, is regulated until no sound is heard; then, removing the apparatus, it is brought near to a body similar to that searched for, and the distance from this at which no sound can be heard indicates the distance from the surface occupied by the other object. On October 7th an experiment was made in the presence of Dr. Hamilton and others on the person of a Colonel Clayton, who was wounded in 1862. The ball had moved the articulation of the left clavicle. It was supposed to be lodged under the scapula, but by the new apparatus the ball was readily found to be in front of and below the third rib."

The author has an article, with illustrative drawings, entitled "Probing by Electricity" in *Nature*, Nov. 10, 1881, p. 40, preliminary to a paper giving a complete account of his researches.

"Blood-Drinking" (see page 106).

The drinking of blood has apparently been resorted to both as a poison and as an article of food or medicine, and symbolically, as a part of religious ceremonies.

Many of the ancients looked upon it when used in a large quantity as a poison. Thus Herodotus says (see iii. 15) that bulls' blood was believed by the Greeks to be poisonous, and that Cambyses compelled Psammenius to drink it, which presently caused his death; and Professor Rawlinson, in his note to this passage, mentions the statement by Eusebius and Strabo, that Midas, King of Phrygia, died from drinking blood. He states that Smerdis did the same. In his notes to Chapter X. of the "Persicorum Excerpta" among the fragmentary works of Ctesias, in which Tanyoxarces, the brother of Cambyses, is described as being killed in the same way, Baehr alludes to Dioscorides, Nicander, and others, as describing the poisonous action of blood;* and points out that Aristotle in his Hist. Anim. iii., 6, 19, and de Part ii. 4, remarks upon it.

Dioscorides has a chapter (pointed out to me by Dr. Aquilla Smith) on bull's blood, in which he describes the effects of drinking blood. (See the translation in the Commentary on his works by Matthiolus. Folio, Venetiis, 1565, p. 1424.) "Tauri recens jugulati sanguis epotus, spirandi difficultatem, strangulatumque concitat: faucium, tonsillarumque meatus cum nervorum distentione præcludit: lingua rubescit: dentes inficiuntur, et quædam concreti sanguinis vestigia, inter eorum commissuras restant."†

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* Baehr cites Helferich, of Heidelberg, as an authority of the subject, but I have been unable to meet with the writings of this author, and my friend Professor Kuhne, of that university, has been unable to help me. Baehr quotes a passage from Pausanias in which, at a certain temple, the purity of the priestesses is tested by the administration to them of blood as a drink.

† Pliny (Lib. 28, c. 9) also mentions the case of Drusus, a Roman Tribune, who drank goat's blood to make himself look pale.

Pliny (?) speaks of warm blood being mortal if drunk, and agrees with other writers in attributing the effect to its rapid coagulation. He has the following remark, when writing "De medicinis ex animalibus" (see Lib. xxviii., cap. 1): "Sanguinem quoque gladiatorum bibunt, ut viventibus poculis, comitiales morbi: quod spectare facientes in eadem harena feras quoque horror est."

He denounces such remedies, and adds: "Procul à nobis nostrisque literis absint ista."

Celsus wrote as follows :—

"De comitialis morbi curationibus" "Quidam jugulati gladiatoris calido sanguine epoto tali morbo se liberaverunt. Apud quos miserum auxilium tolerabile miserius malum fecit."—Lib. iii., cap. xxiii.

The use of human blood, even that of a dead man, as a remedy is of considerable antiquity. Aretæus alludes to it in Book I. of his "Cure of Chronic Diseases" (Syd. Soc. Trs.). He remarks, when speaking of epilepsy, "It is told that the brain of a vulture, and the heart of a cormorant and the domestic weasel, when eaten, remove the disease; but I have never tried these things. However, I have seen persons holding a cup below the wound of a man recently slaughtered, and drinking a draught of the blood! O the present, the mighty necessity, which compels one to remedy the evil by such a wicked abomination. . . . There is another story of the liver of a man having been eaten." *

Plutarch, when referring to the death of Themistocles at Magnesia, describes him, after having sacrificed to the gods and taken leave of his friends, as drinking warm bulls' blood, and thus ending his days. And in the "Knights of Aristophanes," when the citizen Demus asks his slave Nicias the best way to die as most profits brave men, the latter answers, "Nought better than a draught of bul-

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* I may here allude, in digression, to the practice which has obtained of using *baths of blood* as a restorative means. Carlyle makes mention of this in his chapter headed "Realised Ideals," of Book I. of his French Revolution, devoted to the death of Louis XV. He therein quotes Lacratelle, who, when referring to the clearing of Paris by the police, and to their carrying off children in hopes of extorting ransom, on one occasion, observes that "an absurd and horrid fable arose among the people; it is said that the doctors have ordered a great person to take baths of young human blood for the restoration of his own, all spoiled by debaucheries."

Mr. Soane, in his "New Curiosities of Literature," 1849, vol. i. p. 72, refers to the use of blood baths in the early and middle ages. He remarks that during the time of the great leprosy (for the relief of which disease blood was supposed to be eminently efficacious) the belief in the use of blood must have been the cause of great cruelty to children and maidens;[1] and he quotes the old German ballad, "Armer Heinrich," which was the basis of Longfellow's "Golden Legend," and alludes to the story of Amicus and Amelius, which is of the same kind. He says that Klinger has employed the blood bath to heighten the horrors of "Faust."

In connection with the above, a writer in *Notes and Queries*, Feb. 28, 1857, p. 162, refers to French romances in the thirteenth century, and to Eastern stories containing allusions to the use of human blood.

In Hulme's translation of Moquin-Tandon's "Elements of Medical Zoology," it is stated that the blood of a man who had been beheaded, drank while it was still warm, was used by the ancients; that at Rome the warm blood of the gladiators was ordered in various diseases, and that in Egypt kings attacked with elephantiasis were ordered baths of blood.

Pliny, in his description of Elephantiasis (see H. N., Lib. 28, c. v.), writes as

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[1] Bacon, in his Hist. V. et M., when treating of the "Malacissation" of the body, alludes to the ancient belief in the blood of infants as a cure for Leprosy. He terms those "bloody baths and unctions," "sluttish and odious." He prefers baths made of nutritive substances like to the body of man, as flesh of animals, milk, eggs, oysters, wine, &c.

lock's blood. It was the dose that gave Themistocles a grave."* Plutarch also, in his Life of T. Q. Flaminius, alludes to the death of Hannibal (when he hid himself in subterranean passages in Bithynea, "tamed by his misfortunes like a bird that through age had lost its tail and feathers") as being, like the death of Midas, attributed by some authorities to the swallowing of bulls' blood.†

In an edition with notes of a work by Scribonius Largus (1529), "De Compositione Medicamentorum," published by J. Rhodius at Pavia in 1655, I find several allusions (see pp. 24, 25) to the use of blood in epilepsy, with directions as to its use; and allusion to the drinking by people of blood from their own veins, or drinking of blood from the skull of a dead man. At p. 107 are directions for counteracting the poisonous effects of drinking bull's blood, which causes nausea and suffocation when it coagulates. We have also references to mention of the drinking of blood by Aretæus, Celsus, Galen, Dioscorides, Cœl. Aurelianus, Nicander, &c. (see Notes, p. 282), and to the agreement in opinion that it is from the coagulation that blood-drinking proves poisonous.

Moquin-Tandon, in his "Elements of Medical Zoology" (referred to at pp. 190, 204, &c.), says that by certain ancient therapeutists the drinking of kid's blood mixed with vinegar was recommended in cases of hæmoptysis.

The following quotations and references illustrate the use of blood as a remedy or as a food.

Some historians state that Louis IX. of France, who had been subject to epileptic and apoplectic seizures, had the warm blood of infants given to him to drink in his last illness, 1483 (see Henault).‡

In Shakespeare we have many allusions to the drinking of blood and eating of human flesh, many of course quite figurative, but showing forth the idea of nourishment being derived from blood.§

In recent times, as recorded in the notes to Southey's Madoc (p. 428), and perhaps in the present day, in Florida, when a sick man was bled, women suckling a man child were in the habit of drinking the blood, to give, through the milk, strength to the child; and pregnant women drank it for the same reason. It is

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follows: "Ægypti peculiare malum; et quum in reges incidisset, populis funebre. Quippe in balneis solia temperebantur humana sanguine ad medicinam."

In comparatively recent years people used to go (and perhaps still go) to the abattoirs of Paris and have local baths of hot blood for the cure of injured and diseased limbs.

* See Mitchell's Trans.

† In Liddell and Scott's Greek Lexicon we have allusion to several Greek authors who describe articles of food in which blood enters as an ingredient. Thus *αἱμᾶτια* is a Spartan black broth made with blood (Manso Sparta, i. 2, p. 192), *χορδή* is a black pudding made with blood (Sophil. Phyl. 2), *αἱμοποσία* is a "drinking of blood" (Porphyr.), *αἱματοπώτης* a blood-drinker (Ar. Eq. 198), *αἱματορρόφος* blood-drinking (Aesch. and Soph.), *αἱμοβαφής* is bathing in blood (Soph. Aj. 219).

‡ Quoted in Haydn's Dict. of Dates; see art. "Blood" and "Blood-drinking.'

I find that Comines, the French historian, on whose writings Walter Scott's account of Louis and his physicians in his "Quentin Durward" was founded, speaks of the king as subject to "fits," followed by loss of speech and intelligence. He describes his drinking the "aurum potabile," and sending to the Abbot of S. Remy at Rheims for a little drop of the oil from the sacred ampulla. The vial was apparently brought to him when ill, and a second time when dying.

§ Thus, in 1 Henry II. v. 3, "I was wont to feed you with my blood; I'll lop a member off and give it." In Hamlet, iii. 2, "Now I could drink hot blood." In Richard III. v. 2, to "Swill your warm blood like wash." In 2 Henry IV. iv. 5, "Which never quaffed the blood." In 2 Henry VI. iv. 1, "Overgorged with gobbets of thy mother's bloody heart." In the same, "Drones suck not eagles' blood but beehives." In Titus Andronicus, iii. 1, "To drink my dear sire's blood."

recorded also that girls were fed with children's flesh, so as to be the sooner marriageable. It is said that Spaniards use blood as a remedy for consumption.

This idea of the specially nutritive nature of blood which has obtained, is only in accordance with the more ancient view that the blood was sacred as containing "the Life," which view was the Scriptural reason for the prohibition against its being used as food—a prohibition issued as well to Noah as to the Jews, in the books of Leviticus, Deuteronomy, Samuel, and Exodus, and by the Apostles to the Gentiles, in the Acts ; and comprehending also prohibition from feeding on animals dying of natural death or torn by beasts.

In the *Medical Times and Gazette* for Sept. 19, 1862, p. 353, is a letter from "Senex," recommending from personal experience the use of blood in dishes and soups, &c., in health and in convalescence. The author makes various needful suggestions as to the manner of its use, and cautions people against the "black puddings" of the meat shops in London as being most unwholesome.

Also, in the number of the same journal for April 13, 1867, p. 407, is a letter from S. Wrag, Esq., M.D., who recommends the use of blood, and indicates the ways of cooking it. A butcher had told him that from each ox of fair size and condition he gets from two to three gallons of blood, from a calf about a gallon, from a sheep about half a gallon ; and deplores the quantity of blood lost in the kingdom.

Hugh Miller, in his "Schools and Schoolmasters," p. 104, has written,* "On more than one occasion I shared in a not unpalatable sort of blood pudding, enriched with butter, and well seasoned with pepper and salt, the main ingredient of which was derived through a judicious use of the lancet from the geld cattle of the farm. The practice was an ancient and by no means unphilosophic one," &c.

Again, the *Medical Times* for June 22, 1872 (p. 720), contains a quotation from a paper by Boussingault before the Academy of Sciences, in which he expresses his surprise that blood, containing as it does all the constituents of a perfect animal, and so large a quantity of iron, is not more generally employed as food, especially now that meat is becoming so dear in price. The rivers of blood daily spilt on the ground might be utilised. Allusion is made to the pig's blood used in sausages, and to the custom of the natives in the steppes of South America using the blood of animals coagulated and seasoned. The author shows that colourless blood, even that of the snail, contained as much iron as that of the ox or calf.

In answer to an inquiry whether, on physiological grounds, blood should be used as food, it is stated in a note in the *Lancet* (March, 1868, p. 397) that the presence of urea, creatine, and other effete and more or less injurious substances, resulting from the disintegration of tissues, and destined to be cast out of the system, renders the matter doubtful.

An American publication, quoted in the number for Sept. 2, 1876, of the *Lancet*, states that blood is becoming the fashionable beverage in Cincinnati, being a great remedial draught for invalids with anæmia and general "run-down." A place is described in Cincinnati "where between 2 and 4 o'clock in the afternoon ladies congregate to drink blood fresh from the slitten throats of bullocks." Mention is made of another place where people daily drink the life-blood of steers.

Dr. Lombard informs me that he understands that in New York people are in the habit of drinking fresh warm blood as a restorative.

In 1859 a pamphlet was published by Dr. Steinroth called "De la chair coulante et de son exploitation rationelle." Considering the dearness of meat, he suggests that we should take from animals their blood, in the same way as we take their milk, and sell it in blood-daries, bleeding oxen, pigs, or sheep once a week. This

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* Quoted by Dr. Wray in the *Med. T. and Gaz.*, April 20, 1867, p. 433, in a letter on Blood as Food. This recommendation of the Puritan Scotchman was strongly protested against by "John Bull, M.D.," in the same journal for April 27.

would not injure the animal or hurt the meat. He states that in Sweden blood is used in the making of biscuits, and in Ireland, as also in Africa, the people often bleed cows and oxen for the blood, to be used as food.

In the *British Medical Journal* for May 5, 1866, p. 463, is a communication by Dr. G. De Pascale, of Nice, regarding the use of blood as a curative and restorative agent. He alludes to the suggestions of Desmartis, of Bordeaux, that warm blood should be used by phthisical patients, rests the claims of blood as a medicine upon the amount of iron it contains, and reports the progress which he himself made under the treatment by the drinking of blood as a "restorative beverage, not worse than milk from the cow," when ill from the effects of marsh fever.

In the same journal, August 4, 1866, is a notice of the recommendation by Dr. Tanturi of the blood of animals, now wasted, as a nutritive material; and in the number for December 8th, in a notice by M. Borth (*apropos* of a discussion on the ingestion of blood, at the Société d'Emulation) of a cachectic woman who received great benefit from a draught of fresh blood every morning.

The following quotation, pointed out to me by Dr. Walter G. Smith, Professor of Materia Medica, School of Physic, T.C.D., will show that in Germany blood is looked upon by some as a pharmaceutical agent. It is from T. Husemann's "Handbuch der gesammten Arzneimittellehre" (Berlin, 1874-75, Band II., p. 757), under the heading "Plastica:" "Von der immer mehr Bedeutung für die Therapie gewinnenden Transfusion abgesehen, nimmt das Blut als Medicament eine ziemlich untergeordnete Bedeutung ein, was sich zum Theil wohl daraus erklärt, dass grössere Mengen von Blut innerlich eingeführt in den meisten Fällen nur ungern und mit Widerwillen von Kranken genommen werden. Dass das Blut unserer verschiedenen Hausthiere (Säugethiere, Vögel) einen nicht unbedeutenden Nährwerth besitzt, bedarf keiner Erwähnung, und die Versuche, dasselbe aus Schlachthäusern als Nahrungsmittel in Form von Suppen (*Glück*) für die ärmere Bevölkerung zu benutzen, verdienen gewiss Aufmunterung. In wie weit das Blut bei Erschöpften, Chlorotischen, Blutarmen besser wirkt als Fleischpräparate, Milch und Eisen, ist jedoch nicht abzusehen. Man hat aus Blut verschiedene Präparate hergestellt, unter denen das im Wasserbade verdampfte Ochsenblut als *Extractum sanguinis bovini*, welches bei Rachitis, Scrophulose und Atrophie im kindlichen Lebensalter zu ½—4 Gm. 3—4 mal täglich in Pulverform verordnet wird (*Mauthner*), am meisten Bedeutung gewonnen hat; doch löst sich das Präparat schlecht in künstlichem Magensafte und kann selbst zu Digestionsstörungen führen. Aehnlich sind die aus Hammelblut mit Zusatz von phosphorsaurem Natron dargestellten *Capsules hématiques von Foy*. *Tabourin* hat neuerdings sein durch Digestion des ausgepressten Blutkuchens mit angesäuertem Alkohol, Ausfällen mit Alkali und Reinigen erhaltenes *Hæmatosin* als leicht verdauliches Eisenpräparat bei Chlorose und Anämie empfohlen. Ueber die Verirrungen der Volksmedicin, welche das frische Blut Hingerichteter gegen Epilepsie und das Menstrualblut junger Mädchen gegen Warzen empfahl, haben wir Grund, den Mantel der Barmherzigkeit zu hüllen."

Dr. Seiler, of Dresden, informs me that he has heard of blood being used in a superstitious way by people suffering from nervous attacks in Germany; the blood of pregnant asses and of men who have been guillotined.

My friend Mr. Stradling, late surgeon to the royal mail steamship "Elbe," well known as the author of interesting investigations on the antidotes of snake poison, has written to me as follows. He observes: "I am sorry to say I do not know anything personally about blood-drinking. I remember that about twelve or fifteen years ago it became a fashionable remedy in Paris, in lieu of cod-liver oil, milk, &c., with the phthisical, and that scores of carriages were to be seen every morning outside the abattoirs with the patients—mostly ladies—waiting for their glass of hot fluid blood. But I don't think the craze prevailed long. In Peru and Chili (and no doubt elsewhere) the native physicians prescribe 'dulce de sangre'—fresh blood mixed with sugar or guava paste—for cachectic children, as an equivalent, I suppose, for our raw meat soup or scraped extract; but they seem to prefer for the purpose that which contains most

osmazome—deer, pheasants, &c.—not beef and mutton. In my own very small experience I have found that raw pulp answers excellently, mixed with chocolate, for scrofulous children. Greenlanders drink the blood of the whale and walrus, and sailors in the whale fisheries are said to do the same; I know they drink whale milk when they catch a cow suckling her calf. There are some people on the shores of the White Sea, wandering tribes of savages, who are the only idolaters in Europe. They do something notable in the way of blood-drinking, but I cannot call to mind what it is—some religious rite, I fancy. I have seen the Portuguese emigrants on board ship catch the blood when the butcher was killing poultry, and eat it thickened with fariña and a sauce called ticupi, common in Brazil; but a Portuguese will eat anything, and I do not think the practice is general. So I have heard that the Indians in Columbia mix the blood of turkeys in making a saucochio—a mess of jerked beef, turkey or fowl, plantain, rice, yam, and sweet potatoes, all boiled together; but I never saw it done, and I question whether the Gauchos farther south really put sheep's blood, as is said, into a similar dish which is standard with them, called puchero. I once saw an Indian woman up Orizaba spreading very red tortillas for baking, and found the colour to be due to the blood of a fowl she was broiling; but I imagined that, even with her, it was an exceptional thing to do.

"Talking of tortillas, have you any belief in the virtues of the manioca? Might it not be as good as gluten bread in diabetes? My friend Dr. Wiblin in Southampton used to be enthusiastic on the point, and I got him the cakes from Jacmel, ready-baked. If you like to try it, I can get you, without any difficulty, a supply of the tortillas (unsanguinated), but of course they are not so nice as when they come smoking hot from the stove; or I can send you some of the fariña (cassavameal) now.

"There are numbers of superstitions about drops of this or that blood as cures for so and so, but I think they belong to the days of witchcraft. Hindoos abhor blood, and Chinese consider the display of red raw meat in our butchers' shops as 'indelicate.' The Tierra del Fuegans sometimes drink a man's blood, but only, I believe, as a general preliminary to eating the rest of him—or used to do so, before Bishop Stirling brought them up in batches to Keppel and taught them better manners. Defoe relates a nasty circumstance of a young woman in an abandoned ship with nothing to eat, who found a basin into which somebody's nose had been bleeding, swallowed the contents, and 'thought them so nice that she wondered nobody had ever tried it before!' Here in Devonshire they put bullock's blood into the cider to 'fine' it; the clot catches the impurities held in suspension, I suppose, and sinks with them to the bottom.

"A friend of mine will not eat guinea-fowl because they are strangled, not bled to death; and was going to discharge a servant for eating 'black puddings,' a kind of large sausage made of pig's or goose blood and groats.* This prejudice, founded on the old Levitical maxim, 'For the blood is the life,' is a tolerably widespread one even now; and I believe is upheld while the rest of the Jewish dietetic code is allowed to drop, because it is reiterated in one of the epistles as a prohibition. Birds and other animals that are shot do not bleed much, and fishes—red-blooded, like the rest of the vertebrates—are not bled at all. I suppose the colourless juices of articulata and mollusks 'don't count.'† Down in the Falkland Isles, where all the people are very Scotch, this same objection is prevalent with regard to the ordinary mutton there, all the sheep being killed in a sitting

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* In many Lexicons "Apexăbo" is described as a kind of sausage or pudding made at times with goat's blood, probably so called from its shape (simile apici capitis).

† It is stated in "Kitto's Cyclopædia of Biblical Literature," vol. i. p. 372, as cited from Michaelis, that the blood of *fishes* was not interdicted in the Old Testament, inasmuch as they could not be offered by the Jews in sacrifice, as were cattle and birds. Fishes were, however, offered by the heathen (see App. to Rawlinson's Herod. III.). Lane, in his "Modern Egypt," 1849, states that the Copts still abstain from blood according to the Apostolical injunction, and that the Moslems are prohibited its use.

posture, so that the fleece may not be soiled by the blood. It can make very little difference, as they must bleed to death internally. By the way, all this tinned meat, or nearly all of it, must have the blood in it, as the animals in the saladeros and factories are invariably pithed. When I visited Liebig's in Fray-bentos they were killing over a thousand head of cattle per diem, *one man* being the actual executioner of the lot. In the River Plate, when an estanciero wishes to entertain you most hospitably, he kills a cow in calf and treats you to unborn veal as the greatest possible luxury; and that is certainly never bled. And 'carne con cuero' means a steak dug quivering out of a bull the instant it is pithed, with about two feet square of the surrounding skin attached to it. In this it is wrapped, blood and all, and cooked in the embers—most delicious.

"It is a very curious thing that carnivorous animals will not drink blood if they can get the meat, or even have the prospect of getting any. I have repeatedly proved this on board ship with such purely carnivorous creatures as foxes, wolves, ocelots, pumas, and various Mustelidæ and Viverridæ. They might lick off a stain of blood, but when they have been chained within sight or smell of a just-killed sheep or bullock, they have been frantic in their efforts to get at it, while letting a red rivulet wash their very paws as it ran down the scupper disregarded. A hungry snake shows no emotion at fresh blood, even when flickering its tongue into it, whereas it becomes greatly excited over a feather or bit of fur.

"What is it that prevents blood from being universally used as nutriment? I should imagine that it would be wholly capable of absorption, would it not? One would think that such a perfect liquid extract of all the tissues, absolutely ready for use, would have been the very first thing ever seized upon. Yet hunters, trappers, and others travellers, to whom food in the most condensed form is often the highest desideratum, have made no use of it; and people who have been driven to cannibalism in shipwreck speak of very little relief or sustaining power derived from sucking blood from the veins beyond a mere mechanical alleviation of thirst. Among all nations there seems to be an instinctive tendency to drain the meat of what must be, I should fancy, its most nutritious element, before consuming it.

"Talking of sucking blood, have you ever seen mosquitoes fill themselves until they are too heavy to fly? I have. And do you believe in vampire bats inducing local anæsthesia for their puncture by fanning (as perhaps the mosquito does), and then causing actual death by hæmorrhage? I never saw a case, but I have heard such reported with a correctness of detail that gave an air of great probability to them."*

Du Chaillu (in "The Land of the Midnight Sun," 8vo, 1881), who was present at the killing of a reindeer, says: "The blood was removed from the cavity of the chest, where it had accumulated, and put into a bladder. The Laplanders are very fond of dried powdered blood, which is cooked in a kind of porridge mixed with flour, or diluted with warm water and made into a pancake."—Vol. ii. pp. 80–81.

It is stated that Saul's army was in the habit of cutting out slices from live animals, as is proved by verse 32 in ch. 14 of the 1st of Samuel, but of this statement I fail to see the force. And the traveller Bruce states that the Abyssinians use the practice.

Marco Polo, when writing concerning the Tartar customs of war, speaks of the hardy troops wont to ride ten days on end without lighting a fire or taking a meal, but sustaining themselves on the blood of their horses, opening a vein and letting the blood jet out into their mouths, drinking till they have had enough, and then

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* The old belief as to the "kind, life-rendering" pelican, as Shakespeare has it, repasting its young with its own blood is, of course, a fable, which arose from the mother turning the fish out of its pouch into the mouths of the young, and in so doing pressing the bill against the breast, so that its scarlet tip looks like a blood-spot against the white feathers. See Wood's Natural History, in which work also see a description of the vampire bat feeding on the exposed limbs of man and beast, with accounts thereof from Darwin and Waterton.

staunching it. They also carry dried milk.* In the notes on the above description by Colonel Yule (see his Trans., 1875, vol. i. 256—7), he cites Dionysius, who mentions the Massagetæ as feasting on horses' blood mingled with white milk, and the following quotation from Sidonius—

"Solitosque cruentum
Lac potare Getas, et pocula tingere venis."

Yule adduces other accounts, as by Schiltberger and Botero (some of which are denied by others, as by Bergmann and Conolly), of sucking blood from horses' veins when travelling.

He mentions a report of the Mongols as eating all kinds of flesh, clean or unclean, and of opening a horse's vein and drinking the blood.†

Humboldt, in his "Aspects of Nature," 1849 (Mrs. Sabine's Trans. I. 166), writing of the steppes and deserts, says that to the original inhabitants of the new continent, as to those of China and Cochin-China, the care of animals yielding milk was unknown, but the natives drank the fresh blood, not the milk of their cattle.‡

Prescott, in his "Conquest of Mexico," alludes, I believe, to the drinking of blood.

Sir H. Halford, in his Essay on the Deaths of Illustrious Persons of Antiquity, already cited, states that a friend told him that, when present at a bull fight in Madrid, he saw a man rush from the crowd, catch the blood from the stricken animal, and drink; the blood of an animal just slain being a popular remedy for consumption.

It is stated in the very interesting account of Jerome Cardan's treatment of the Scottish Archbishop Hamilton, related in that most curious volume, the "Life of Jerome Cardan," that this physician had had personal experience of the efficacy of the water distilled from the blood of a full-grown pig and coltsfoot leaves. Two ounces of this distilled water a day, taken with a little sugar for about fifteen days, would fatten a man rapidly, and be found able sometimes to bring back a hectic person from the gates of death.

The following quotation from "Fynes Moryson's Itinerary" (folio, London, 1617, Part iii. Book 3, Chap. 5, p. 163) has been sent to me by Dr. Aquilla Smith :—

"They (wilde Irish) feede most on white meates, and esteeme for a great daintie sower curds, vulgarly called by them *Bonaclabbe*. And for this cause they watchfully keepe their cowes, and fight for them as for religion and life, and when they are almost starved, yet they will not kill a cow, except it bee old, and yeeld no milke. Yet will they upon hunger in time of warre open a vaine of the cow, and drinke the bloud, but in no case kill or much weaken it. A man would thinke these men to bee Scythians, who let their horses' bloud under the eares, and for

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* The mode of drying and preparing the milk is given ; ? a wrinkle to our Swiss friends !

† In Mr. C. Darwin's "Narrative of the Adventures of the Beagle" (1839) (vol. iii. p. 118), when describing Bahia Blanca, he speaks of a number of wild and savage Patagonian Indians drinking spirits to intoxication, and swallowing the steaming blood of the cattle slaughtered for their suppers, and then, being sick from drunkenness, casting it up again, and being covered with filth and gore.

Mr. Darwin quotes the following lines from the Æneid III. v. 630, &c. :—

"Nam simul expletus dapibus, vinoque sepultus
Cervicem inflexam posuit, jacuitque per antrum
Immensus, saniem eructans ac frustra cruento
Per somnum commixta mero ;"

Mr. Darwin informs me that in the "Voyage of the Vega" there is also mention of the habit of drinking blood on the coast of Siberia.

‡ The use of milk and cheese, like the cultivation of farinaceous grasses, has remained a distinguishing characteristic of the natives of the Old World.

nourishment drinke their bloud, and indeed (as I have formerly said) some of the Irish are of the race of Scythians, comming into *Spaine*, and from thence into Ireland."

I may here quote the case of the young savage girl of Champagne who was caught near Chalons-sur-Marne towards the end of 1731, having lived for some time in the woods, recorded by M. Racine. She swallowed liquids like a horse, and could imitate the voices of certain quadrupeds and birds, and eat birds and other creatures raw. She was wont, after hunting down hares, to *open a vein with one of her nails and drink the blood*, throwing the rest away. The narrative of this girl's case is most remarkably interesting.*

When the Templars were executed in France in 1310 on a large scale, one of the sins alleged against them was the roasting of a man and drinking his blood.

Blood has been thought very beneficial as an *outward application*. Thus it is stated that in certain parts of Ireland the blood from the cat's ear is a certain cure for erysipelas. Lane says that in Egypt the blood of the bat is supposed, when applied to those parts of the skin of a newly born female child where it is wished no hair shall appear, to arrest its growth (vol. i. 58). (See *Med. Times and Gaz.*, Oct. 15, 1859, p. 383.)

Regarding the drinking of blood as part of a *religious ceremony*, it is stated in Kitto's Cyclop. of Bibl. Lit., vol. i. p. 372, that mention is made of the Jews having a rite of feasting over the blood of the victim, and that Pagans, including Phœnicians, drank blood mixed with wine as a rite of idolatrous worship. He points out that this custom is alluded to in the 16th Psalm, v. 4, as indicated by Michaelis. In Cook's Commentary on the Bible, in allusion to this verse, it is said that frequent mention is made among the heathen of mixing wine with blood in libations; and that there is notice of Egyptian monuments showing the priest piercing the head of a kneeling figure, whose blood spurts out as a libation.

Mr. R. Stuart Poole tells me, *apropos* of this remark, that the Egyptians do not seem to have offered libations of blood. The word "blood," so far as he knows, never occurs in the list of liquids offered. In the case of the sepulchral acrifices there is a long list of liquids—wine, beer, milk, and so forth, among "everything in which a god lives," but blood never. He observes that "in Egyptian representations such subjects as that alluded to above in the commentary belong to the pictures of the punishments of the lost rather than to the sculptures representing the subjugation of foreign nations by the typical slaughter of their chiefs before the gods." "Libations in Egypt are always poured from vessels."†

The 13th verse of the 50th Psalm may be also quoted: "Numquid manducabo carnes taurorum? aut sanguinem hircorum potabo?"

I may quote from the description of a "bear festival" among the Ainos by Dr. Scheube of Kioto. He witnessed the veneration of the animal, owing to its good services to mankind, and by the subsequent sacrifice at which the liver and other parts were eaten, and the blood collected and drunk by the men.‡

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* See Moquin-Tandon (*op. cit.*), p. 21.

† The reader will perhaps remember the striking passage in the Odyssey (Book XI.) describing the offering and libations by the "much-contriving" Ulysses of the black blood of sheep to the souls of the perished dead for their drinking. Tiresias, the Theban prophet, points out to Ulysses that the tasting of the purple blood by the souls of the departed gave to them the power of telling the truth.

‡ The writing and signing with one's own blood is often used as a symbolical expression of feeling akin to the above. There is a scene in Mr. Hope's "Anastasius" in which the dagger is converted into a pen, the contract at Chios being signed "with the purple of my own blood." Shakespeare, again, gives illustration of this. In Henry VI., Part 3, v. 1, King Edward exclaims, "This hand," &c., "shall, whiles the head is warm, and new cut off, write in the dust this sentence with thy blood," &c.

To add blood in the composition of building-mortar seems to have been an old

An instance of the superstitious use of blood is given in the case of Macbeth's witches, when the baboon's and sow's blood enter into the composition of the cauldron. Among the notes to Macbeth in Malone's edition of Shakespeare is part of an old play in which Heccat speaks of giving to the raven and screitch-owle "barley soaked in infants' blood; they shall have semina cum sanguine." The "blood of a flitter-mouse" is also mixed with "magicall herbes."

On this subject Professor Rawlinson has pointed out to me that drinking the Blood of Friends was a common practice, and was regarded as producing consanguinity (Herod. i. 74; iii. 8; iv. 70; Lucian. Toxaris. 37; Pomp. Mel. ii. 1). He observes that drinking the Blood of Enemies existed (Herod. iv. 64), but was not common.

It appears that by some scientific agriculturists many prevalent diseases of cattle are attributed to the use of blood as a manure, especially contagious abortion among cows.

Painters and dyers use blood largely in the composition of certain colours. I am told by Dr. Stradling that romantic stories have been afloat as to disease arising in consequence.

Shakespeare makes Othello to describe the Egyptian handkerchief as "died in mummy." Steevens, in a note on this, speaks of the anciently-believed anti-epileptic properties of the balsamick liquor from the mummy, and quotes certain lines written in 1633 showing the then popular view of its virtues and uses. He observes that in his own time (ob. 1800) mummy (the word is said to be derived from "mum," wax) was sold in the druggists' shops,* and that it was still much coveted by painters as a warm, transparent, brown pigment.†

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custom. It was a belief in former times that the monk Guldulf, in constructing the "White Tower" of London, mixed the blood of animals with the cement. It is supposed that he gave the red colour by admixing the pounded tiles and bricks of ancient Roman structures. Shakespeare has a line bearing on the subject in Henry VI., Part 3, v. 1, "Who gave his blood to lime the stones together." In Titus Andronicus v. 2 we have mention of making a paste with blood and dust of bones for a coffin (*i.e.*, pie-crust).

* The sale of mummy and other colours by apothecaries is illustrated by what we know of the connection between the practice of medicine and the art of painting. This connection was commented on at length by Sir C. Eastlake, in the Introduction to his "History of Oil Painting." He points out that chemistry was the professed auxiliary of painting and medicine from the thirteenth to the seventeenth century, and that colours, when not furnished by monks, were provided by apothecaries. He remarks that "the most valuable treatises on the merely technical department of the art of painting were composed by physicians; and the alliance between medicine and painting was represented at different times by the friendship of Lionardo Da Vinci and Marc Antonio della Torre, Corregio and Giambattista Lombardi, Vandyke and Theodore De Mayerne."

Eastlake quotes at length from the MSS. of Dr. Mayerne on colours.

† At the present time the painter uses a pigment sold under the name of "*mummy;*" on the use of which as a pigment see "Field's Chromatography," edited by F. Salter.

Mr. F. R. Pickersgill, keeper of the Royal Academy, has told me that in 1851 he was able to buy at Venice a colour made from real mummy mixed with oil, sold to painters.

Mr. Church, Professor of Chemistry at the Royal Academy, informs me that mummy is named by C. Van Mander, painter, biographer, and poet, whose poem was published at least as early as 1604.

Sir C. Eastlake, in his "Materials for a History of Oil Pa.nting" (vol. i. p. 465), refers to a Dutch work ("Secreet Boeck") which describes mummy ("Menschenvleesch") as being fit for hair and drapery, and as being generally useful. The "Secreet Boeck" also says that mummy was only to be had "in de Apteke." In a German work on Raphael, Lady Eastlake tells me she finds an

OUR FORMER "THERAPEUTIQUE WAY" (see the bottom of p. 34 WITH AN MS. ACCOUNT OF THE DEATHS OF CHARLES II. AND QUEEN ANNE.

I have thought that the abstract which I shall subjoin of the MS. copies of the statements which exist in the Library of the Society of Antiquaries of London regarding the last illnesses of the above-named royal personages would prove interesting, partly because I am not aware that the statements have been hitherto so fully published, partly because they well illustrate the practice of medicine of the time, and partly because they serve in some degree (at any rate, in the case of the king) to correct the opinion commonly held as to the exact nature of the fatal illness. Dryden, whose dead body, by Garth's influence,* lay in state, after embalmment, for ten days in our college before burial, in Poets' Corner at Westminster Abbey, remarked that it was doubtful whether the king had a fever, and that he was killed by bark, as he says in his Funeral Poem, "Threnodia Augustalis," "with all the cannon of the medicinal war."

With regard to the death of the king—that "brisk and airy prince," as he has been termed—it may be remembered that Sir H. Halford, in his work on the "Deaths of Eminent Persons of Modern Times," describes that of Charles II., and the medical treatment adopted by his physicians.† He states that he died of apoplexy, and that he was bled to 16 oz. by an army medical man before any physician could come to him. When the regular physicians came, they cupped and purged and blistered him, and administered enemata, and gave him the "spirit. cranii humani," but that he proceeded from bad to worse hourly until death. He states that one prescription was signed by fourteen physicians.‡ Sir H. Halford records that, after death, "lymph" was found to be much effused into the cerebral ventricles, and at the base of the skull, owing, as he states, to pressure and interruption of the circulation.

Subsequently Macaulay (1849), in his History of England (vol. i. chap. iv.), penned the picturesque description, well known to many, of the circumstances

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allusion to Raphael's using the same "Bein-Schwarz" (*i.e.*, "bone-black,") which had been used by Perugino, and probably by Lionardo da Vinci. I find on inquiry of several artists' colourmen that a very good imitation of "real mummy" pigment is now made from ground-up burnt bones and bitumen mixed with oil. But a pigment from *real Egyptian mummy* is sold in London, at any rate at one place—viz., at the house of Roberson and Co., 99, Long Acre. Mr. C. Park of that firm tells me that they have always used real mummy, and that at the present time they have two mummies in their establishment, one of which is still entire, the other having been partly used up. One of these mummies was the body of a priest, and Mr. Park has brought its description before the Archæological Society. The head of the mummy was presented in June, 1881, to the College of Surgeons by Mr. Park, and is catalogued as 600A. Dr. Birch, of the Br. Mus., examined the mummy, and described it as being that of a man named "Har" (called a God beloved) of the period of the 22nd dynasty, about 900 B.C. Mr. Park says the entire body of the mummy is used, ground up with linseed oil, in making the pigment, which is sold in collapsible tubes.

A friend of mine saw in Egypt, many years ago, piles of bones from mummies, for use as animal charcoal in the purifying of sugar.

* Farquhar, the comic dramatist, stated that at Dryden's funeral an Ode of Horace was sung in place of the Psalms of David.

† On the authority of Sir C. Scarborough's report, "in very good Latin, deposited in the Library of the Society of Antiquaries." To Dr. Scarborough Cowley addressed one of his "Pindarique Odes," praising him, in addition to other reasons, for his freedom "from the physician's frequent maladie, fantastick incivilitie."

‡ It will be seen further on that the highest number at one consultation was eleven, but he was visited altogether by sixteen physicians.

attendant on the king's death (for the unconscionable slowness of which the king, with his wonted urbanity, apologised to those about him); and he makes considerable reference to his medical men and their mode of dealing with the fatal illness. He forcibly and graphically delineates the events of that memorable Sunday evening (Feb. 1, 1685), when the king flirted with his three foreign sultanas, listening to the warbling of wanton verses, and surrounded by gambling courtiers;* but the king, who had had symptoms of gout, was complaining of not feeling well, and of loss of appetite, &c. He slept badly, and soon after he rose the next morning (Candlemas Day) his speech was indistinct and his thoughts wandering,† and his aspect was alarmed and ghastly. Shortly afterwards his face became black, and his eyes turned in his head. He uttered a cry, staggered, and fell into the arms of Thomas Lord Bruce. A physician, who had charge of the royal retorts and crucibles, happened to be present. He had no lancet, but he opened the vein with a penknife. The blood flowed freely, but the king was still insensible. The sick-room was quickly crowded by peers, privy councillors, and foreign ministers, and all the medical men of note in London were summoned. "So high did political animosities run that the presence of some Whig physicians was regarded as an extraordinary circumstance. One Roman Catholic, whose skill was then widely known, Dr. Thomas Short, was in attendance. Several of the prescriptions have been preserved. One of them is signed by fourteen doctors. The patient was largely bled. Hot iron was applied to his head. A loathsome volatile salt, extracted from human skulls, was forced into his mouth. He recovered his senses, but he was evidently in a situation of great danger." On the morning of the fifth day of illness (Thursday) the king was reported as going on well; as Dryden has it,

"The joyful, short-lived news soon spread around,"

but in the evening a relapse occurred, and no hope could be held out—the king complaining of great pain, which he bore bravely, and feeling as if a fire burnt within him.‡

The king appears to have almost entirely retained his senses until the evening of the day when he died (æt. fifty-four), without a struggle.

Macaulay adds: "The fourteen doctors who deliberated on the king's case contradicted each other and themselves. Some of them thought that the fit was epileptic, and that he should be suffered to have his doze out. The majority pronounced him apoplectic, and tortured him during some hours like an Indian at the stake. Then it was determined to call his complaint a fever, and to administer doses of bark. One physician, however, protested against this course, and assured the queen that his brethren would kill the king among them. Nothing better than dissension and vacillation could be expected from such a multitude of advisers. But many of the vulgar not unnaturally concluded, from the perplexity of the great masters of the healing art, that the malady had some extraordinary origin—*i.e.*, murder, &c."§

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* See Samuel Butler's Satire on the Licentious Age of Charles II.—

"An age as vile as ever justice urg'd,
Like a fantastic letcher, to be scourg'd."

The king's death was, however, greatly lamented. North said that at the time it was rare to see a person walking the street with dry eyes.

† We are told by others, as recorded in Ranke's History of England, B. 16, that the king persisted in talking French to those about him who did not know the language.

‡ Then follows the remarkable interview between the king and Father Huddleston (who had previously saved the king's life, after the battle of Worcester), in which the old Scottish Benedictine monk administered to him the last rites and consolations (see Ellis's Original Letters, quoted at p. 202).

§ In the course of his narrative Macaulay takes exception to certain statements of Sir H. Halford. He says: "It is much to be regretted that Sir Henry Halford should have taken so little trouble to ascertain the facts on which he pronounced

In Walter Scott's Notes to the Works of Dryden, vol. x. p. 80, is the following passage: "If there is safety in the multitude of counsellors Charles did not find it in the multitude of physicians. Nine were in attendance, all men of eminence, the presence of the most of whom, Le Sage would have said, was fully adequate to account for the subsequent catastrophe." Again, "Charles, after escaping the poniards and pistols of the Jesuits, may be said to have fallen a victim to the bark" of the physicians.

I will now give an abstract of the MS. copy of a statement (written by Dr. Scarburgh, to whom Harvey bequeathed his velvet gown and surgical instruments), which I before alluded to as existing in the Library of the Society of Antiquaries,* regarding the last illness and autopsy of Charles II.:—

"Whilst gently walking in his bedroom, Feb. 2, 1684, he felt a certain peculiar failing of brain, which was succeeded by aphonia and severe convulsions. About 16 oz. of blood was taken from the right arm by two of the royal physicians who happened to be present. The other physicians were quickly called, and cupping to the shoulders and abstraction of 8 oz. of blood were resorted to, and an emetic of 'Infusio Croci Metallorum'† and white salt of vitriol dissolved in compound 'pœony water' was given. This was followed by some 'Pilularum ex duobus,'‡ and an enema, containing 'Spec. Hier. Picr.,' Syr. è Sp. Cerv. Salis Gem.§ and Infus. Croci metal.'

"Again, 'Pil. ex. duobus' dissolved in pœony water was given from time to time.

"The whole head was shaved, and epispactics applied to it ('ut nullum lapidem immotum relinquerat').

"Then tincture made of Hier. Picr. in pœony and bryony water.

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judgment. He does not seem to have been aware of the existence of the narratives of James, Barillon, and Huddleston." I suppose he alludes to Halford's attributing "the king's indifference to all the solicitations made to him respecting religious offices" to the stupefaction from disease; and stating that the king was incapable of discriminating altogether, that all his faculties were gone, and "that no inference could be drawn safely of anything that implied an exercise of judgment at that late hour." Bishop Burnet states that the king "went through the agonies of death with a calm and a constancy that amazed all who were about him and knew how he lived."

In the autobiography of Sir John Bramston (Camden Soc., vol. xxxii.), the friend of Lord Chancellor Hyde, and of Evelyn, and devoted to the royal cause, is a description (see p. 164) of the last illness of the king. It is related that when the "physitians" came to him they applied "the fier pann and burning amber, &c." After his first attack it is said that he came, after an hour or two, to know those about him, &c., and that a day or two afterwards he "had ANOTHER SOUNDINGE FITT, but he came quickly out of it, and he continued soe sensible that he knew those about him and could speake to be understood. As the children came to him he talkt to them, and that morninge that he died blest them." With respect to the kind of surgical treatment above alluded to Miss Lucy Phillimore aptly observes, in her interesting and recent work on the family and writings of Sir C. Wren, when referring (p. 224) to the performances of a certain Mrs. Holder, who had cured Charles II. of a hurt in his hand, and to the medicine and surgery of the period, "When one reads . . . of the frightful remedies used—the 'hot fire-pans' applied to the head in cases of apoplexy, the constant bleeding, the roughness of the entire treatment—one is thankful to think that they were occasionally ministered to by the gentler hand of a woman."

* See Catalogue of MSS., No. $\frac{206}{5}$.

† The "Crocus Metallorum" was made of Sulph. Antimony and Nitr. of Potash.

‡ The "Pil. è Duobus" was made of Colocynth and Scammony and oil of cloves.

§ The "Sal. Gemmæ" in the Lond. Pharmacop. of 1618 are described as fossilis, crystallinus, Indus, Ammoniacus, Armeniacus, niger, communis, factitius petræ, marinus, alkali, &c. Pareira (see 3rd ed., p. 547) speaks of the rock salt of Cheshire as sal fossilis, or sal gemmæ.

"Then sneezing hellebore powder was used.

"Then (cerebri invigorandi gratiâ) a powder *è flor* Primul. Veris was used.

"Then manna dissolved in barley water, with cream of tartar (Crem. Tartar), in thin broth.

"Then, to meet strangury from the blister, an emulsion of barley water and liquorice, with peeled almonds and sugar.

"Feb. 3.—Then Spir. Salis Armoniaci was ordered to be applied to the nostrils, and the same given in a draught of *Aqua Lactis Alexiteriæ.**

"Cephalic plasters of euphorbium and Burgundy pitch to the soles.

"There was strangury, which required an emulsion of the following—viz., dried Rad Alth. in barley water with dried almonds and Sem. Melon.

"Throat-pain, met by gargle of Dec. of elm bark in barley water and Syr. de Alth.

"The Tinctur. Sacr.† and the manna with cream of tartar in thin broth were used from time to time, *and the jugular vein was opened.*‡

"A Julepium was ordered, as follows :

"Aq. Ceras. nigror. Flor. Til.

"Lil. convol. Pœon. comp.

"Spir. Lavend. comp. Margaritor præp.

"Sacch. cand. alb. (ad gratiam).

"Feb. 4.—An Apozema laxativum§ was ordered.

"Tartar alb., Ven. alb., Fol. Senn., Man. opt., Flor. Chamœmel, rad. Gentian, Nuc Moschat, to make a decoction with water, &c.

"At night meat broth, emulsion, liquor Poseti,‖ Cerevisia non lupulata.

"Feb. 5.—The physicians who stayed in the king's chamber at night, learning that every night there was an exacerbation or paroxysm, and some having affirmed that in the city much intermittent fever, beginning with dire convulsions, existed, giving way to Peruvian bark, it was determined to give this remedy to the king, mixed with syrup of cloves and 'Aq. Lactis Alexiter,' alternately with Spiritus Cranii humani.

"Feb. 6.—The disease getting worse, and as 'totus Medicorum Chorus ab

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* The "Aqua Lactis Alexiteriæ," according to the L. Pharm. of 1721, is composed of elm leaves, the carduus Benedictus, galega, mint, rue, absinthe, angelica, and milk. (See MS. on fly-leaf opposite p. 32 in a copy of the L. Pharm. of 1677 in Coll. of Physic. Lib.)

† The "Tinct. Sacra." was a vinous solution of aloës. On a fly-leaf opposite p. 38 in the Pharmacop. just mentioned above (1677) is a MS. formula for the Tinct. Sacra. of Dr. Doncombe, containing sp. Hieræ Picræ, absinthe, centaury, sp. of wine, and aniseed water; and in the following Pharmacop. (1720) a Tinctura Hieræ appears, made of aloës and white wine or brandy.

‡ One is inclined to wonder that in the case of the king more recourse was not had to venæsection. For a forcible description of the habit of phlebotomy, which prevailed during the first half of the present century, see a passage on "Provincial Medical Practice" in "Hone's Every-Day Book," vol. ii. p. 478, where the Whitworth *doctors* are referred to. "On a Sunday morning the doctors used to bleed gratis. The patients, often to the number of one hundred, were seated on benches round a room, where troughs were placed to receive the blood. One of the doctors then went and tied up the arm of each patient, and was immediately followed by the others who opened the vein. Such a scene is easier conceived than described." People certainly seemed, in those days, to have almost been of the opinion of Le Sage's Sangrado, "C'est un erreur de penser que le sang soit nécessaire à la conservation de la vie ; on ne peut trop saigner un malade."

§ An "apozema" was a potion or decoction (deriv. *ἀποξέω*, to boil off, Diosc.).

‖ Lady Macbeth exclaims, "I have drugged their Possets!" According to the notes on this line in Malone's Shakespeare the Posset consisted of "hot milk poured on Ale or Sack, having sugar, grated biskit, and Eggs, with other ingredients, boiled in it, which goes all to a curd." In the "Merry Wives of Windsor" Mrs. Quickly promises Jack Rugby a Posset at night.

omni spe destitutus animumque desponderit,' the king had given to him more generous cardiacs—viz., the '*Antidotum Raleighanæ major*' and Lapis Goæ* in broth; subsequently the Sp. *Salis Armoniaci Succinati*, and the Lapis Bezoard oriental.†

"The brothers of the king and his heir James attended him in his last moments most assiduously.

"The king was seized with a fatal orthopnœa, and died in the afternoon of the 6th, aged 54.

"On *post-mortem* examination they found—

"The cerebral veins and arteries very distended:

"The cerebral ventricle full of serous fluid, and the brain-substance itself also very wet.

"In the right pleura were strong firm adhesions; the left side was free.

"The substance of the lungs very full of blood.

"The heart was natural; the kidneys and spleen were full of blood.

"The following physicians attended on the king, and had frequent consultations, but not all at the same time:—

Car. Scarburgh.	F. Mendes.
Ed. Dickenson.	M. Lyster.
Ric. Lower.	J. Lefebure.
Tho. Short.	E. Browne.
Edm. King.	C. Farell.
Tho. Witherby.	F. Millington.
G. Charleton.	Pet. Barwick.
C. Frasier.	R. Brady.

"At the ninth and last consultation there were eleven physicians." ‡

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* The "Lapis Goæ" was made of topaz, hyacinth, saphire, ruby, pearls, emirals, bezoar, coral, musk, ambergrise, and gold made into a ball and polished. It was supposed to be an antidote to poisons, plague, &c., and useful "to revive the spirits, cheer the heart, fortify nature, resist melancholy," and "to cause a lively presence, nimble wit, a pleasant countenance, and a sweet breath." [1]

† The *Oriental* Bezoar was a calculus formed in the intestines, chiefly of goats which feed on vegetable containing tannin. The tannin is decomposed slowly, and changes into ellagic acid, which is the foundation of the calculus according to Mr. T. Taylor, quoted in Pareira, Ed. 3, p. 1228. The word ellagic was obtained by the discoverer, Braconnot, by spelling the French word "galle" backwards, something, I suppose, "like a witch's prayer." The word bezoar is said to be a corruption of baal zoar—*i.e.*, lord of poisons.

‡ In Rymer's Fœdera (see vol. 5, part 2, p. 55) is a curious chapter, enjoining the royal physicians and surgeons to attend to the diet and the medicines, internal and external, of the king, headed, "De administrando medicinas circa personem Regis."

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[1] In Southey's Comm. P. Book, vol. i. p. 527, is the following extract from "Mercurius Rusticus," p. 158:—"The rebels broke open the house of Mr. Fowler, a practitioner in physic, and who 'had in his study extract of pearl, aurum potabile, confections of amber, a great quantity of compound waters, a good proportion of pearl in boxes, a box full of bezoar stone, with many other things of admirable use for the preservation of the life of man.'" The old Pharmacopœias contain preparations of gold in solution. Prince Henry, in Shakespeare's "Henry IV.," Part 2, iv. 4, speaks of gold "in med'cine potable;" and Johnson observes that people have long held that the incorruptibility of gold might be communicated to the body impregnated with it. Bacon, in his Hist. V. at M. discourses upon the use of gold and of gems as restoratives. See also notes on Bacon's remarks by Ellis.

In the same library is an old Latin MS. book formerly belonging to Dr. Cony, containing recipes for various things (having no date), such as Elixir Proprietatis, Lac Benzonini, Veneriss Calcinatio, sive æs ustum, Sal Jovis, Amalgamatio Jovis, Aqua phagadendea.

The above MS. was partly given in Ellis's Original Letters, Series II., IV., p. 74.

The above account, meagre though it be, from the MS., of the king's illness, taken in conjunction with the description given by Macaulay, and the results of the after-death inspection, points to epilepsy or epileptoïd convulsions as having existed rather than to apoplexy, as spoken of by Halford, Macaulay, and others. The scream which was specially noticed, called by Bramston a "soundinge fitt," and the strabismus preceding the sudden unconsciousness, which was so speedily succeeded by restoration of sensibility (which was more or less entire until very shortly before death), and the absence of mention of any paralysis of face or limb, all point in the direction I have suggested.* His death following orthopnœa appears to have been the result of pulmonary congestion, as indicated by the *post-mortem* examination.

A highly-interesting feature in the course of the illness was the intermittent character of the symptoms—so marked, indeed, that recourse was had to cinchona bark in the treatment. Many readers will be able to recall cases to mind as well of epilepsy as apoplexy in which periodical exacerbations occur.

With regard to the treatment adopted, the MS. described the venæsection as being performed by two of the royal physicians who happened to be present, and we may suppose, as historians have stated, that a penknife, on the emergency, was used. The descriptions are interesting as indicating the acknowledged "therapeutique way" of the time in England. With this we may compare the treatment of another royal personage at about the same period; I mean the "Grand Monarque," "Le Roi Soleil."

For this purpose I will utilise what Dr. Daremberg has written of the illnesses and the treatment of Louis XIV. In his "La Médecine Histoire et Doctrines," p. 198, &c., Daremberg, basing his account on the MS. of the king's three chief physicians, "Journal de la Santé du Roi Louis XIV. de l'année 1647 a l'année 1711, écrit par Vallot d'Aguin et Fagon,"† published by Le Roi, and also the work, "Les Médecins au Temps de Moliére, par M. le Docteur Raynaud" (a work full of curious matter),‡ considers the subject at length, and I will set before my readers a portion of what he relates. It appears that during the years before mentioned the king suffered what Daremberg calls a martyrdom, from disease, intemperance, and the doctors. He was bled largely, and with a steadfast determination to alleviate nature—thirty-eight times from the foot or arm, even *ad honorem*, to insure greater success. From 1647 to 1715 he had from 1,500 to 2,000 purgative draughts for precaution or necessity, received some hundreds of enemata, and had many pounds of quina, been *labourée* by steel and by cautery,

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* I find it stated by Walter Scott in his Ed. of Dryden's Works, vol. 10, p. 81, that "One Stokeham is said to have alleged that the king's fit was epilepsy, not apoplexy, and that bleeding was '*ex diametro*' wrong."

† Autograph in the Imperial Library made use of by Michelet, S. Beuve, and others.

‡ In this work Raynaud (whose address at the recent International Medical Congress will be well and gratefully remembered) gives an interesting historical sketch of the ancient Faculty of Medicine at Paris and Montpellier, and much of importance connected with the traditions of medicine, and the manners of the seventeenth century; also a description of several noticeable medical characters, and references to the chemical and physiological discoveries and controversies of the period. He, moreover, presents us with the private views of Moliere on medicine, and shows how he was influenced in his writings by the physiology and philosophy of the day, and especially by the state of his own health. Raynaud portrays the chief characters in Moliere's various plays. It appears that Moliere probably died of aneurysm in the year in which he published "Le Malade Imaginaire."

had tried all the cordials, all the lozenges, all the medicinal broths, all the jalaps, all kinds of plaisters, all the specifics avowed or unavowable, in such a way that it would have been difficult to find in the kingdom a man more disinherited by nature, &c.

The numerous diseases of the king for which the varied treatment had been thought necessary had been as follows. We have first, notice of a malignant scarlet fever; then, in succession, follow violent measles; vertigo and vapours which continued for many years of his life until its close; severe rheumatic attacks; rebellious intermittent fever; caries of the upper jaw; fistula; ophthalmia; divers skin diseases; malignant boils; dislocation of the shoulder, followed by suppurating indolent tumours; worms; gout, as it were, of a permanent form; gravel; constant indigestion (eating much and chewing but little), accompanied by such storms of the digestive organs that he often had suddenly to quit the council or the apartment of M. Maintenon, or the table, or to avoid hunting; deep despondency and ennui.

Respecting the death of Louis XIV., Carlyle (see his chapter on the death of Friedrich I., in his "Frederick the Great") remarks (vol. i., p. 371) as follows:—"Louis XIV. himself is ending: mournfully shrunk into the corner, with his missal and his Maintenon, looking back, with just horror, on Europe four times set ablaze for the sake of one poor mortal in big periwig to no purpose. Lucky if perhaps missal-work, orthodox litanies, and even Protestant dragonades can have virtue to wipe out such a score against a man! Unhappy Louis: the sun-bright gold has become dim as copper," &c.

Even for many years after the time when such remedies as those above enumerated were administered to the sick, England and the world in general rejoiced in strangely-named* and what are now termed barbarous remedies, though in truth it may be no doubt said that these curious combinations of remedies were only the result of a laudable tentative and inductive process, a desire to submit to trial, and profit by, all possible agents, and of a fancifully supposed connection between diseases of particular parts of the body and certain organic or inorganic substances. Thus, as late as our fourth Pharmacopœia (1721), Sir H. Sloane being president, in addition to the Theriacum† and Mithridatium,‡ or Conf. Democratis, I find officinal preparations derived from apes, scorpions, toads, snails, vipers, earthworms, ants' eggs,§ teeth of animals, the excrementa of birds and animals,‖ the fat of man, the blood of the goat, the

* As an instance of the strange names attached to therapeutical formularies may be mentioned the following from the Pharmacopœia Basiliæ of 1561—viz., the Emplastrum gratia Dei, Empl. divinum, Empl. Apostolorum, Electuarum Episcopi.

† Containing ABOUT one grain of opium in 75.

‡ Containing ABOUT one grain of opium in 240.

§ Butler, in his "Hudibras," Pt. I. C. 3, lines 325-6, has the following:

"Till purging, comfits, and ants' eggs
Had almost brought him off his legs."

‖ Regarding the numerous and extravagant remedies derived from animals, employed medicinally in early times, see an interesting chapter in A. Moquin-Tandon's "Elements of Medical Zoology," translated by R. T. Hulme (Baillière). He quotes, among others, a work by J. W. Paul entitled "De medicamentis e corpore humano desumptis, merito negligendis" (Leipsiæ, 1721), also from the "Stercoral Pharmacopeia" of C. F. Paullini, Frankfort, 1696 (see also the "Regnum Animale" in the "Materia Medica" of Linnæus for a curious list of preparations from every part of the scale of animal life. The stercus hominis, saliva jejuni, exuviæ serpentis, stercus equi-non castrati, testes equi e galli, urina pueri impuberis, telæ aranearum, ungula of various animals, priapus cervi, bufones, ranæ, caviarum, cranium hominis violentâ morte exstincti, ova struthionum, lapides pretiosi of all kinds, and others, had existed in the London Pharmacopœia of 1677. In this edition also coffee is admitted.[1] In the one of

[1] Learned dissertations on the properties and uses of coffee, tea, chocolate, &c., are to be found in the "Amoenitates Academicæ" of Linnæus.

human "nephriticus lapis," the mummy (mumia Sepulchrorum), Pisa asphaltum; and we have oddly-named compounds, as the "Oleum latericium Philosophorum," the "Ens Veneris," the Pil. è Duobus—*i.e.*, of Colocynth and Scammony.* It was only in the fifth Pharmacopœia (1746), Dr. H. Plumptre being president, that the MUMMY was excluded. In this book, however, the viper and the millepede are found. Soot was also prescribed in this volume, and "powders," as in other pharmacopeias, often went under the name of "species."†

In a work published by Stephen Bradwell, 1633, entitled, "Helps for Svddain Accidents," &c.,‡ among other antidotes for poisons are recommended the blood of a malard, "drunk fresh and warme;" also the blood of a stag. Another panacea for poisons is the following: "Take a sound horse, open his belly alive, take out all his entrailes quickly, and put the poysoned partie naked into it, all save his head, while the body retains its natural heat, and there let him sweat well." To those bitten by animals the flesh of the same beast that bit them is recommended for inward and outward use. In one case of bite from a mouse the teeth of a dead man made into fine powder is recommended.

I have the following notes of the contents of a little volume, published 1715, called "General Observations and Prescriptions in the Practice of Physic; on several Persons of Quality in the time of James and Charles I. Dedicated to Sir S. Garth. By a London Physician of some eminence, and one who consulted with Harvey, Mayerne, &c." The quotations I shall make well illustrate the kind of practice which existed among us formerly.

Thus we have numerous instances of the advantage of bleeding from the veins on the *same* side of the body as that of the disease§—as of the

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1618 (*i.e.*, our first Pharmacopœia) we have, among other strange things, the cranium humanum, in eo os triquetrum; mandibula lucii piscis; nidus hirundinum; blood, fat, axunge,[1] medulla, liver, &c., of many animals specified, sperma ranarum, sericum crudum; amber, under the name of gagates, carabe; asbestos under the names of amianthus, linum vivum, amentum, pilus Salamandræ, viscus aucupum; manna is also called Tereniabin, mel æreum; opium is called Maslach and Meconium; "Usquebach"[2] is composed of raisins, cloves, liquorice, mace, ginger, and spirit. In this Pharmacopœia many of the formulæ are designated by the names of physicians. We have the "Pilulæ sine quibus esse nolo," the "Manus Christi ad Lumbricos," "Emplast. Gratia Dei," "Empl. Isis Epigoni," derived from Galen. An emplastrum was called "Sparadrapum seu tela Galteri." The "Philonium Romanum" was a cordial containing opium and various aromatics; it was called Philo's Antidote, after Philo, of Tarsus, who is supposed to have lived in the time of Augustus. It is described in Greek verse, and explained by Galen very quaintly (see Pareira, 3rd ed., p. 2134).

In looking over old Pharmacopœias in our College Library I have found one (1677) in which, on a blank leaf, the *post-mortem* appearances are described of his Highness the Duke of Kendale, "who dyed convulsed, May 22, 1667," and who was, as I find, the third son of James, Duke of York (future James II.), and who died, an infant, one year after he was made a duke.

* There also existed a *solid* laudanum; also preparations of fruits with sugar or honey called "Rob"—the foundation, no doubt, of the popular household drink of that name of the present day.

† It was in the seventh Pharmacopœia (1809), Sir Lucas Pepys being president, that the MINIM was used as a measure in place of the vague and uncertain "drop," as pointed out by Dr. Munk.

‡ See *Notes and Queries*, April 10, 1880, p. 290.

§ The usage of bleeding on the *opposite* side to the part affected was very fashionable in France at one time, and it appears from Wadd's Nug. Chir.

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[1] The old word axunge is derived from the use of the substance for anointing the axles of the wheels of carriages (unguendi axem).

[2] Usquebach, the same, probably, as "usquebaugh" (Irish, uisge-beatha, water of life); hence our "whiskey."

liver-vein in right pleurisy; the opening of the ranular vein under the tongue, for headache; the bleeding in several veins in different parts of the body at one time, including the veins of the feet; the use of doloriferous ligatures to the extremities; the application to the body, to relieve pain, of live pigeons cut in two;* of the lungs of lambs and sheep just killed, of young whelps, of heated sheep's cauls; injunctions to sleep in warm baths, the water being constantly renewed, in diseases of the skin; the use of baths of milk and water, and of "sallet oil;" the fumigation of the eyes by the smoke of tobacco by means of a hat; the use of mercurial fumigations; the use internally of the powder of dried hedgehogs, of lice, of dried earth-worms, of dried bees, of horse-dung; of the application of pickled herrings, peppered, to the feet; application, outwardly, of urine to the skin; the frequent use of tobacco internally, and of the "antimonial cup;"† and the application of issues under the knee. Mention is made of both solid and liquid laudanum. Portions of the body of animals as food were supposed to be of special service in cases of disease of the same parts or organs in man.‡

I will now proceed to give an abstract of a copy of a MS. letter in the Antiquarian Soc. Library, containing a description of the last illness of Queen Anne, written by Dr. J. Smith, one of the Physicians to Queen Anne:—

"The Queen Anne was taken ill at Windsor. Had been long corpulent, and latterly became very gross. App. good. Weakness from gout. No exercise. On Dec. 24, 17 $\frac{1}{4}\frac{3}{4}$, seized with violent fever. (See letter to D. of Shrewsbury.)

"The other physicians declared the illness to be ague, and wanted to give Jesuits' Bark. Dr. Smith differed from them as to disease and remedy, and thought it was a continued inflammatory fever, with exacerbations occasioned by a translation of the gouty matters and an erysipelas that seemed to be forming in the thigh. He suggested bleeding, gentle evacuations and diaphoretics, to produce critical fits of gout.

"The Jesuits' Bark was given, and after the third dose she bled considerably from the hæmorrhoïdal veins. This gave relief, and the pulse became softer.

"She went on with the Bark, and then bleeding from the nose came on; but the blood was overheated.

"This showed that the bleedings at first suggested would have been very improper.

"The physicians then gave (after Dr. Smith's remonstrance) a decoction of the powders in spring water, and later on this was also discontinued.

"On the ninth day of the seizure a fit of gout came on, with much relief, but the erysipelas of the thigh continued. The physicians refused to purge her well, and she fell into an obstinate looseness, upon the stopping of which she grew very drowsy, and she had to be cupped, though at first the physicians would not let her lose blood.

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p. 223, that Pierre Brissot "produced a civil war in the medical world by writing against the custom, and, in the year 1600, was driven into exile, by edict of the University of Paris, for thus exposing the established practice."

* In Vol. 17 of the *London Medical Gazette*, p. 128, the case is related of a young man dying in recent times near Chelmsford, whose father, thinking to try the powers of a potent spell, cut up a live pigeon and applied the various parts of it, still moving with life, to the soles of the feet of the dying patient, fully believing he should behold an instantaneous effect.

† Dr. Hamey's antimonial cup is in the possession of our College.

‡ Notice of several works of the sixteenth century, in which cookery and chemistry are very curiously mixed up, with an explanation of many old terms and names, such as the "Manus Christi," Jumbols, Quidony, March-pane, &c., will be found in *Notes and Queries* for Oct. 4, 1846, pp. 260 and 333. Brewer's "Reader's Handbook" states that, according to an old superstition, a person suffering from Quartan Ague could be at once cured by having the 4th Book of Homer's Iliad placed under his head. S. Sammonicus, a noted physician, wrote as follows:—

"Mæoniæ Iliados quartum suppone timenti.'—Præc. 50.

"Later on another febrile attack and erysipelas on other leg came on; and still later (when at Kensington) she had another return of same illness. But neither of these two illnesses (which were less violent than those at Windsor) did the physicians call ague, nor did they propose the bark. In the second attack they would not take any blood; but in third they were more enlightened; still they would not treat Her Majesty with evacuants and a more temperate regimen, nor be convinced that lapis contra yervæ was not a milder and less active medicine than the powder of snake root.

"Upon every appearance of erysipelas, the surgeons attended and dispersed it with fomentations, but the part was no sooner free from that fire than Her Majesty fell into an acute feaver, except the last attack, after which an imposthumation happened in the left leg. This was kept a secret, at least from me, but at length I discovered it, and the sergt. surgeon owned to me that it discharged an ichorous water and blood, and sometime afterwards he believed it would heal. I reproached both him and Dr. H—— for not persuading Her Majesty to let the physicians see the inflamed part, and told them that I could not with common honesty prescribe for a sore that I was not allowed to see; that their covering themselves with the Queen's pleasure I believed would not excuse them to the world, and that it was very hard I should be answerable for a matter in which I had no hand. After the attack of the last feaver the surgeons pressed us to purge Her Majesty, but for ten days we could not agree that she was in a condition for it. The day after the meetings were broken off Dr. L——k H——l directed a purge for her, and sent to me to sign, which I refused to do, alleging that it was too nice and difficult a point to be determined without seeing Her Majesty; but the other two gentlemen being much better disciplined tamely acquiesced, signed the prescription immediately without seeing her, and the Queen was purged accordingly.

"Wednesday, July the 7th, being my day to wait on Her Majesty, in going in I was told by the surgeons that she was very well, and she answered to herself, but I found by her pulse that she was not so, and desired the surgeon apothecary to tell those about her that I feared there would be some unlucky blow if not prevented. I waited upon the Duke of Shrewsbury and informed his grace of my opinion, and I returned that day twice to Kensington, to try to alarm those near Her Majesty, but they were so infatuated that my prophecies, like Cassandra's, were not to be believed.

"The next day she was seized with a doziness, and the physicians were sent for. They having seen her, and given me an account before the Duke of Shrewsbury, and asked how her pulse was, answered, "Very well;" when his grace was pleased to tell them that it must then be very much altered for the better since the day before, when Dr. S—— was three times at Kensington to alarm people yt. it was not well, and that he feared some severe attack.

"Her Majesty was cupped, and blisters were ordered, but not applied. They were so little alarmed yt. her dinner and supper were served as usual; and next morning she was seized with apoplectical fits attended with convulsions. After 2½ hours she recovered her senses, but lost them again next day, and died the following morning."

Then follow several letters to the Duke and Duchess of Shrewsbury, in Ireland, from Dr. Smith, to the same purport as the above statement. Her Majesty is alluded to in some places thus: "The *person* was seized with chilness," &c. "The person did not shiver."

The letters are signed, "Your Grace's most obedient humble servant."

In the Library of the Soc. Antiq. are also other MSS. bearing on the practice of the time. Thus, in the Ashburnham MSS. (Cat. cxxi., cxxii.) are Medical Tracts; and there is a collection of Medical Receipts (Sir R. Temple) of the date of 1656. In the Stowe Collection are a set of aphorisms of Hippocrates and Galen, with comments, in the Irish language and character, of the time of James II., for the benefit of the poor.

There is a letter (see Cat. of MSS. $\frac{206}{12}$) containing Observations on *Hypuecuanna*.

Also copies of a letter respecting two eulæ or maggots found in the cells between the laminæ of the os frontis of a sheep in a dissection at Oxford (MS. $\frac{206}{10}$); a paper in Latin, "De Erysipelate Collectanea" (MS. $\frac{206}{11}$). Among the Sloane MSS. in the British Museum is one, 1047, containing a volume, of the time of Henry VIII., in which is a large collection of recipes for outward appliances made by the king himself and his physicians. The king is said to have sent to the Lord Mayor of London a recipe for a remedy compounded by himself against the plague (see Ellis's Original Letters, Series I. Vol. I. p. 287).

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