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ORIGINAL COMMUNICATIONS.

I.—*On Hybridization amongst Vegetables.* By the Hon. and Very Rev. William Herbert, LL.D., Dean of Manchester. Part the First.

(Communicated Oct. 14, 1846.)

Having been urged to prepare a paper for the Journal of the Horticultural Society, embodying whatever is known to me concerning the cross-breeding of vegetables – although I am not aware that I can add much to what I have already laid before the public on this mysterious subject—in compliance with repeated requests, I will try to arrange what seems to me ascertained, and to point out some of the results, and some of the difficulties and uncertainties that require further investigation. When I first asserted that it was preposterous to suppose all the existing forms of vegetables, according to the subdivision of our botanical arrangement, to have been so specially created by the Almighty, and that I suspected the various forms of animal life to have also branched out from a smaller number of original types, I was attacked by some as a person who was minishing from, instead of attributing infinity to, the power and wisdom of God. I trust that the progress of useful knowledge has nearly dissipated such absurd calumnies; and that the labours of geologists have shown that, as the Allwise, who fills the unlimited expanse of universal space, speaks to us of his hands and handy-work as if He were an artificer of our own definite dimensions, so the Scriptures detail the immense operations of ages before the creation of man by expressions conformable to our petty space of life—revealing in simple terms a few great truths, gradually and duly confirmed by the progress of scientific investigation, which brings to light the primordial remains that prove the succession of events, while it adds immeasurably to the greatness and majesty both of the operations themselves and of the means by which they have been effected, showing that they were not comprised within a diurnal week of our terrestrial life, but filled a gigantic page in the great volume of antecedent time. We must learn to understand the true force of the words of Scripture, and not derogate from the greatness of God by reducing it to the compass of our narrow conceptions. I have entered at length into that consideration in a late publication entitled 'The Christian,' and shall not now revert to the subject.

Let us, however, consider the grounds for believing that all the existing forms of vegetable and animal life flourished, such as they now are, from the first. If such was the case, why do the deposits of the old world not exhibit them all, as well and as plentifully as the lost races? And how comes it that the primæval forests, and the vegetation of primæval swamps, have vanished with the mastodon and the sauri, and neither the oak nor the chesnut, neither the rhododendron nor the azalea of our own days, are to be found amongst the remains of ancient time? We know of no second creation of vegetables; we have no account given to us, by any person having divine authority, of any successive acts of creation, except in the course and unfolding of the reproductive system by generation, and in the creation of land animals after the fowls and aquatic creatures, and of man after them, though every reproduction, where a new soul is incorporated with a new body, is in fact a fresh creation, but conformable to the law established by God at the commencement, when He said, "Let the waters and let the earth bring forth;" unless we adopt this, which perhaps is the most probable solution, that the mandate to the earth to bring forth vegetables (that is to say, the law impressed upon its matter to that effect) had not merely instantaneous effect, but was a law continuing for ever to operate, and, as long as the earth remained in the same general state, would reproduce the same results in the generations successively arising; but, on each great change in the circumstances of the earth itself, would produce results, both in the vegetable and animal forms, that are continually arising from and returning to the dust, different from those which the same mandate or law of the Almighty evoked in its original condition. That simple view of the great creative act of Almighty God is calculated to give us the sublimest view of His unfathomable wisdom and power, and it accounts for the mystery of generative reproductions in similar form, as well as for the variations which have taken place in existing things since the first great periods of the creation. If the old saurian races, which are utterly extinct amongst animals, could only thrive in shallow salt water, which seems probable, we can understand why, after the uplifting of a larger portion of the earth and the confinement of the waters to deeper hollows within a narrower space, their races should have gradually failed, being drowned or starved in the deep, and unable to exist on the dry land. We may, perhaps, by a stretch of imagination, figure to ourselves some drier and more elevated spot in the earliest ages of the world, where the animals and vegetables which were destined to people it in later years, after the destruction of the races which prevailed at first, had their nidus, and were so closely quartered together, that the species of rhinoceros and

roebuck now existing, by perpetually biting the oak or the hazel, prevented them from multiplying, and were in their turn so harassed by the hyænas of the existing species, that their races were barely able to perpetuate themselves; while the extinct rhinoceros and hyæna have had a more rambling spirit, and gone forth into the wide world, and fed on the margin of the waters upon the vegetables and creatures of the shallow swamps, so that their bones became mingled with them in death. But, if anything so improbable were admitted, we should still be met by a grave difficulty; for why should those which had overspread a wider space, and become multiplied, have disappeared from the world, and the species, which we must suppose to have been so limited in number and confined in space, that their remains have not been discovered, have since become prevalent in their stead? I can suggest no rational solution for that difficulty; no reason why the remains of the old world, when dragged from underground, should exhibit a rhinoceros and a hyæna, or a plant, of a kind which does not now exist, and not exhibit the kinds which do exist, if both were created simultaneously, in their precise respective forms: and yet, without entering into particulars, I may safely assert that, as to many races of animals and plants, the fossil species are not found in the present day. We must try, with humility and piety, to reconcile apparent facts with the revelation of God that has been handed down to us: we must remember, that as the Bible contains the only and the whole word of God, and is the sole record of His will and of the doctrine He has delivered to us, and stands in that respect alone, unrivalled, and invaluable, it is not the sole, nor even the most certain, record He has given us of ancient natural facts; for the remains of the old world, which He has preserved in such wonderful perfection by His power and wisdom, are infallible documents, handed down by His almightiness for our instruction and edification; and, although we must not indulge in presumptuous speculations and conclusions drawn from them, the facts which they exhibit are even more certain than the words in that precious and invaluable volume which relate to things only mentioned incidentally therein, and not affecting the great object for which the Bible was given to man—namely, the declaration of the will of God, and the relations between Him and ourselves. We have, in the history of Egyptian hieroglyphics, a memorable instance of the gross stupidity of mankind in understanding words. A distinguished Greek ecclesiastic had expressly written that they exhibited the first elements of words. For sixteen hundred years the meaning of that expression continued to be a riddle, and the most wild and absurd theories were advanced in the attempt to

explain it; no schoolboy was asked "What are the elements of words?" and answered, "Letters, to be sure!" and no person discovered that the first elements of words were their initials, till a sentence was accidentally found written in letters as well as in hieroglyphics. I may therefore safely say, that the image of substantial bones stamped by the will of God in ancient days upon the solid rock, unchanged and almost unchangeable, are more certain documents as to old facts than any written record; because we now see the former as they are and were impressed by the dispositions of the Almighty, and we may quite misunderstand the meaning of the latter. When we look to doctrine and the will of God, we have nothing but the inestimable volume of the Bible to consult; and yet we lament to find how unable even its most precious words are to bind mankind in a uniform and consistent understanding of their import, and of the things absolutely necessary for our salvation; and, excepting the fact that everything was made by God, they testify very little concerning the things and creatures with which He peopled the world in the first ages, and that so loosely, that our understanding could not rely upon our interpretation of its meaning, in opposition to the imperishable memorials He has handed down to us, if they should seem to disagree; but, in truth, when rightly examined, they do not disagree.

According to the scriptural statement, God created vegetables before the existence of the light of the sun and moon, or the present course of night and daylight; at a latter period He created the birds and aquatic animals from the sea, including under that name (see Gen. ii. 19) the wet soil it covered; and, at a later period, land animals from the earth, which had then become fit for their production: and He ordered them to yield fruit and seed, and to bring forth after their kind—"cattle, and creeping thing, and beast of the earth, after its kind." Here arises a great question, which has never been properly considered:—What is their kind? Zoologists and botanists divide vegetables and animals respectively into genus and species. Species means form or appearance; and genus means a kind. Therefore, according to the words in use amongst us, we are to understand that God created the genera severally, and ordered them to multiply within the generic limits. And what are even generic limits? According to the new lights of science, those limits are varying every day; and no two botanists or zoologists are agreed about them: and we have no record of the origin of specific diversities. But botanists have higher divisions; they have tribes, alliances, orders, &c.; and who shall venture to say that the limitation, which the Bible calls a kind, was not that which modern penmen in Europe have thought fit to call an order, or

a tribe? To me it seems that the Bible itself appears rather to indicate that it does not mean one of the lower subdivisions, where it adds, as an explanation, "cattle, and creeping thing, and beast of the earth, after its kind:" which might signify, that cattle shall not yield a creeping; a beast of the earth (that is, a cat or tiger, &c.) shall not yield cattle—*i. e.* a cow or sheep, &c.; a snake shall not yield a bird or a fish: and beyond such a general outline the Bible history speaks not to man on the subject of the propagation and diversification of races. It is a subject open to inquiry. It is not said that God made each beast, but "the beast of the earth after his kind." We are left to our own inferences and experiments, and to the examination of the organic remains God has bequeathed to us, in order to acquire temporal knowledge on such points; which, as we acquire it, will lead us more and more to adore the infinite wisdom and power of God; but is entirely unnecessary to the great object of holy life and the acquisition of eternal salvation, and therefore of a nature which the Allwise did not think fit to communicate to us authoritatively. Upon all such matters, therefore, we have liberty to speculate and reason, with piety and humility, according to the gifts God has given us, for the good of mankind, and for His own glory.

I will therefore state, briefly and humbly, what is the general bias of my surmises as to the diversification of vegetables, to which that of animals must be in a certain degree analogous. We know that four races of men have branched out from one stock,—the white, the black or African, the brown or Asiatic, and the red, with various subdivisions of aspect amongst them, and we know nothing of the mode or time in which those diversities arose. Revelation and history are equally silent on those facts. They must have occurred very early. Jupiter is said to have visited the Æthiopians; and M. Faber has proved that the things recorded of Jupiter relate to the period which immediately followed the deluge. We may therefore assume that such changes began in the lifetime of the sons of Noah, or were immediately consequent on the dispersion of mankind. We are equally in the dark as to the races of dogs. Old writers allude to different kinds of dogs, and we do not know when or how any one of those we possess originated; and the same may be said with respect to the origin of languages. From these facts I draw this inference, which seems to me incontrovertible, that a course of change was in operation in the early ages after the deluge, which had ceased, or at least was greatly diminished, before the era at which our knowledge of events began to be more precise, and handed down by writing. I shall be told that these different races of men breed freely together, and that these dogs intermix, and produce

mongrels also, and that we see thereby that they are only varieties of one kind. Granted; I entertain no doubt of their having respectively descended from one pair of created individuals; but how do you prove to me that the cat, lynx, tiger, panther, lion, &c., did not descend from one created pair? I am rather inclined to think that they did (but this is only a surmise), and even the horse and the ass from one created pair; and I am quite unable to believe that the several sylviæ of the wren family, some of which can with difficulty be distinguished except by the proportions of their quills, and which have nevertheless very diverse habits, notes, and nests, were created separately and specially; and, when I look to the vegetable races, I am still more unwilling to assent to the assertion, that every plant, which this or that botanist has called a distinct species, or even a distinct genus, had a special creation in the period before the sun and moon shone upon this world, when God created vegetables. Upon what authority is such an assertion made? Upon none but the dictum of those who are pleased to inculcate it. Upon what ground is it made? Upon none that will bear investigation,—upon a rash assumption that everything cross-bred is sterile, and that if the offspring is sterile the parents are thereby proved to have been descended severally from the Creator. In the first place, the fact is even false as to animals. Buffon records an instance of the fertility of a mule. I have seen that which I am satisfied was a hybrid between a bitch and a fox, which was the father of many puppies. But if the fact were positively true, how is it to be proved that the constitution and frame may not have undergone such changes in the diversification as to prevent intermixture? If I can show that in one genus of plants cross-breeding is not only easy, but more easily obtained than fertility by the plant's own pollen, and that in others, so closely allied to it as to make it a question whether they are not sections of one genus, cross-breeding cannot be effected generally, and in no case easily; that in some genera of plants many or all the cross-bred varieties are fertile, and in others nearly allied thereto all, or almost all, are sterile; the assertion that the races of canis or dog must have had one origin because their crossed produce is fertile, and the races of felis, from the cat to the tiger, must have had separate origin because their crossed produce is sterile (supposing the fact to be true, which is not ascertained), must fall to the ground. The only thing certain is, that we are ignorant of the origin of races; that God has revealed nothing to us on the subject; and that we may amuse ourselves with speculating thereon, but we cannot obtain negative proof, that is, proof that two creatures or vegetables of the same family did not descend from one source. But we can prove the affirmative; and that is

the use of hybridizing experiments, which I have invariably suggested; for if I can produce a fertile offspring between two plants that botanists have reckoned fundamentally distinct, I consider that I have shown them to be one kind; and indeed I am inclined to think that, if a well-formed and healthy offspring proceeds at all from their union, it would be rash to hold them of distinct origin. We see every day the wide range of seminal diversities in our gardens. We have known the dahlias from a poor single dull-coloured flower break into superior forms and brilliant colours; we have seen a carnation, by the reduplication of its calyx, acquire almost the appearance of an ear of wheat, and look like a glumaceous plant; we have seen hollyhocks in their generations branch into a variety of colours, which are reproduced by the several descendants with tolerable certainty. We cannot therefore say that the order to multiply after their kind meant that the produce should be precisely similar to the original type; and, if the type was allowed to reproduce itself with variation, who can pretend to say how much variation the Almighty allowed? Who can say that His glorious scheme for peopling and clothing the earth was not the creation of a certain number of original animals and vegetables, predestined by Him in their reproduction to exhibit certain variations, which should hereafter become fixed characters, as well as those variations which even now frequently arise and are nearly fixed characters, but not absolutely so, and those which are more variable and very subject to relapse in reproduction?

Let me suppose that the Almighty perhaps originally created an individual plant of each natural order extinct and existing, supposing the natural orders to be correctly set forth, and rectifying the errors which may require correction. What proof can be offered that more individual vegetables were originally created? None! It will perhaps be asserted that the several individuals of different species or present form, which are included in one order, could not have descended from one original mother, because either they will not breed together, as is usual with individuals of the same species; or, if they do, their offspring is sterile. Such used to be the assertion; but it was bare assertion, unsupported by proof. In the first place, the fact is false in numberless instances; in the second, if it were true, what proof can be given that no two things descended from one origin can have become so diversified as to be now incapable of a fertile union, or of producing that which will be fertile? We are utterly in the dark as to the mystery of fertilization. We know not by what wonderful secret contrivance the unsearchable wisdom of God has prevented the minute and almost imperceptible grains of pollen from usually fertilizing any ovary but

that of its own or of a kindred flower; and how can we presume to say that structural and constitutional differences may not have arisen amongst vegetables which have diverged from one origin, rendering the fertility of their sexual union in some cases difficult, in others impracticable?

I have had no opportunities, by the help of a powerful microscope, of pursuing any investigation into the process by which the pollen fertilizes the ovules; and I have somewhere stated, that, although I could not pretend to contradict those who asserted that the grains of pollen from their own bulk emitted tubes which reached from the surface of the stigma to ovules in the germen, sometimes as in Hymenocallis pedalis tubiflora, 12 or 13 inches distant, and in others where the germen is subterraneous at an uncertain distance, my understanding would not assent to it: my objections were twofold: first, that it did not appear possible that such a minute body should emit a tube of such length, through which its contents were passed into the ovary, as asserted. Secondly, that in all the wonderful contrivances of Almighty wisdom to effect apparently difficult purposes, I had perceived that no *unnecessary* complication of machinery was used. It seemed to me preposterous to imagine that the Allwise would employ such almost miraculous tubes to convey the contents of the grains of pollen into the ovary without conducting them to the ovule itself, when they might have been as securely delivered by passing directly from the pollen into the passage through which the tubes were to advance without such secondary conductors. It was as if an engineer, after leading water for miles from the mountains in pipes, should at last turn it into the valley, to find its way as it might into the cistern he was desirous of supplying. I understand that further observations tend to the establishment of the fact that the tubes, instead of terminating abruptly, as before asserted, do actually reach the foramen or aperture of the several ovules, and obtain admittance through the mouth thereof. I have not witnessed this phenomenon, but I am willing to believe in it, because it is perfectly consistent with the apparent wisdom of God in all his works; but I think those who have broached the facts have not understood the operation, and it seems to me to yield the key to a great part of the mystery in which the subject of vegetable fecundation is involved. I therefore recur to my first objection, that it is utterly impossible that such a minute body should emit such a pipe and its contents, that is, emit it of its own substance; and I apprehend the fact to be, that by contact with the juices of the cognate plant it acquires that which enables it to gain bulk for such an elongation. I conceive that the abstraction of something, perhaps carbon, from the juice of the stigma, is necessary to that

increase of bulk, and in some cases that atmospherical moisture is essential to it. Hence it arises that old pollen which has been kept perfectly dry may act so as to fertilize, but that which has been once damp cannot do so, because it has been carbonized and has discharged its office, and is incapable of acting a second time. But the probability is, that, although mere moisture may have a certain effect on the pollen, there is some more chemical union between the grain of pollen and the juice of the plant necessary to carry the duct to its distant point of reception, and enable it to cry "Open Sesame," and make good its entrance when it arrives there. It has, I believe, not been duly considered, that the fecundation of the ovules is not a simple, but a complicated process. There seem to me to be three or four several processes —the quickening of the capsule of the fruit, the quickening of the outer coats of the seed itself, and the quickening of the internal part or kernel, and the quickening of the embryo.

Whoever tries to raise mule Alstrœmerias from A. aurea by some cognate species, will find, under favourable circumstances, every flower produce a full-sized perfect capsule, though he may fail in obtaining the least enlargement of the ovules. A mule raised by Mr. Bidwill between Passiflora cœrulea and onychina flowered this summer in my conservatory, and produced of itself, to my surprise, two fine plump fruits, two inches long, of a bright orange colour, there being no other Passiflora in flower at the time on the premises. On opening its beautiful fruit, it proved to be empty as a bladder, the outer coat of the fruit only having been fertilized in consequence of the weakness of the cross-bred pollen. In other attempts at cross-breeding, or in plants that do not make seed freely in our climate, he may find not only a perfect capsule, but seeds grown to full size, though containing a perishable lymph, and no sound kernel. In others he may find the seed either of an undue texture and substance; or, if apparently good, deficient in embryo. In some cases, as in the very extraordinary one first noticed by Mr. Brown with respect to Hymenocallis, the seed having no discoverable embryo when first ripened, acquires one after lying for some weeks or months on the earth. It follows, therefore, that a continued operation of the pollen must be necessary to produce all these requisites for the formation of a good seed. It has been said that, when the ovules are fertilized, the outer coat or capsule begins to swell. This does not appear to be true; for the capsule often becomes perfect, though the ovules do not seem to have become fertilized at all. It seems, therefore, a process independent thereof, whether simultaneous, antecedent, or posterior; so must the fertilization of the seed-coats and of the albumen be, since they may grow without an embryo: and some mysterious process must be con-

tinued to vivify the embryo at a later period, since it can elude the microscopic research of Mr. Brown in a seed so large as that of Hymenocallis. I have cut open seeds of Hymenocallis an inch and a half long, and found no visible embryo, but a large cavity; yet the rest of them, being left in the damp ground, acquired visible embryos, and sprouted some months after. If, therefore, as I apprehend, the pollen tubes cannot reach the ovules without deriving substance from the cognate juices of the style through which they descend, it becomes easy to understand how there may be sufficient affinity between them to carry on the process to the degree necessary for quickening the capsule, but not to carry it on to the point requisite, and with the excitement and irritability necessary for reaching the ovule, and stimulating it to open its aperture for the reception of the substance conveyed by the tube from the interior of the grain of pollen. It is also easy to understand how moisture, either to feed the plant inwardly, and make its juices abundant, or to affect the stigma outwardly, may be necessary to the fertilization of the ovules. If a chemist could analyze the pollen before application, and the tubes after, perhaps it would appear that the pollen is deficient, and, in order to be available, must be deficient in some one of the ingredients which will be found in the tubes. If it be true, as I imagine, that it is necessary for the pollen to derive from the style some chemical adjunct to increase its bulk, and to enable it to irritate the aperture of the ovule and obtain access, it will become manifest why it is, that in some genera intermixed produce is easily obtained—in others not; because it depends upon the close similarity of constitution and chemical relation of the component parts of the two plants. We can easily understand that the individual which, on a hot and barren soil, dwindled, after the dispersion by the deluge, to a slender annual, may have acquired such different chemical qualities, that it has not now sufficient affinity to the species which in a moist and luxuriant position has become the master of a forest, twining its colossal arms round the loftiest of its inhabitants; while two other species, though very different in some striking points of conformation, may have such constitutional similarity, and such identity of component ingredients, as to have precisely the same chemical affinities and intermix readily. Why is it that in the genus Hippeastrum all the several natural species, forms, or varieties of that plant (I care not by what title their variation is styled) breed more readily by the pollen of any other, however complicated by cross-breed, than by its own; and that in the genus Habranthus, most closely allied to it, every attempt to cross the several natural sorts has as yet entirely failed? The facts are so. Why is it that in the genus Zephyranthes, closely akin to Habranthus, and making seed freely, crosses are obtained

with much difficulty, and, when obtained, are rather disposed to sterility? I cannot answer those questions, further than by saying that the ways of the Allwise are past finding out: but I can surmise that in the genus Hippeastrum there is a great sameness of constitution, and that the pollen finds in the style exactly that which is requisite for the growth and development of its tubes, and that the pollen of a fresh individual with the same chemical properties gives a more powerful stimulus, as the introduction of a fresh cross has been found to do amongst animals; and that in the two other genera there is less sameness of constitution, greater difference in the proportions of the component parts of their juices, and the pollen is not suited with what it wants for the purposes of fertilization. I suspect, therefore, that it is by the nice adaptation of the juices of each individual type to yield the exact proportion of what is wanted for the pollen of its kind, that the Almighty has limited the races of created things; and that, wherever that adaptation is perfect, a perfect offspring is produced. Where it is not perfect, an inadequate or a weak fertilization takes place. It is further to be observed that there is frequently an imperfect hybrid fertilization, which can give life, but not sustain it well. There are several crosses which I have repeatedly obtained, but could not raise the plants to live for any length of time. I obtained much good seed several years ago from Hibiscus palustris by speciosus; I sowed a little each year till it was all gone; the plants always sprouted, but I saved only one to the third leaf, and it perished then. I have never raised beyond the third or fourth leaf a cross between Rhododendron ponticum and an orange Azalea, though I have saved two or three through the first winter. My soil, however, is very uncongenial to them, and under more favourable circumstances they would have been saved. From Rhodora canadensis by Azalea pontica (sections of genus Rhododendron), I saved ultimately only one out of more than a hundred seedlings, and that became a vigorous plant. Such crosses sometimes are a hundred times more delicate in their first stage than natural seedlings. Mr. Bidwill, in attempting crosses at Sydney, has also (as he informs me) raised some with difficulty, which have invariably perished. In these cases I apprehend that, although the affinity of the juices is sufficient to enable the pollen to fertilize the ovule, the stimulus is insufficient, the operation languid, and the fertilization weak and inadequate to give a healthy constitution. It has been generally observed that hybrid fertilization is slower than natural fertilization, and that often a much smaller number of ovules are vivified. The same cause probably operates in that respect: the affinity not being perfect, the necessary ingredients are attracted by the pollen less readily and insufficiently, and by many of the grains not at all.

It appears that if two stigma-bearing lobes of a triple or even tripartible style are cut off, the whole germen may be fertilized by the one left. In such cases, therefore, the pollen tubes from one lobe must be able to penetrate all the cells of the germen. In cases such as I have seen, where both natural and hybrid seeds have been produced in one capsule, I cannot state whether the two sorts of pollen acted through the same or different lobes. I have *in no instance* succeeded in obtaining any multiplicate cross by blending the pollen of two or more kinds intimately before their application. Mr. Knight thought he had given at the same time the curl of one cabbage and the red colour of another to a third variety. My invariable failure in such attempts induces me to think his recollection was inaccurate, if he meant that he had done so at one fructification. He might easily have obtained the twofold features by two successive crosses, but I believe not in one generation by simultaneous application of different pollens: for I do not think that two grains even of the same pollen can get effectual access to the foramen of one and the same ovule. I now understand, nearly at least to my own satisfaction, in what manner the pollen of Rhododendron may in the fertilization of the ovules supersede the pollen of Azalea previously applied; because I do not believe that they are always fertilized so soon as has been usually supposed. The stimulus may have been given to the germ or outer coat of the seed-vessel, and yet the fertilization may not have reached the ovule, and the operation which produces a living embryo may remain suspended till a change of weather and a moist atmosphere afford a supply of carbon, or whatever is needful thereto; and therefore that pollen which has perfect affinity to the plant may develop itself effectually at a later period on a change in the state of the atmosphere; but, when the pollen has once reached and stimulated the foramen, further access will be assuredly denied. I have repeatedly observed in dry seasons the pollen of Rhododendron very parched and seemingly deficient, the stigmas dry, and the germens remaining for weeks nearly stationary after flowering, as if no seed would be produced; but, upon a change of weather inducing moisture, universal fertility of the pods soon became apparent. I suspect that in such cases the fertilization has remained incomplete from want of the food necessary to the elongation of the tubes. If such views have any foundation in truth, it is possible that, in addition to mere water, a supply of the chemical ingredients which are the food of plants to the style may facilitate difficult impregnations. It is certainly desirable, where dry pollen is to be tried, to moisten the stigma to which it is about to be applied.

Having made these preliminary observations, I will try to re-

capitulate the facts that seem to be ascertained. It is now forty years since I began experiments on this subject, which have been, not an employment, but an occasional source of amusement. My original assertion was, that the genera of plants (rectifying in the limitations and definitions thereof by botanists such things as shall appear to require rectification) represent the several created types of vegetables; that such created types cannot properly amalgamate; and that, if a monster is at any time produced between them seminally, it cannot be seminally reproduced; that the species of botanists and the permanent local varieties are not essentially different in their nature, but are variations induced by causes more or less remote in the period of their operation, though the features of their diversity may be severally more or less important, and that they differ from accidental varieties in the permanent habit of similar reproduction which they have acquired from soil and climate, and that often in a long succession of ages. Those points appear to me now completely established, excepting that we cannot prove that even the genera did not branch out from higher types, or in fact that the tribes or orders were not the original genera, or kinds. In some genera we find that all the species are capable of breeding together and producing a fertile offspring: in Hippeastrum that they even prefer breeding with each other; in some genera that many species will cross together, and some have as yet refused to cross; in some, that the cross-bred plants are abundantly fertile; in some obstinately sterile; in some individuals capable of fertilization by the pollen of another, and not by its own; in some cases that two individuals will breed freely with a third, and not with each other.

To what results do those facts lead us? The promiscuous blending of the species of any one genus proves that the sterility or impediment to intermixture does not depend upon any original created diversity of species—*i. e.* that the thing called a species by botanists is not the created type; and, if the fertility does not depend upon that, the various results must depend upon the want of equal affinity amongst the several species of each respective genus—that is to say, on a wider departure from the common type in the several varieties of one genus than in those of another. We cannot suppose anything so preposterous as that the Almighty would have created so many species of a genus, with permission, when approached together by the hand of man, to confound their generations, and so many others under a peremptory prohibition to do so. Therefore, if by a genus we mean anything definite, anything that has a real and natural character, and not merely a fanciful and capricious denomination, whatever be the nature of the individuality which absolutely and essentially separates one genus from the rest of the creation, must also exist in every

other genus; so that, if the species of any one genus are variations generated from one original type, the species of every genus must respectively have descended from a peculiar type; otherwise it would be apparent that the same thing is not meant when the words genus and species are used in the one case and in the other, and that the application of the words is vague and unscientific. If I have shown that the species of one genus are convertible, and therefore of one origin, I have shown that every genus must have had one original type, unless the genus which I bring in evidence shall appear to be in truth a division of an inferior grade, and not deserving of the name of a genus. Let us, therefore, inquire how the fact stands. It so happens, as if expressly to prevent the possibility of any doubt on that point, that the genus in which I have lately produced the proof of the most marvellous convertibility, is not only a valid genus, but embraces greater structural differences than any genus amongst the seven or eight thousand that have been defined—I mean the genus Narcissus, which, on account of those diversities, had been subdivided into a number of genera; which supposed genera have been found capable of breeding together and re-crossing, so that not only intermediate forms can be originated, but one even of the supposed genera can be obtained in two or three generations from the capsule of another. This cannot stand as an isolated fact. It holds out a warning to all botanists, that on closer investigation it will be found, not merely that the genera of plants duly modified are the descendants of individuals which have branched into variations, but that a great portion of the seven or eight thousand are not even real individual types, but sections of a genus or kind embracing a certain class of variations, which have peculiar affinities to each other, and which in many, perhaps in most, cases cannot now intermix with plants of another section. The circumstances of the genus Crinum do not speak with less force as to this point. When I first introduced and described a number of species of Crinum which had not been known before in Europe, I was greatly censured by some experienced botanists for asserting that plants, which they held to be species of Amaryllis, were in fact variations of the genus Crinum, and it was even declared that Crinum was more nearly allied to Pancratium than to the species in question. I proved the justice of my botanical view of that point by obtaining not merely sterile mules but a fertile offspring between the Common Cape Crinum, which was before erroneously called Amaryllis longifolia, and the great Crinum pedunculatum of New Holland. I have now in my garden a further seedling from such a mule, between the Crinum Capense and Crinum canaliculatum which is closely akin to pedunculatum, with ripe seeds upon it. Gene-

rally these mules become impregnated by the pollen of Crinum Capense, of which a great bed stands near them, and the offspring being two-thirds Capense, revert nearly to its aspect; but the plant above mentioned did not revert, but exhibits an improved form of the mule, and is in fact a new fertile species. The freedom with which species of Crinum of the old Linnæan section and most of the section I added thereto interbreed, furnishes decisive proof that the facility of intermixture is not confined to genera in which species have been rashly formed out of seminal varieties, but is found when the species were even erroneously considered to be of different genera. There is every reason to believe that Thuja and Cupressus have bred together, and those who look to the small difference between them will become satisfied that they form two sections of one genus. Sinningia has been crossed with Gloxinia, and the produce is capable of being crossed again. They are indubitably of one genus or original kind; and perhaps not they only, but Gesnera also and Achimenes. When we look to the botanical characters, the characters of very many genera, of which all the species are not generally cultivated, are frequently false as to matter of fact, because opportunities have not occurred, or have not been carefully used, of comparing all the species in a live state, and in dry specimens the truth cannot be always ascertained.

Therefore, if it be admitted, that there is little probability of obtaining a cross between two plants generically distinct, it does not follow that it would be needless to attempt an intermixture between all that bear and have long borne different generic names. Some observations on the inaccuracy of the views of Martius and De Candolle concerning the Gesneraceæ, as stated in the Bot. Reg. 1845, 3, will illustrate my meaning. The question arose in that article, whether the subject was to be called Gloxinia or Gesnera tubiflora. I have premised that the separation of Sinningia from Gloxinia has been disproved by the crossed produce, which even bears seed. First, then, as to Gesneria or Gesnera, *the alternative* of "five protuberances at the base of the corolla or an equal swelling all round," is no generic distinction, if the swelling of the base is to furnish such a distinction compared with a protuberance on one side. These protuberances depend in part upon the relative posture and inclination of the calyx and tube. They are so various in different species, that Achimenes patens has a long spur projecting from the prominence of the base. A like objection applies to the definition, "two or five glands round the ovary," which shows that the thing set forth, as the fixed and determining character, is a varying feature. Proceeding to the definition of Gloxinia, we find, 1. *calyx equal*, as distinguishing it from Gesnera, with

calyx somewhat unequal. The fact is not so. The two upper lateral segments in Gloxinia speciosa and hirsuta have a disposition to be smaller than the others. The calyx of the order consists of one upper segment and two pair of laterals, and there is often a little and not very certain difference between the two pair. Their relative size is manifestly unsteady. 2. Corolla protuberant on one side only of the base. It will be found that the protuberance varies in the species according to the greater or less depression of the corolla. In Gloxinia speciosa it is bent downwards so rigidly, that the base can only swell upwards. In Gloxinia hirsuta the corolla is not depressed and *the base is very different.* Proceeding to Achimenes, we find an assertion utterly unfounded, that the anthers are separate, being united in the two former genera. I have before me the anthers of Achimenes coccinea, pedunculata, hirsuta, &c. all as closely attached together as those of any Gesnera. I have also seen a few flowers in which they were separate, but I believe in a barren and imperfect state, and I find them more ready to part when they decay. Having disposed of those false facts, let us see what distinctions remain. *Gesnera*, corolla tubular. *Gloxinia*, funnel-shaped, or somewhat bell-shaped, inflated in the middle. *Achimenes*, tubular and funnel-shaped. Those differences, if correctly stated, would only show that there is a variability in the swelling of the tube in different species, as there is in a much more decisive manner amongst the various species of tropical Convolvulaceæ in the genus or section Pharbitis; but those facts are also incorrect. The corolla of Gloxinia hirsuta is not inflated, but nearly cylindrical, with furrows; on the other hand, that of Gesnera zebrina and Geroldtiana is immoderately inflated, and nearly similar in form to that of Achimenes pedunculata and hirsuta. What remains? Nothing between Gesnera and Gloxinia; a ring round the ovary to Achimenes. I can however point out one, which has not been noticed, of considerable importance between the fruit of Gloxinia and Gesnera as applicable to Gloxinia speciosa and hirsuta. The fruit erect. Gesnera, the fruit sub-horizontal, with a beak curved a little upwards and a different dehiscence. Again: Gesnera, calyx adpressed. Achimenes, calyx patent. No person can compare Gesnera zebrina and Geroldtiana with Achimenes pedunculata and hirsuta, and not see that they are much more closely allied to the latter than to Gesnera faucialis and bulbosa, and others which have the upper portion of the limb prominent and incurved, while that of the former is short, two-lobed, and recurved: but the calyx of Gesnera rutila is neither patent nor adpressed; the calyx of Gesnera Geroldtiana has the upper lobe of the calyx not adpressed, while that of faucialis is closely adpressed; there-

fore, if these characters are so important, another genus must be formed for Gloxinia hirsuta and another for Gesnera zebrina and Geroldtiana. The fruit of Gesnera tubiflora is horizontal, and I have no hesitation in saying that it does not conform with Gloxinia speciosa, but approaches rather to Gesnera zebrina, having the tube however less inflated. Here then we have a beautiful race of plants which are in cultivation, concerning which the most skilful botanists are quite adrift, and which lies open to experiments on the part of those who have opportunities of testing their respective individuality.

The genus Lycopsis is distinguished specially by Endlicher, as having the stamens included in the tube. I brought from Cephalonia a pretty unknown Lycopsis (L. sanguinolenta, *mihi;* staminibus non inclusis, limbo albo maculis sanguineis, foliis variegatis), scarcely distinguishable from Lycopsis variegata in its singularly variegated foliage, but having the stamens not included in the tube. I entertain no doubt of the possibility of crossing it with Lycopsis variegata, or of their joint origin in times long bygone. Let the cultivator therefore not be discouraged by every nominal generic separation, but let him take his own view of apparent affinities, and bring the accuracy of those separations to the test. It has not been unfrequent with eminent botanists to speak of the convenience of uniting or separating some plants generically; a remark which I can never observe without dissatisfaction. If botanical distinctions are matters of convenience, and not the limits assigned to His created works by the Almighty, and investigated by the humble researches of human science, the botanist is degraded to the mere character of an index-maker. It is a matter of convenience and useful to separate extensive genera, which have various subordinate forms, into sections and sub-genera, to which names may be affixed; but we render the book of botany a deceptive tissue in inconsistency if we lose sight of the fact that the genus or generic character is (or, according to our amount of knowledge, is presumed to be) the definition of the limitations of the created type, and confound the sub-divisions made by us for convenience with the natural divisions that originally proceeded from the Divine Artificer. I will exemplify this rather from my own immature views than from those of others, though the evil is of rapid growth amongst those to whom botany is a study and profession, and not, as to me, an occasional amusement, which has been often neglected for months and even years together. Perceiving that the plants called by me Choretis differed from Hymenocallis by the insertion of the filament into a callus on the anther, I inquired of those who were much better informed than myself whether such a difference existed amongst the species of any well-ascertained

and accepted genus, and no such genus could be brought to mind. I therefore, though with great hesitation, separated generically Choretis, which differed also like Ismene in bearing a globular seed that produced a bulb underground, not vegetating upwards till after a season of rest. I am now satisfied by the cross-breeding in the genus Narcissus, of which the sections (supposed to have been genera) are distinguished by greater diversity of stamens, that Choretis is not a genus, but a sub-genus or remarkable section of Hymenocallis. In the like manner I am satisfied that my late brother's gardener, Mr. Carton, now residing with the Duke of Northumberland, raised at Highclere two beautiful mules between Hymenocallis speciosa and Ismene calathina, and I am thereby convinced that, notwithstanding their diversity of form and habits, Ismene is also to be considered as a sub-genus or section of Hymenocallis. Such is the rectification of my own botanical views: but the matter does not rest there. If I have here retrodden my steps justly, the professors of the science on all sides must check their course a little, and retrace an infinity of crooked windings, and look not merely to petty differences, but to the general bearing of their sub-divisions. This very day a statement has issued from the pen of a most able botanist, that *no doubt can exist* of the propriety of accepting the generic separation of Spartium spinosum of Linnæus, alias Cytisus spinosus of Lamarck, as called Calycotome spinosa by Link, on account of "deciduous teeth and a truncated membranous edge to a calyx subtended by a bract," and its ranging with "stiff, spiny, yellow-flowered bushes;" and the establishment of a genus Retama for some sorts of Spartium, Syspone of Genista, Lembotropis of Cytisus; and the restoration of Laburnum as a genus is approved. I have not a word to say against the establishment of such subordinate classifications, as a matter of convenience; but if it is meant to exalt such distinctions into genera or original limitations of kinds created by the Almighty, I must protest against it as a total subversion of the true substance of botany; and I am persuaded that my distinguished friend does not so mean it, and has not sufficiently considered the consequences of thus blending great and insurmountable separations with lesser and subordinate variations. We have actually a mule between Cytisus Laburnum and purpureus, of which I shall speak more particularly, and those he proposes at this time of day to separate generically, for I presume that Cytisus purpureus will not fall under Laburnum. I hope that these observations may tend to draw the attention of botanists to the invaluable aid the results of cross-breeding afford to their labours, at the same time that they may excite the cultivator of plants to take the high station he ought amongst the scientific

investigators of the glorious creation by which Almighty God has surrounded him.

Hippeastrum and Narcissus are, I think, the genera in which the most remarkable convertibility of species has appeared. In the former genus no impediment has occurred in the intermixture of any of the various natural forms. Seed, when obtained, from Hippeastrum reginæ-vittatum has reproduced the cross-bred flower, though usually of rather inferior size. It is, I think, desirable to enter into special details. I stated (Amaryllidaceæ, p. 371) that I had found flowers of every cross-bred kind of Hippeastrum, after its stigma had been touched with the pollen of another bred by a different cross, produce seed abundantly; while those on the same stem, which were touched with their own pollen only, either failed to produce seed, or produced few, and those in a capsule very deficient in size and vigour. The observation of several years enables me now to say that this remarkable fact is almost invariable, and that, although the hybrids in this genus are capable of bearing seed by their own pollen, the admission of the pollen of another cross-bred plant of the same genus (however complicated the cross) to any one flower of the umbel, is almost sure to check the fructification of the others, so that the excision of the anthers in such case is quite superfluous, the difficulty being to get the individuals to fertilize their own germens. This remarkable fact led me to try a further experiment, and the result has brought to light a startling fact, that in the same genus the pollen of a cross-bred plant can even overpower the natural fertilization of a wild bulb of an unmixed species. For this experiment I chose a bulb lately dug up by Mr. Gardner on the Organ Mountains in Brazil, and sent to me by the kindness of G. Wailes, Esq., of Newcastle; closely allied to H. aulicum, of which it may be called var. Organense, or, if it be separated as a species, H. Organense, having the scape usually two-flowered, the red not intense or shining as it is in Aulicum, and the screen in the throat ragged and half-bearded. The very bulb lately dug up in Brazil was used. It produced two two-flowered scapes; the first pair of flowers were touched with their own dust, and the germens swelled; of the second scape, which was several days later, one flower was touched with its own, and the other by the dust of a fine triple cross from H. bulbulosum, var. pulverulentum by reginæ-vittatum, otherwise called Johnsoni. The ovaries of the three flowers impregnated by the natural pollen for a few days after the decay of the last flowers appeared to have the advantage, and the fourth continued smaller, and seemed likely to fail, when it unexpectedly made a rapid advance, and immediately the three others ceased to grow, and after a few days

perished entirely ; while the progress of the pod impregnated by the mule made vigorous and rapid progress to maturity, and bore good seed, which vegetated freely. The impregnation by the cross-bred pollen was therefore slower in taking effect, but had the same decided superiority over the pollen of the natural species as over that of any other cross-bred variety. The anthers had been taken out of the flowers before their expansion. This is a strange truth, and the more remarkable from the difficulty of obtaining cross-bred seed at all in the genera which are most nearly related to Hippeastrum, namely, Habranthus and Zephyranthes. Where no access from the dust of another individual is admitted, the hybrid Hippeastrum Johnsoni is capable, as I have stated, of reproducing itself by seed. A bulb of Solandrifloro-Johnsoni, of which all the flowers were set by their own pollen, produced seed vigorously from all of them.

My experiments among the Narcissean bulbs have produced still more singular results, which have been partly detailed in the Botanical Register. It will be recollected that in examining the various genera which had been carved out of Narcissus by Mr. Salisbury and Mr. Haworth, I discarded some of the separations as inconsistent, or founded upon trivial features ; and that I retained, as distinct from each other, Corbularia, with declined assurgent filaments ; Hermione, with very small oval anthers, almost sessile, and incumbent on decurrent filaments, with short incurved points ; and Ajax, with very long linear erect anthers and stout filaments, in great part free. These plants, viz., the hoop-petticoat, the daffodil, and the Polyanthus narcissus, are separated by features which, as far as my research extends, I can find united in no other genus of plants. With much greater hesitation I assented to the division of Hermione and Ganymedes from Narcissus, in which the differences, though of a like nature, are far less marked. There was still another separation of Queltia, of which there were two divisions, one with larger anthers coming nearer to Ajax, and one with smaller anthers including the jonquil. In the progress of my investigation I found that no person could furnish me with the seed of any Queltia of the class with larger anthers ; and, although wild localities are attributed to several of them, it did not appear that they had been observed to increase there or elsewhere by seed. On looking back two hundred years, to the time of Clusius, it appeared that he could not point out the place of their growth, but had received some expressly from a garden. A strong doubt had suggested itself to my mind whether these anomalous species were not garden hybrids produced above two hundred years ago, and admitted as natural species by botanists who did not suspect their origin. On the other hand, no plants

divided by such strong features of structural difference as Ajax and Narcissus or Hermione, had yet been found capable of breeding together. I had instituted a course of experiments to bring this mystery to light before the publication of my treatises on Amaryllidaceæ and hybrid vegetables, but the results were not sufficiently verified to make me think it advisable then to broach the subject. I will now state the facts and the course of my experiments. The macrantherous or large-anthered Queltias consist of five species, with their varieties:—1. Macleayi; 2. Montana; 3. Incomparabilis; 4. Orientalis; 5. Odora. Macleayi and Orientalis have not been ascertained to have been found anywhere in a wild state, and it is not stated that any person has known either of them to have produced seed.

Montana is likewise so circumstanced; but we further know that it was cultivated by Parkinson, and his expressions were considered as implying that the bulbs had been sent to him from the Pyrenees by a Frenchman. The words do not very clearly refer to this plant, but the name by which he describes it implies that he thought it a native of the mountains. But if a Frenchman had found it on the Pyrenees, how is it that it has no place in the Flora Gallica, and that it has never been discovered wild since the days of Parkinson? Incomparabilis has been found wild in France, and, I believe, in Bavaria; and it has been a question amongst collectors whether it was generated accidentally between an Ajax and Narcissus poeticus. There can be no doubt that in every respect, except the smell, it is, in all its varieties, such a plant as might be expected to be produced by such an union. It increases abundantly by offsets, and is common in our gardens, but it has not been found to produce any seed by those who attend to the cultivation of Narcissi. Parkinson states that its seeds are pretty large for a Narcissus, but very rarely produced; but he gives no account of its having been propagated by seed: and yet, if it had been a natural species, it might be presumed that it had been freely cultivated by seed to have obtained the three fine double varieties we possess, as well as single ones. Under these circumstances, I tried whether I could obtain seed from it by its own pollen, protecting it from the weather; secondly, whether it would make seed by any other pollen; thirdly, whether I could cross Ajax with Narcissus poeticus, and make the very plant. The result is, that I could obtain no seed from it by its own pollen; and that, although I had at the first one seedling Ajax by the pollen of Q. incomparabilis, the usual result has been a failure in all impregnations by it. Pollen of several other Narcissean plants were applied to it in vain; but by the application of the pollen of N. poeticus., var. stellaris, one of its supposed parents, I obtained a healthy pod, containing

nine large seeds; and plants are raised from them. I obtained seed from Ajax Pseudo-narcissus by the same pollen, which also vegetated. I also got, with the greatest facility, seed from the same Narcissus poeticus by Ajax luteus, var. propinquus, and var. maximus, and by all the varieties of moschatus, the pods being large, and the seed abundant; but I could not fertilize it by the pollen of Q. incomparabilis or odora, though botanically nearer to it in structure. Two pots full of seedlings of N. poeticus by A. albicans and cernuus were unfortunately killed by too early exposure to frost in the winter of 1837, after having been forced. I have since obtained similar crosses frequently, both from the wild pseudo-narcissus of Yorkshire and from the neat little Ajax minor. The result produced Haworth's Q. incomparabilis and aurantia and another form from the same pod, as figured in the Botanical Register; and afterwards various hybrid varieties with both pale and orange cup, like a single orange-phœnix of the gardens, and the Queltia concolor named by Haworth from a lost plant of Parkinson's, and his Q. alba; and also, from Ajax minor, varieties of smaller stature. From incomparabilis itself, by the pollen of N. poeticus, was produced a very pleasing new plant, figured as Narcissus Spofforthiæ in the Botanical Register, which, with a larger and orange cup, had the generic features of a true Narcissus, like poeticus; and it seemed very evident that another cross by the pollen of poeticus, or at most two, would actually produce a genuine N. poeticus from the descendants of Ajax Pseudo-narcissus, and extirpate the female type. I have not had leisure and opportunity to follow up that experiment, the bulb having been planted out, and the Narcissi do not make seed so freely in the border as when forced and kept from strong sunshine.

The facts above recited are sufficient to establish the point, that the several varieties, single and double, of Q. incomparabilis were raised between N. poeticus and some yellow Ajax, above two hundred years ago, and that more varieties may be obtained by following the processes above stated. I apprehend that the yellow parent has been A. Pseudo-narcissus, var. nobilis, the Pseudo of Redouté, in which I have perceived a similar unpleasant smell. By the pollen of a cut flower of that N. Spofforthiæ I obtained twelve very strong seeds from N. montanus, taken up just before it flowered, and potted at the Fulham nursery, placed in my room in Portman Square in 1842, and deprived of its anthers; the only pod of seed N. montanus is recorded or known, as far as I can hear, to have ever produced. Those seeds were unfortunately mislaid in removing from London, and were never recovered. The pollen of N. montanus, whether it be a natural plant or not, is very fertile. I have flowered seedlings

from Ajax minor by it, and very neat and pretty things they are. I have also flowered seedlings from N. poeticus by it, and they are remarkable, having the widely expanded limb of poeticus, with the drooping posture and long cup of montanus, in one of them a little edged with red. This is a strange circumstance. A plant, widely distinct from any other species, cultivated above two hundred years, not since found, as far as I can learn, where it was supposed to grow, or elsewhere, except in gardens, producing no seed by its own pollen usually, if ever, yet very ready to fertilize its neighbours, and to be fertilized by a cross-bred plant! If it be cross-bred, I should say that Hermione dubia and N. (Ajax) candidissimus of Redouté are its most probable parents. From Ajax Pseudo-narcissus and minor I have many crosses by Hermione, especially the variety called States-general by the Dutch; they make the genus Diomedes of Haworth. Pseudo by States-general produces a very handsome, vigorous, two-flowered, yellow Diomedes, with some little variety of shape and tint. I have given a figure of one from A. minor in the Register, and it will serve to show how Diomedes Macleayi and Sabini, of Haworth, originated. Sabini produces no seed by itself, but I have had seedlings from it by N. poeticus, which have been rather neglected.

We must next consider Q. odora, of which there are ten or eleven varieties, but no person has been able to produce to me a seed from any one of them; and, though several spots in the South of Europe are pointed out as their native places, I cannot learn that any botanist has found their fruit. M. Loiseleur des Longchamps, the author of the 'Flora Gallica,' to whom I am obliged for the urbanity with which he has replied to my inquiries concerning the French Narcissi, assures me that it is certainly indigenous in France; but he admits the fact that he has never heard of its seed being found; and, although its seed is mentioned in the Neapolitan Catalogue, Professor Tenore could give me no tidings of it.

Clusius above two hundred years ago received the variety calathinus from a Dutch garden, and was ignorant of its native country. Bulbs of the variety isometra, which I described for the first time (p. 416) from a specimen gathered under the chesnut trees in Madeira, have been since imported from thence, but I cannot learn that any seed of it is discoverable, and I believe it is confined to a particular spot. It is observable, that the chesnut woods in Madeira are not indigenous; and in them, and them only, Amaryllis Belladonna is now found abundantly, though certainly not an original native of the island, and not observed there by Masson. It is further to be considered, that as we possess many varieties of Q. odora, they could not have been obtained

without cultivation by seed, unless we suppose that they are all to be found in different localities equally sterile, which is almost an absurdity. How then could they have been made? From my experience in breeding mules, I said from the first that if Ajax luteus could cross with the jonquil, it would produce exactly such plants, and that all the varieties might be obtained by fertilizing the latter by different varieties of Ajax.

These sentences are printed from a page written eight or nine years ago, and the opinion therein expressed has been since verified. Such plants have been raised both by myself and by Mr. Trevor Alcock near Carmarthen, and, having flowered, have shown that the Linnæan N. odorus, the genus Philogyne in all its variations, is cross-bred between Ajax and jonquil. Concerning the sterile Q. orientialis (Schizanthus of Haworth), I am quite satisfied that it is a cross between Narcissus, either poeticus or albus, and Hermione Italica, probably var. præcox. I have been able to obtain no cross from any Narcissean plant by the pollen of odorus, orientalis, tenuior, Bazelman major or minor. The pollen of the double Roman and Soleil d'or Narcissi of the shops is sterile from long cultivation by offsets.

I think there is a strong presumption that the whole section of large-anthered Queltias (Amaryllidaceæ, p. 413) are cross-bred plants of long standing in our gardens; and the probability is that they were raised above two hundred years ago in a Dutch garden, either by accident, from the contiguity of the species in cultivation, or more probably by the skill of some gardener who may have possessed the secret of hybridizing them, and suffered it to die with him. It must be remembered, that wherever a cottage garden existed two or three centuries ago, the bulbs that were grown in it, if the climate is congenial to them, may continue to be reproduced; that cultivators may even have amused themselves with planting a bulb in any coppice or pasture; and that bulbs may be carried into the fields with manure, or dropped by accident; and that the existence of some of these Narcissi in particular spots in France where they do not make seed cannot be taken as proof of their being natural species and indigenous.

There is another portion of the Narcissi which labours under a like suspicion—I mean the family of Hermione bifrons. I am of opinion that bifrons and compressa were both raised between a yellow Hermione and a jonquil, and I entertain no doubt that they can be so reproduced with variation. Not having had any stock of single jonquils, and having been disappointed in the Dutch bulbs which were purchased for the experiment, but which proved to be calathina, I was not able to bring this to the test; but the crosses which I have obtained between Ajax and Hermione make it certain that jonquil, which is nearer allied to

Hermione, will mix with it. I have seedlings from A. pseudo by a yellow H. brevistyla, from A. minor by papyracea, æquilimba, and italica or States-general. All the breeders were forced near a month before the time of flowering, and were carefully deprived of their anthers some days before expansion by making an incision in the tube and drawing them out at bottom, so that they did not approach the stigma; and the non-access of the natural pollen was proved by the invariable failure of all the flowers touched with the pollen of certain plants, and the success of almost all touched with that of certain others. For instance, the failure was complete with pollen from Double Roman Hermione which seemed very dry; of Soleil d'or (doubtless because the bulbs have been raised by offsets for three or four centuries); of the large-anthered Queltias, except montana; of Bazelman major and minor, which I am satisfied are crosses between Hermione brevistyla and Narcissus poeticus; of N. gracilis and tenuior; of Corbularia and Ganymedes; while it is remarkable that almost every Ajax flower touched with pollen of Hermione States-general has seeded. The application of pollen of Ajax luteus or moschatus to Narcissus poeticus is almost sure of success. The constitution of the seedlings was very different. The seed of A. pseudo-narcissus crossed with A. luteus came up readily, and grew so fast and weak in the green-house in winter that it was necessary to put the pot out; that of the same Ajax which was impregnated by Hermione brevistyla came up very slowly, much of the seed rotting, and the seedlings did not find the house too warm, and were twice as many months as the others were weeks in reaching the same stature, and proved so delicate that, having been planted out in May, all but one of the first batch, which was much injured, rotted by the cold and wet in the autumn. One drawback is, that the seed of Narcissi is very apt to lie two years in the ground, unless sown immediately; and to rot if it gets too much wet before it is ready to vegetate; and that the snails are apt to destroy the seedlings if raised in the open border; and that the mule seed, however good and fine, is more apt to suffer than the natural seed.

N. gracilis and tenuior lie under the same suspicion as the Queltias. Their native country cannot be shown; their seed has not been seen; that which I described (p. 316), as less round than the seed of N. poeticus, was from the Chelsea Garden; but it proved to be seed of the larger and lesser jonquil, misnamed by a mistake. There is an outline in Parkinson of a plant said to be from the Pyrenees, which looks like tenuior; but I very little heed this; for if the mules were raised by the secret skill of some gardener, he would have been likely to state a false origin. I apprehend that they can be produced between jonquil

and Narcissus poeticus or albus, gracilis from the larger Narcissus, tenuior from the diminutive pale poeticus which I have had from Florence; and I have more than once had seed from N. poeticus by the jonquil, which would indubitably have produced N. gracilis, but the seedlings have been neglected and the labels mislaid. Neither gracilis nor tenuior have been known to bear seed, nor has any native locality been assigned to them. I believe them to have sprung from the larger and smaller varieties of poeticus. That Bazelman major and minor of the shops, and Sweet's Hermione Cypri are the produce of poeticus and a white-limbed Hermione, and N. bifrons and compressus of Tazetta and jonquil, I consider to be as certain, as if I had obtained them from seed, and I have not troubled myself to make the like.

There is ample room for further experiments in this race of plants, from which much vernal beauty for our gardens and rooms may be obtained, and even the curious little autumnal Narcissus and the autumnal green jonquil may be brought into action. But the great value of these experiments lies in the strong light they throw on the wide variation which the Almighty has permitted from his created type with licence to revert towards the abandoned form, and by intermixture to produce new forms, while in other races, which exhibit less diversity of form amongst the species, the variation seems fixed. There cannot be more perfect similarity of structure and habit, excepting a difference in the size of the seeds, in any two plants of different species than in Schizanthus pinnatus and retusus, and yet I have tried so many chances on both plants without success that I believe they will not intermix at all. The same observations apply precisely to Anomatheca juncea.

While the foregoing sentences were in the press, a curious anomaly in the strange race of plants of which I have been treating (the Narcissi) has come to light, though we had some obscure notices before of such a tendency in the genus; I mean the obliteration of its cup; which was ingeniously compared by a friend of mine to the removal of the part of the hero from the tragedy of Hamlet. N. deficiens, *mihi*, from Sta. Maura, has no cup that I can distinguish without a magnifier, and the little ridge that exists is imperfect, and in some of the plants takes the form of six minute separate teeth. The cup had been dwindling away to little in the other known autumnal species, and we have an obscure notice of an eight-flowered Narcissus obliteratus, said to be found near Mogadore. This suggests to me so strong an illustration of the probable origin of races and their departure from one point, that I must be permitted to pursue the subject a little further. N. deficiens has one or two short, slender, cylindrical leaves, just like the flower-stalk, and one small white star-

shaped flower with a tube, and an abortive attempt to produce the rudiment of a cup. The order contains Narcissi with the filaments included within a cup; the Pancratiform plants, in which they are connected by the cup; the Amarylliform, in which there is no cup, but often an irregular manifestation of the membrane that forms it in the shape of ring, screen, or beard, or even supernumerary anthers; and the Caulescent plants, such as Alstrœmeria. I wish to illustrate the possibility, and even probability, of their being all branched from one created type, however dissimilar at the remotest extremities of the order. First, then, I consider N. deficiens to be the nearest existing plant to the first Narcissus; and turning to the Pancratiform plants, I find Cavanilles's Pancratium humile (*Tapeinanthus*, Herbert corrected to *Tapeinægle*, the former name having been preoccupied, but perhaps referable to genus Lapiedra), in size, bulb, foliage, stalk, and flower nearly similar to N. deficiens, excepting the yellow colour of its limb, and its sometimes bearing two flowers on the stalk, like N. obsoletus. Its cup is so deficient, that in the one dry specimen I have seen I could not perceive it without a lens, and it was merely a minute exhibition of a thread of connecting membrane. The most conspicuous difference is the prolongation of the filaments, and the want of a tube. Cavanilles's plate is very inaccurate. The specimen had a one-flowered scape five inches long, peduncle above one-fourth, spathe eleven-sixteenths of an inch, germen short, subordinate, perianth seven-sixteenths long, segments about one-tenth wide, cup scarcely anything but a manifestation of the membrane visible with a magnifier. Here then we have what we may suppose to be nearly the form of the first attempt to produce the Pancratiform plant. The abbreviation of the tube from many inches to a fraction occurs in the genus Hippeastrum. But I have another autumnal flower at this moment just appearing, Carpolyza spiralis, of the Amaryllidiform section; and in what does it differ from N. deficiens? Bulb, leaf (except its not being erect), scape, spathe, season, size, and shape of the flower similar, and the colour nearly so; bearing sometimes three flowers; but it has the fleshy seeds of its division, and it has no manifestation of the membrane. Here then we have what we may take as nearly the first type of Amaryllis, Crinum, and the whole division to which they belong. Approach these three, and compare them; and, however widely they have departed from each other at the extremities of each division, who will venture to say that they could not have proceeded from one type?—or that Carpolyza without the membrane may not be the very root and foundation of the order? Is the breadth of a hair in the position of a thread of membrane, either between or behind the filaments, or

its total absence, requiring keen sight or a lens to discover it, a variation impossible in the course of generations since the creation of vegetables before the sun shone upon the earth? Is it a feature of difference as conspicuous as those which daily occur amongst seminal varieties? And does it not derive its importance (for I do not underrate its importance) merely from its having become in all its further development a fixed character and the badge of a peculiar family? It must be remembered, that even amongst the Pancratiform plants, Urceolina has even less rudiment of a cup than N. deficiens, and that in Pentlandia, which in every other respect is a perfect Stenomesson, with which it is perhaps capable of breeding, there is no vestige of the membrane which forms a cup. Then turn to Alstrœmeria, and look at Alstrœmeria pygmæa, Herb. Am., pl. 8, and see something like the first attempt to produce that race, a solitary pale-yellow flower on a short stalk, with a few narrow leaves at its base, and see how near it comes to the Tapeinægle humilis; having, however, a palmated tuber, and therewith the disposition to a leaf-bearing stalk—a variation occurring in some genera amongst plants of which the flowers are conformable, as in the group of Sisyrhynchium. The round turnip has this very year degenerated into a bunch of keys in my fields, in consequence of the state of the atmosphere, as I know to my cost; and since the change of weather some turnips are beginning to form a round root on the top of the bunch. Here I see, to my cost, how the condition of earth, air, and water can affect the conformation of a root; and I learn what the changes that have taken place since the great era of the creation of vegetables may have done in that respect. I should take Zephyranthes minima, and Gracilis, Carpolyza, Hessea, and Acis, to be nearest to the created type of Amaryllidaceæ.

II.—*On the Ventilation and Covering of Hot-houses.* By Mr. Thomas Moore.

(Communicated Sept. 19, 1846.)

It is a well-known fact, that in producing an artificial climate for the growth of tropical plants, or for the purpose of forcing those which are natives of more temperate regions, the less amount of artificial heat which is applied in keeping up a proper degree of temperature (so that this is done), the better will that climate be suited to its intended purpose, all other things being equal; and it is especially at night when the plants are surrounded by darkness, and when excitement would be more than ever hurtful, that this becomes of increased importance. At night, too,

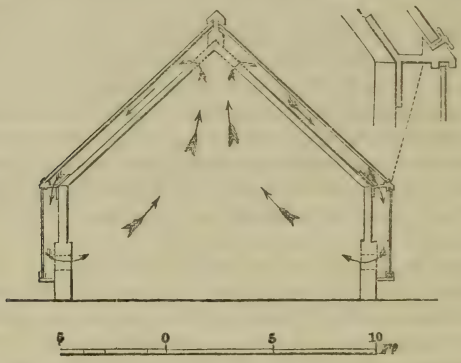
it has been found that a depressed rather than an elevated temperature is desirable for the healthy development of all plants requiring artificial heat, inasmuch as they will not thrive without their natural season of repose.

From the changeable nature of our climate, there is some difficulty in apportioning the degree of applied heat so as to suit exactly the requirements of the plants; and it is especially difficult to maintain with certainty the low degree of night temperature which would be desirable, and at the same time avoid risking the safety of the plants through a sudden and unexpected declension of the temperature of the exterior air. These difficulties under present circumstances have to be surmounted by a degree of watchfulness and care which presses heavily upon the daily rest of those whose duty is thus involved, and incapacitates them to a certain extent for those studies which are indispenably connected with honourable proficiency in their vocation; nor is this watchfulness, though rigorously maintained, at all times attended with success.

It appears to me that the end in view would be much more effectually and certainly secured by a *complete system* of covering hot-houses and forcing-houses; and this, too, would very greatly relieve the attendants. I am aware that night-covering is a generally acknowledged benefit, and that it is in some cases acted on; but it should be more universally and more systematically followed up. To assist in bringing the principle of night-covering into more universal application is the purpose of the following suggestion.

I need not stop to show *how* night-coverings prove beneficial. It is sufficient to state that whatever prevents the radiation of heat from the interior to the exterior atmosphere through the conducting agency of the glass, decreases in the same ratio the amount required of *applied* heat, and hence saves the plants from being submitted to unnecessary excitement. The principle upon which a covering acts most efficiently is that of enclosing a complete body or stratum of air exterior to the glass, this body of air being entirely shut away from the surrounding outer atmosphere; and as air is a bad conductor of heat, the warmth of the interior is by this means prevented from passing to the exterior atmosphere; or, in other words, the exterior atmosphere being prevented from coming in contact with the glass cannot absorb from the interior any sensible proportion of its heat. To secure this advantage, however, the coverings *must* be kept from contact with the glass, and they should extend on every side where the structure is formed of materials which readily conduct heat, such as glass or iron. The coverings, in fact, should form neither more nor less than *a close outer case.*

One point connected with the application of these coverings which I consider would constitute an improvement, and which, as far as I am aware, has never been acted on, is that of having them to fit so accurately as to exclude the external air (a matter of no difficulty in the degree required), and then to have a series of ventilators provided, to stand open during the night, whereby an interchange of the atmospheric volume would take place throughout the night, without exposing the plants to contact with cold air. The stagnation of the internal atmosphere would thus be prevented, in consequence of the interior air, and the air between the glass and the covering being of different degrees of density owing to their being differently charged with heat. By this plan, therefore, I conceive that direct benefit would accrue to the plants; and it would also materially assist in preserving that cooler—but not cold—night temperature, which the fear of injury from frost prevents from being now fully realized in ordinary cases.



The annexed diagram represents one of the many ways in which this idea might be carried into practice. It will be understood that, as here shown, the side shutters and end shutters (the latter not indicated) fit into grooves, the upper groove being attached to iron pins, and thus fixed at a proper distance from the building without obstructing the passage of air along the enclosed space, and that on the lower side being so fixed as to exclude the external air in that direction. The top or roof shutters also run into a groove along the ridge of the roof, and at the lower end fix close down to the top of the side shutters, fastening with a button. Each of the shutters should have a projecting fillet fixed on one side, so as to shut close over the adjoining one. The shutters, themselves, should of course be made of light frame-work, strengthened where necessary with

small iron rods. The material used for covering them may be the asphalte felt now manufactured extensively for roofing purposes, or strong brown paper coated with tar; the latter is used extensively in Germany for this purpose, and is found to be *very durable and cheap;* it is there even preferred to every other material.

Though the covering of hot-houses has been already practised in some cases, I am not aware of any one having adopted a close covering with the view to facilitate *ventilation or aëration during the night.* It appears to me that the circulation of air, secured by the means here proposed, would have much influence in excluding cold, whilst at the same time it would prevent the interior from becoming too warm and close.

5, *Gloucester-place, Regent's-park.*

III.—*Facts connected with the Potato Disease.* By Mr. John Towers, C.M.H.S.

(Communicated October 23, 1846.)

It might appear superfluous to dwell longer on an infliction which has formed the subject-matter, as it were, of all the periodicals on rural affairs for above twelve months. Nevertheless, as a member of the London Horticultural Society, I should not be satisfied were I to withhold the communication of experiments and results performed and obtained by myself, without any interference which could affect the condition of either.

In common with others, my then extensive and most beautiful winter crop became affected in August, 1845. The earlier varieties of ash-leaved, middle, prolific-kidney, and round potatoes (all white), suffered little. I caused the haulm of all the winter reds to be cut over and burnt, but that of the Champions and "July" variety (so called) was left untouched. During the dry weather of October all were dug. The crop would have been great, but a sixth part, or thereabout, was either so decayed or affected as to be deemed worthless. The remainder was stored in a dry airy barn, but so covered by new straw and a rick-cloth as to be quite secure from frost.

The only circumstance of moment which I noted as then peculiar to the disease of 1845 was the fermentation of the entire cellular substance of a few of the largest tubers, even as they were digged. It bore every appearance of strong working yeast—frothy, and in texture nearly adhesive and ropy as birdlime—the fermenting pulp emitting highly fœtid *ammoniacal* gas, discoverable by the approach of a glass stopper moistened by muri-

atic acid. I have witnessed nothing similar in the totally decayed tubers of 1846, they being altogether rotted as if by immersion in water. The labourers here remark the same circumstance, saying, that "now they have the *wet* rot, whereas last year it was the *dry*."

In 1845, after permitting the store to remain quiet for a month, I had it looked over, and removed another quantity of decaying tubers. It was then I perceived, as others had remarked, that strong sprouts appeared at the rose or crown ends, even when the fibrous end of junction with the plant was greatly affected. I selected a bed of good loam for seven eight-yard rows. Furrows were made, and the sprouted decaying potatoes were planted in them one foot asunder, all of them dusted over along the course of the drills with dry air-slaked lime. The course of each row was sprinkled with coal-ashes over the covering earth. Had frost occurred, the rows would have been further protected, but it did not, and broad beans were dibbled in among them, about ten inches apart. Notwithstanding the precocious excitability of the eyes, a phenomenon which has not as yet been observed (October 19, 1846), the shoots were so tardy in the spring, that, fearing a total decay, I set early sound kidneys in the intermediate spaces, and these rose before the November sets. At length the shoots of the latter appeared, with here and there a blank, and both varieties progressed together, as also some of the beans; but as a burning heat with aridity was established by the 22nd of May, the bed became droughted, and when new potatoes were wanted, the ground and the lime with which the potatoes were covered were found dust dry. A second progeny, some not larger than peas, had been produced from pre-ripe young tubers, themselves not so large as walnuts. Both plantings remained healthy till the first week in August: then the dark-brown spot, with mildew round it, on the under side, appeared in the leaflets. When the stems became feeble, I pulled the whole up entire.

Results.—The kidneys failed as to yield, but very few were diseased. Some rows remain in the ground, which now is so poached with perpetually recurring rains that it is difficult to move it: the crop from the defective tubers was fine flavoured.

2. *A row* of very early kidneys had been left in 1845. The tubers were therefore deep, but they produced extremely vigorous shoots, which remained healthy till August 3. On their foliage I first observed the spot and the accompanying mildew. Under a powerful lens this fungus was most beautiful. Upon its fibres, spores were seen of an oval form; the fibres rotated if touched by the breath, and some spores were then seen to explode. Though the foliage and stems failed rapidly, I found

little decay of the tubers in September, and their quality was very good. This experiment proves that "self-sowing," as it is termed, is no security from *disease of the leaf* at least. In another instance, one large solitary plant had died away completely, and became a pale buff. I digged the potatoes, and found a great return. One only was tinged with the reddish corrosion so much resembling that which is seen in the bruised pulp of an apple.

So fine were these potatoes, that about the 1st of October I had a row of more than 10 yards planted with the entire smaller, or the *halves* of the larger tubers.

3. During the course of April all my potatoes were planted; and, whether entire or cut, the tubers were coated with dry lime before they were placed in the ground, and more lime was sprinkled over them before they were covered with earth. In the month of August, whatever the situation or the variety, the leaves of all became affected. In one instance the haulm was cut off within 9 inches of the surface, in others it was left untouched, but I could perceive no difference in the results. Some tubers (yet comparatively few) became spotted, others a mass of brown watery pulp, but of most the quality was, and remains, good.

The inferences I draw are these:—No security has been obtained by any precautions adopted by me or by others with whom I have conversed.

4. The old store was finally inspected in April, when some gallons of diseased tubers were removed, and, with a quantity of sproutings and some damp straw, were thrown in a heap near a ditch. There, after a few weeks, numbers vegetated, formed a mass of luxuriant verdure, and those plants remained long free from taint. At length they fell over, and died away, when it was found, by inspection of the mass, that only a very few tubers, none so large as a walnut, had been produced—proving that decayed vegetable matter, without any of the proper earths, was entirely insufficient to support potatoes. Peat or heath soil from Bagshot I have proved to be a most fertilizing medium; but though from one four-ounce tuber I had twenty-eight returned (some much larger), yet the quality as to flavour was not satisfactory: hence it should appear that *loam* is required to support the tuber.

5. *The period* of planting appears to possess some influence: thus, within half a mile of my residence, there is a field of several acres which I remarked in passing to be perfectly green and healthy on the 17th of September. I saw it again a month after, and perceived no change. The foliage appears to have escaped infection, perhaps from the late planting, which was not made

till after midsummer. I shall try to inspect the crop of potatoes, if indeed there be any.

If very late sowing be a preventive, it remains to be seen how autumnal planting may succeed. I have put in all my late sorts in deep drills made in new loamy soil without manure, excepting a sprinkling of dry sawdust mixed with one-third of coal and wood ashes, with a small quantity of coal-soot. Rain has fallen in great profusion, and the ground is a swamp. I made no selection, and must wait the result.

IV.—*Note upon Daphne Fortuni, a new species introduced from China.* By Mr. Fortune, Curator of the Botanic Garden of the Society of Apothecaries at Chelsea. (*With a coloured plate*).

A BOTANICAL description of this charming shrub has been already published by Dr. Lindley in the first volume of this Journal.* It was discovered in a nursery-garden near Shanghae, in the winter of 1843. As it is deciduous in its habits it was then leafless, but when taken down to the south of China with the rest of my plants for the purpose of being sent to England, the warmth forced it into bloom, and I had the pleasure of seeing its flowers before it was sent off.

When I returned to the northern provinces in the spring of the following year, I found it wild on many of the hills in the province of Chekiang. It here forms a dwarf shrub, two or three feet high, and, like other deciduous plants, its leaves fall off in autumn. Like the English Mezereum, it is the harbinger of spring. In March and April the flower-buds expand, and then the whole of the hill-sides are tinged with its beautiful lilac-coloured blossoms, and have a very gay appearance. Before they fade, the Azaleas, as if in floral rivalry, burst into bloom, and give those northern Chinese hills a description of beauty peculiar to themselves.

The plant from which the drawing has been made reached the garden of the Society in good condition on the 26th of July, 1844, and flowered in England for the first time in January, 1846. It is to be hoped that it will soon be propagated in sufficient quantity to be given away to the Fellows of the Society; at present it is extremely rare.

Its Chinese name is *Nû-lan-ēe*. Like the Mezereum of this country, its bark is extremely acrid and poisonous, and is used by the natives to produce blisters on the skin, particularly in cases of rheumatism.

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* Vol. i. p. 147.

Daphne Fortuni.

In the garden of the Horticultural Society it is found to be very easily cultivated. It grows without much care in a loamy well-drained soil, and strikes freely from cuttings. It may probably succeed well if grafted on the deciduous hardy kinds of Daphne. The main points in its cultivation, however, are a well drained soil, full exposure to the sun when forming and ripening its wood during the summer months, and rest during winter when the leaves fall off. Attention to these matters will always secure a fine show of bloom in the early part of spring. If it is allowed to ripen its wood and lose its leaves in autumn, I have no doubt that it may be brought into flower at any time during winter by the application of heat, and is consequently well adapted for forcing.

It is impossible for me to say whether this plant will be hardy enough to endure our English winters, although there is some probability that it may. Its companions in the north of China are such things as Macartney roses, Glycine sinensis, Chinese pine, &c. The thermometer (Fahr.) on the Chekiang Hills often sinks to within a few degrees of zero, and I never met with the species in the southern parts of the Chinese empire. It is, however, planted out in the Society's Garden, and its hardiness will be proved during the present winter. Whether quite hardy or not, it will always be a favourite amongst spring flowers in the greenhouse, where it richly merits a place in every collection.

V.—*Report on Experiments made in the Garden of the Society, in* 1846, *with Seeds prepared by Mr. Francis Henry Bickes, of Mayence, on the Rhine.*

It having been announced that superior crops had been produced on very poor land, without the aid of manure, from seeds prepared by Mr. Bickes, considerable interest was in consequence excited. It was stated that favourable results were obtained from the discovery in Prussia, Austria, Germany, Holland, Belgium, France, and latterly in England.

Mr. Bickes having offered to prepare seeds for trial in the Society's Garden, various kinds were supplied to him for the purpose. The seeds for the experiments, when taken out of the respective packets, were separated into two as nearly equal portions as possible ; one portion was forwarded to Mr. Bickes for preparation, the other was retained for sowing unprepared, for comparison.

A piece of ground, 133 feet in length and 31 feet in breadth, was uniformly prepared. In this the seeds were sown in rows

across; the prepared portion occupying one end of the piece of ground, and the unprepared the other, leaving a vacant space 10 feet wide in the middle.

The Prepared and Unprepared seeds were sown in a similar manner, and on the same day, March 18th. Comparative observations, with regard to the appearance of the respective crops were made from time to time, and noted as follows:—

1. *Nemophila insignis.*—April 4, Prepared and Unprepared above ground. April 9, plants in both cases perished from cold and excessive wet.
2. *Gilia tricolor.*—April 4, Prepared and Unprepared above ground. April 9, Prepared appears better than Unprepared. May 11, both similar. June 17, Prepared scarcely so good as the Unprepared.
3. *Collinsia bicolor.* — April 4, Prepared and Unprepared equally above ground. April 9, Prepared appears the best. May 20, Prepared scarcely so good; and the same remark is applicable June 17.
4. *Chryseis crocea.*—April 9, a few plants above ground; in both cases similar. May 29, Unprepared the best.
5. *Papaver amœnum.*—April 9, plants in both cases up abundantly. May 11, similar. May 29, Unprepared appears the best. June 17, leaves from Prepared seeds rather broader; probably owing to the plants being less crowded than in the Unprepared.
6. *Godetia rubicunda.*—April 4, above ground, and in both cases similar; the latter remark applicable April 9, May 11, and May 29.
7. *Lupinus pubescens.*—April 9, Prepared, 42 up; Unprepared 44. April 13, Prepared, 54 up; Unprepared, 87. May 11, similar, plant for plant. May 29, Unprepared seems to have rather the advantage.
8. *Erysimum Peroffskianum.*—April 9, both up abundantly. May 11, 29, June 17, Prepared seems rather the best.
9. *Lupinus polyphyllus.*—April 9, Prepared, none up; Unprepared, 2. April 13, Prepared, 21 up; Unprepared, only 14 up. May 11, similar. May 29, several blanks in the Prepared; plant for plant similar to the Unprepared.
10. *Acer Pseudo-platanus.*—Seeds in both instances failed to vegetate.
11. *Madeira onion.*—May 11 and 29, similar.
12. *Large Spanish onion.*—April 9, Prepared scarcely so far above ground as the Unprepared. May 11 and 29, appearance similar.
13. *Radis rose demi-long.*—April 4, 9, similar. May 11,

Prepared, not so numerous, decidedly better, plant for plant, than the Unprepared.

14. *Malta lettuce.*—April 4, 9, similar. May 11, Prepared appears rather the best. May 29, similar.
15. *White Paris cos lettuce.*—April 4, above ground equally in both cases; Prepared seems rather the best; and the same remark is applicable May 11, but the contrary May 29.
16. *Yellow Malta turnip.*—April 4, plants in both cases above ground. April 9 and May 11, Prepared seems rather the best.
17. *Green-topped white carrot.*—May 11, similar.
18. *Red Castelnaudary beet.*—May 29, similar.
19. *Yellow-leaf beet.*—April 9, a few of the Prepared up; more of the Unprepared. May 19, similar.
20. *Lettuce-leaved spinach.*—April 4, a greater number of plants up in the Prepared than in the Unprepared; and the seed-leaves larger. May 11 and 29, Prepared seems rather the best.
21. *Pomeranian cabbage.*—Similar.
22. *Large green Savoy.*—April 4, 9, similar. May 11, Prepared rather better than the Unprepared.
23. *Fine dark-red cabbage.*—April 4, up alike. April 9, Prepared appears the best. May 11, one end of the Unprepared row scarcely so good as the Prepared; the other fully equal.
24. *Champion potato*—six whole tubers planted.—May 11, Prepared and Unprepared above ground five or six inches. May 26, earthed up; the plants in both cases similar.
25. *Haricot noir hâtif de Hollande.*—May 11, of the Prepared 17 up; Unprepared, only 1. Subsequently, the whole perished.
26. *Pois nain hâtif.*—April 9, all appearing. May 29, a few flowers expanded, alike on Prepared and Unprepared.
27. *Auvergne pea.*—April 4 and 9, similar. May 11, Prepared a little taller than the Unprepared.
28. *Windsor bean.*—April 9, Prepared, 33 just appearing; Unprepared, only 20. April 13, Prepared, 77 up; Unprepared, 68. May 11 and 29, similar.
29. *Barley.*—April 4, 9, and May 11, Prepared and Unprepared similar. May 29, Unprepared rather darker green and a little stronger than the Prepared. June 10, Awns appearing. June 17, Prepared about 1½ inch taller than the Unprepared.
30. *Wheat.*—April 4, 9, May 11, and June 17, similar.

It may be necessary to remark, that in Nos. 14, 15, 16, 17, 18, 19, 21, 22, and 23, the plants were thinned to regular distances, leaving an equal number of plants in the Prepared, and Unprepared rows. The barley, No. 29, and the wheat, No. 30, were sown in drills, six inches apart; the seeds being placed, by a marked rod, two inches apart in the drills.

The amount of produce resulting from the respective Prepared and Unprepared seeds is exhibited in the following Table.

			Produce from Seeds prepared.	Produce from Seeds not prepared.
			lbs. oz.	lbs. oz.
1	Nemophila insignis	. . . . .	..	..
2	Gilia tricolor	Whole produce, July 3	8 13	10 5
3	Collinsia bicolor	July 3	3 1	5 1
4	Chryseis crocea	Aug. 11	27 4½	23 13
5	Papaver amœnum	July 21	13 0	18 8
6	Godetia rubicunda	Aug. 11	14 6½	19 5
7	Lupinus pubescens	Aug. 11	19 11	18 9
8	Erysimum Peroffskianum	Aug. 11	11 3	7 3
9	Lupinus polyphyllus	Sept. 11	38 4	37 11
10	Acer Pseudo-platanus	. . . . .	..	..
11	Madeira Onion	Aug. 11	24 12	26 2
12	Spanish Onion	Aug. 11	5 1	4 0
13	Radis Rose demi-long	July 3	57 7	71 4
14	Malta Lettuce	July 3	43 5	41 12
15	Paris Cos Lettuce	July 3	51 3	55 8
16	Yellow Malta Turnip	July 3	19 15	25 7
17	Green topped White Carrot	Sept. 11	18 11	15 12
18	Red Castelnaudary Beet	Sept 11	98 0	116 4
19	Yellow Leaf Beet	Sept. 11	96 14	135 2
20	Lettuce-leaved Spinach	July 3	18 2	21 7
21	Pomeranian Cabbage	Cut close by the ground, Sept. 11	71 9	88 15
22	Large Green Savoy	„ „ Sept. 11	81 5	95 12
23	Fine Dark Red Cabbage	„ „ Sept. 11	74 0	82 0
24	Champion Potato	Tubers, dug up Sept. 11	37 10	44 5
25	Haricot nain hâtif de Hollande	. . . . .	..	..
26	Pois nain hâtif	Whole produce, July 3	10 12	11 4
	Prepared, Number of Pods 953 }	their weight	4 6	4 4
	Unprepared, „ 1,124 }			
27	Auvergne Pea	Whole produce, July 3	22 13	23 4
	Prepared, Number of Pods 1,033 }	their weight	7 15	8 3
	Unprepared, „ 1,139 }			
28	Windsor Bean	Whole produce, July 21	16 17	16 17
29	Barley, 5 rows prepared, against 3 unprepared, July 21		30 8	28 0
	(Grain 10 lbs. 13 oz. prep. 8 lbs. 14 oz. unprepared.)			
30	Wheat, 5 rows prepared, against 3 unprepared		13 14	10 12
	(Grain 21 lbs. 11 oz. prep. 2 lbs. 4 oz. unprepared.)			

It thus appears that, in eight instances, the return of produce is in favour of the Prepared seeds; and in twenty-three instances the Unprepared has the advantage. The potatoes, it may be remarked, were in both cases nearly all diseased; whilst in an adjoining piece of ground there was a good crop of sound tubers, with very few diseased. This can only be attributed to the depth of planting, which was much greater where the crop turned out the soundest.

ROBERT THOMPSON.

In my opinion the differences thus observed are mere accidents. I do not find that Mr. Bickes' preparation has any appreciable effect, either beneficial or otherwise.

JOHN LINDLEY.

VI.—*On the Culture of Asparagus at Killerton.* By Mr. W. Craggs, Gardener to Sir T. D. Acland, Bart., M.P., F.H.S.

(Communicated October, 1846.)

The large size and excellence of the Asparagus grown at Killerton having excited attention in consequence of its having been exhibited at the Society's Meetings in Regent-street, where it has successively obtained a Banksian Medal and a Certificate of Merit, Mr. Craggs has been requested to state his mode of cultivation; and he does so as follows:—

HAVING for some years been successful in the cultivation of asparagus, I beg to offer an account of my method; and although in this there may be nothing new, yet if fully carried out I am sure it will prove as successful with others as it has done with me.

About the middle of May, I select some of the finest heads for seed, and in autumn, when the seeds are ripe, I wash them out of the berry, drying them as quickly as possible, and preserving them in a dry place during winter.

Sow early in March, in a rich piece of ground, prepared for the purpose. I generally sow broadcast, in beds four feet in width; drawing the soil with the back of a rake equally off on each side of the bed into the alleys, so as to cover the seed about an inch in depth. The seeds are sown moderately thick, and after the young plants are about two inches in height, I thin them out to about three inches apart, which allows those that remain to become fine strong plants for next year's planting. Should the season prove dry, an occasional watering will be of great benefit.

In selecting the ground for permanent beds, choose a piece free from trees, and sloping to the south, if possible. I should prefer a strong sandy loam of the depth of three feet; if not naturally so deep, make it that depth artificially. Take out a trench two feet six inches wide and three feet deep; laying one-third of the soil on the vacant ground where you commence, and carrying the other to the place where you intend to finish. Suppose the trench to be now taken out, and the ground ready for trenching, lay over the whole surface, six inches in depth of dung from old hotbeds, shaking it well with a fork. Turn in

the first spit and crumb with a full length spade into the bottom of the trench, mixing the dung and soil thoroughly together with a fork, then throw on the other soil, until the second trench is the same depth as the first, and so proceed until you come to the last trench, into which throw half the earth taken back, and add dung equal to that for the first spit, mixing it and the soil well together with a fork as before. Now that the ground has been once trenched over, and the bottom spit thoroughly mixed, tread the whole surface, and again lay on it about six inches in depth of dung, shaking it well as before. Then proceed to trench the ground back, leaving the bottom spit that has been mixed with manure unmolested. Proceed as before, after the first spit and crumb have been turned in, mix the dung and soil well together with a fork, which will be two-thirds of the trench mixed, throwing on the top the remainder of the earth unmixed with dung, until you come to the first spit that has been mixed, and so continue until the ground has been all trenched a second time; then throw in the earth laid out at the commencement of the trenching, adding dung equal to that for the spit just thrown in, and well mixing it with the soil. There will now be an opening at the top, and one-third of the earth left at the bottom. Tread the whole surface over, and again lay on six inches in depth of dung, forking it up the hill, and keeping the same opening. The whole mass of earth and dung will then be thoroughly mixed from bottom to top, and the opening will take the remainder of the earth thrown out of the first trench.

The work should be done in dry (not frosty) weather—say in October. The ground being thus prepared, throw it up in rough spits, one spade deep, to be pulverized by the frost against planting time.

My time of planting is, when I observe the plants to have grown about an inch above the ground in the seed-bed, choosing a dry day when the soil will work freely. After having marked out my beds four feet in width, and having allowed two feet for the alleys, I strain a garden line on each side, and as before mentioned, with a rake draw the soil equally off the bed into the alleys about two inches and a half deep. I then strain the line exactly through the middle of the bed, and with the point of a dibble make light marks one foot six inches apart. That being done, I then strain the lines nine inches from the margins of the bed, being a distance of one foot three inches from the middle row, to the outside ones. These I mark in the same way as I did the middle one; but so that the plants will not be opposite each other. Every thing being now ready, plants are obtained from the seed-bed, selecting the finest and exposing

them as little as possible to sun and air. I place one plant over each mark made in the bed, spreading the roots out as regularly as possible on the surface, and laying, as I proceed, a little soil with the hand from the alleys on the plants, in order to fix them in their places. The bed being planted, I strain the lines on the outside, and with a spade throw the soil from the alleys over the crowns, covering them about an inch and a half, but not deeper. If any burned vegetable matter can be obtained from the rubbish heap, I should recommend coating the beds over, about half an inch in depth with it after they have been planted. In autumn, when the stalks are ripe, cut them down close, and clean off the beds, taking care not to disturb the soil, the crowns being so near the surface. Make a mixture of equal parts rotten dung and burned garden rubbish, and coat the beds with it three inches in thickness, just covering it with soil from the alleys. In this state allow them to remain during winter, and early in March run it through with a fork down to the level of the bed when covered.

I have cut a few heads the second year after planting; but in the third year one-half the fine asparagus that comes up may be cut without injuring the plants. The fourth year the beds are in fine bearing condition, and when in this state my method is to keep every thing cut, both large and small, up to the first or second week in June, with the exception of the heads selected for producing seed. After this time, I allow the whole to take its natural growth, and I find my beds to continue for years in a good bearing state. Some of them were made ten years ago, and I have cut finer asparagus from them this season than I did three years back. And I must mention further, that I have not put a barrow-load of dung on them for four years. In the summer months, I keep the rubbish of the garden burning, preserving the ashes dry until autumn, and, as soon as the asparagus is fit to cut down, I take off half the soil above the crowns with a fork, laying it on the alleys; I then put on three inches in thickness of burned rubbish, running it through with a fork as near the crowns as possible without injuring them. I then take a portion of the soil that has been removed and cover the bed with it, allowing it to remain on them through the winter. Early in March I mix the whole well together with a fork, and rake the beds off regularly, watering with manure water once a week through the growing season, if required.

I have grown a crop of turnips or lettuces on my beds every year since they were planted; but I do not recommend the plan if sufficient ground can be had for these crops in other parts of the garden.

VII.—*Further Observations on the Influence of Electricity on Vegetation.* By Edward Solly, Esq., F.R.S., F.L.S., Hon. Memb. Royal Agricultural Society, Professor of Chemistry to the Horticultural Society, &c.

(Communicated November, 1846.)

In a preceding number of the Journal * I drew attention to the subject of electricity in connection with the growth of plants, and briefly recapitulated some of the more important of the numerous investigations which have been made during the last hundred years, with a view of determining the nature and extent of the influence which electricity has been supposed to exert on vegetation. I also described a few of the experiments on this subject which were made last year in the gardens of the Horticultural Society at Chiswick; the general tendency of which, as far as the results of so comparatively small a series of experiments may be trusted, was certainly opposed to the view that electricity in its ordinary forms exerts any very marked influence on the growth of plants. The experiments described were designed with the object of endeavouring to augment or diminish the natural supply of electricity which, under ordinary circumstances, might be supposed to affect the plants; for it was imagined that if this power played so important a part in the phenomena of vegetation, any means which could either diminish or increase the natural quantity of electricity in the earth on plants would necessarily either assist or retard the growth of such plants. No result of this kind, however, was produced; but this was of course only negative evidence, which might be influenced by the form of the experiments and other circumstances; and in drawing the general conclusion that the direct effects of electricity on the growth of plants is far less than is commonly supposed, I was led to do so by other experiments than those described. Some of these I propose now to mention.

In the experiments at Chiswick just alluded to, no direct attempts were made to increase the natural effects of electricity by augmenting its quantity from artificial sources, in the manner described with such opposite results by the electricians of the last century; I was, however, enabled to make a series of observations of this nature through the kindness of Lord Hill, who intrusted the management of the following experiments to his excellent gardener Mr. F. Nieman, under whose superintendence I was quite certain they would be carefully and accurately carried out, and the results minutely observed and noted.

The place selected for the experiments was one of the grape-

* Vol. i. pp. 81—109.

houses in his Lordship's garden at Hawkstone, in which the convenience of a dry warm room attached was obtained; in this room, which was in fact part of the storehouse, boarded over above the furnace, a powerful cylinder electrical machine was arranged. The cylinder of the machine was about 20 inches by 16 inches, and was very well insulated, so that although the room was not always so dry as might have been wished, the machine always gave abundance of electricity even in wet and damp weather. Stout glass tubes of about 5 feet long passed through the back wall of this room into the grape-house, the tubes projecting several inches from the wall on either side into the store-room and grape-house. The walls were nearly 4 feet thick, being double, and containing flues. Through these tubes copper-wires of the 12th of an inch in diameter were carried, one end of each being connected with one of the two conductors of the electrical machine, the other ends of the wires being fastened to two rings of wire placed on the top of the separate stools well insulated with glass legs a foot high. Each conductor of the machine was thus connected with, and in fact made one with an insulated stool in the grape-house, the stools being placed at a distance of some feet from each other, and the wire suspended from the framework of the house by loops of white silk. When thus arranged, sharp and powerful sparks could be drawn in abundance from any part of the wires or from the tops of the stools when the machine was worked; whilst the latter was so completely apart from the house and plants as not to be at all affected by the moisture &c. necessarily present in the grape-house. It was also found that a pot of moderately moist earth containing a growing plant, when placed upon the wire circle attached to the top of each stool, became thoroughly charged with electricity when the machine was worked, and gave abundant sparks to the hand or a piece of metal.

The first experiment was made in October, 1845. Four sets of pots were taken, in all respects perfectly alike, each set consisting of five pots containing, 1, young plants of French beans; 2, young plants of the common scarlet geranium; 3, young plants of strawberry; 4, seeds of wheat; and 5th, seeds of mustard and cress. One series was placed on the wire-ring on the insulated stool connected with the positive conductor of the machine; a second on that connected with the negative; a third on a similar stool of wood wholly uninsulated, placed near the insulated stools as a standard of comparison, whilst the last was sunk in tan and exposed to the influence of bottom heat. The experiment was carried on for four weeks, the two stools being strongly electrified four hours a day, namely, from ten to twelve in the morning, and from two till four in the afternoon; during

this time the French beans came into blossom and formed pods. Those which were positively electrified were rather more forward than either of the other three sets, appearing to be about four days more advanced. Mr. Nieman, however, does not think that this could be fairly attributed to the influence of the electricty, but that it was caused by accidental circumstances. In the other plants no difference whatever could be observed, and the seeds came up at the same time and were in all respects perfectly alike.

Being rather surprised at this result, and having certainly expected to observe some little difference in the germination of the seeds, I requested the experiment might be repeated with some other seeds, and this was accordingly done in January, 1846, with pots containing wheat, barley, oats, mustard, and rye. The action of the machine was kept up four hours a day for three weeks, but in this case also no perceptible difference whatever could be observed. As in these two experiments, however, the conditions were very unlike those which ever can occur in nature, another experiment was tried at the suggestion of my friend, the Rev. E. Sidney, in which the plants themselves were left quite free and untouched, a peculiar electric state being brought about by induction, so as to resemble as far as possible the effect of an electrified cloud. For this purpose the insulated stools were removed, and a branched wire terminating in several points connected with the wire from the positive conductor of the machine was suspended over an uninsulated pot in which wheat was sown, a wire from the negative conductor being connected with the ground as in the ordinary manner of working a machine. The machine was worked as before four hours a day, and consequently the germinating wheat was exposed every day to the influence of the positive electricity given off from the pointed wires suspended a few inches above it. Another similar pot of wheat was kept by way of standard, and on comparing it with the electrified wheat from day to day no difference whatever could be observed.

Since to some extent plants growing thus under glass can never be fairly compared with those growing naturally in the open air, it became desirable to make an experiment with plants growing wholly in the open air, and for this purpose three sets of pots were arranged in the open air, two being placed on insulated stools, and the third placed close by, but uninsulated, the three being in all other respects perfectly alike. One stool was connected by wire with the positive, and the other with the negative conductor of the machine. Six pots were taken in each series, containing seeds of French beans, spinach, cauliflower, turnips, cabbage, and mustard. The machine was worked four

hours a day, from ten till twelve in the morning, and from four till six in the afternoon; the experiment was commenced early in July and continued till nearly the middle of August, and the weather being remarkably fine and warm, the machine worked well and gave abundance of electricity. In the middle of August the working of the machine was discontinued, the plants were all then perfectly similar, and during the whole time of carrying on the experiment no perceptible difference could be observed in any of the pots.

The general result to be drawn from these four experiments made on different kinds of plants is certainly opposed to the idea of much influence being exerted by free electricity on the growth of plants under ordinary circumstances. It is very possible that the arrangements devised for the purpose of these experiments were by no means the best, or those most fitted to exalt the effects sought for, but nevertheless a number of seeds and young plants were placed four hours a day under the influence of an unusual quantity of negative and positive electricity, and it is hardly possible to doubt that some effect would have been apparent were the free electricity of the earth and air of so much importance in connection with vegetation as has been supposed.

VIII.—*A Return of the Proportion per Acre of Diseased and Sound Tubers in the Society's Collection of Potatoes cultivated in* 1846. By Mr. R. Thompson, Superintendent of the Orchard and Kitchen-Garden Department.

A CONSIDERABLE number of varieties of potato in the Society's collection had been cultivated in the garden for many years. A change of soil became necessary; this, as well as want of space in the garden, rendered it expedient to plant out most of the varieties on a farm in the neighbourhood belonging to Mr. Jessop. This season the following varieties were thus treated, near the Thames, in a warm, black, sandy soil, loose for the roots of plants both in wet and in dry weather. It had no manure, as the latter appears to increase disease in the present over-excitable state of the potato plant.

The potatoes were planted in drills, about 21 inches apart. The length of drill which each variety occupied was accurately measured, and the produce carefully weighed, even to ounces. From the data thus obtained the following table has been computed:—

	Estimated Produce per Acre.						Per Cent. of Produce Diseased.
	Sound.			Diseased.			
	Tons.	cwt.	lbs.	Tons.	cwt.	lbs.	
Cornichon jaune, dit la Parmentier	10	14	22	–	–		–
Greenlaw's Seedling, No. 2	9	14	85	–	–		–
Bonne Belotte	9	14	49	–	–		–
Early Kidney	9	14	28	–	–		–
Jaune Blanche	9	9	6	–	–		–
South American	8	16	49	–	–		–
Greenlaw's Seedling, No. 26	8	10	98	–	–		–
La Jaune Haricot	8	6	9	–	–		–
Diack's Early Round	8	5	29	–	–		–
House-keeper's Delight	7	19	27	–	–		–
Greenlaw's Seedling, No. 27	7	14	74	–	–		–
Red Kidney	7	13	50	–	–		–
Flat White	7	6	75	–	–		–
Round Black	7	5	94	–	–		–
Greenlaw's Seedling, No. 30	7	1	46	–	–		–
White-eyed Red	6	16	14	–	–		–
Black Kidney	6	12	59	–	–		–
Golden	6	9	61	–	–		–
Early Purple Marbled	6	4	95	–	–		–
Greenlaw's Seedling, No. 14	5	19	18	–	–		–
Hâtive de Meudon	5	18	99	–	–		–
Girkin	6	1	68	–	–		–
La Canterbury	5	18	84	–	–		–
Honour of Westerwald	5	16	71	–	–		–
La Guérine	5	12	73	–	–		–
Raith	5	7	36	–	–		–
La Claire Bonne	5	9	55	–	–		–
Goldfinch	5	2	81	–	–		–
Greenlaw's No. 18	5	1	16	–	–		–
Yorkshire	4	17	74	–	–		–
Spanish	4	11	21	–	–		–
La Batave	4	8	103	–	–		–
Round Red German	4	4	97	–	–		–
Cornichon Rouge d'Hollande	4	0	68	–	–		–
Long Faint Red	3	19	46	–	–		–
La Prime Rouge, ou Rouge Tardive	3	10	92	–	–		–
Robertson's Kidney	3	10	47	–	–		–
Lanckman's Red	3	6	55	–	–		–
Gloucestershire Pink	3	2	41	–	–		–
Early Manly	2	19	48	–	–		–
Maesbury Red	2	15	90	–	–		–
La Truffe d'Août	2	13	30	–	–		–
La Longbrin	2	1	33	–	–		–
Long Red Kidney	2	9	41	–	–		–
La Oxnoble	2	6	56	–	–		–
Knight's Seedling	2	2	54	–	–		–
La Rose Jaune	1	13	19	–	–		–
La Rose Œil	1	11	21	–	–		–
Sweeney Seedling	1	4	29	–	–		–
Diack's Red	0	19	42	–	–		–

	Estimated Produce per Acre.						Per Cent. of Produce Diseased.
	Sound.			Diseased.			
	Tons.	cwt.	lbs.	Tons.	cwt.	lbs.	
Monstrous White	11	19	62	0	0	44	0·16
Philadelphia	8	12	36	0	0	34	0·17
Dutch	6	4	1	0	0	28	0·20
Shaw	7	6	53	0	0	39	0·23
Bread-fruit	9	1	91	0	0	50	0·24
Winchfield	7	2	63	0	0	48	0·30
Durham, or Mossy	5	6	53	0	0	41	0·34
Greenlaw's Seedling, No. 1	7	14	7	0	0	67	0·39
Petite Jaune	4	10	97	0	0	52	0·40
La Patraque	7	6	8	0	0	91	0·55
Greenlaw's Seedling, No. 3	6	7	85	0	0	82	0·57
Mule	4	1	24	0	0	55	0·60
Yorkshire Red	5	11	68	0	0	78	0·62
Greenlaw's Seedling, No. 17	6	12	62	0	1	5	0·62
Large Pale Red	3	16	74	0	0	57	0·67
Hollist's Pink Kidney	6	11	21	0	0	109	0·74
La Bonne Pommier	5	5	98	0	0	91	0·76
Smooth Red Kidney	3	12	56	0	0	63	0·78
Black (La Violette)	6	9	102	0	1	3	0·78
La Jaune Semi-longue	3	2	87	0	0	60	0·84
Vaughan's Seedling	8	4	70	0	1	44	0·84
Pink Oporto	7	1	62	0	1	25	0·86
Round Pink	4	9	102	0	0	86	0·86
White	5	5	20	0	1	8	1·01
Belle Ochreuse	2	8	37	0	0	55	1·02
Large Yellow	8	6	58	0	1	89	1·07
Bangor Rouge	4	7	62	0	0	107	1·08
Greenlaw's Seedling, No. 9	7	5	101	0	1	83	1·18
——————— No. 25	6	16	90	0	2	28	1·28
——————— No. 8	8	12	91	0	2	36	1·32
Onion	8	6	43	0	2	65	1·52
La Bavière	6	9	95	0	2	16	1·62
Dwarf	8	6	44	0	2	88	1·64
Black (La Noire Grosse)	6	5	21	0	2	16	1·72
Early Kidney	6	10	23	0	2	50	1·84
Bullock's Heart	6	7	110	0	2	47	1·86
D'Hollande	3	12	41	0	1	50	1·92
Neapolitan	9	10	64	0	3	101	2·00
La Coton	5	3	45	0	2	21	2·07
Azores	11	10	20	0	6	78	2·22
Khynsburgh	6	2	41	0	2	88	2·23
Grosse Jaune	8	0	108	0	3	84	2·28
Jaune Hâtive	7	7	76	0	3	54	2·30
Early Dwarf	2	19	33	0	1	83	2·85
Brown's	2	4	3	0	1	34	2·88
Early Walnut-leaved	8	4	96	0	5	31	3·10
Radical	6	0	87	0	3	110	3·19
Seedling White	8	11	63	0	5	76	3·20
Yellow	6	15	51	0	4	56	3·21
Oxnoble	5	1	48	0	3	42	3·22

	Estimated Produce per Acre.						Per Cent. of Produce Diseased.
	Sound.			Diseased.			
	Tons.	cwt.	lbs.	Tons.	cwt.	lbs.	
New Grenada	3	14	87	0	2	57	3·24
White Oporto	11	18	94	0	8	41	3·38
Leather-coat	6	10	87	0	4	72	3·43
Large White	5	18	65	0	4	40	3·54
Biscuit	4	14	19	0	3	54	3·57
Greenlaw's Seedling, No. 10	2	17	106	0	2	16	3·57
La Bernard	6	3	97	0	4	72	3·61
Booth's Early Hamburgh	11	5	90	0	8	93	3·64
Vitelotte	8	10	75	0	6	57	3·67
Blue Red Marbled	4	12	95	0	3	95	3·98
Downton Yam	8	15	43	0	7	8	4·34
La Semi-rouge	2	17	41	0	2	73	4·49
Parnel's	8	12	65	0	8	29	4·57
Hâtive de Juin	9	3	97	0	8	98	4·60
La Chinese, ou Sucrée	6	12	24	0	6	57	4·69
Early Bright Red Palatinate	2	10	30	0	2	57	4·76
Champion	8	9	87	0	8	56	4·77
Jersey Blue	9	14	22	0	10	67	5·17
Everlasting	7	17	29	0	8	98	5·21
Greenlaw's Seedling, No. 4	4	19	6	0	5	64	5·33
La Jeanette	5	0	25	0	5	76	5·36
Salisbury	6	3	104	0	7	14	5·44
Bellows-nose	7	11	24	0	9	0	5·61
Magendaise	6	13	59	0	7	108	5·63
La Dégénérée	1	13	24	0	0	93	5·66
Diack's Prolific	17	1	8	1	5	40	6·92
Hog's Goliath	7	2	41	0	10	87	7·05
July	7	5	22	0	11	43	7·27
Pink-eyed	7	17	36	0	12	52	7·34
Knight's Seedling	5	8	20	0	7	93	7·37
No. 36	8	12	54	0	13	106	7·48
Diack's Early	2	17	22	0	6	46	8·01
White French Kidney	4	0	88	0	7	8	8·05
La Feuille de Haricot	3	13	14	0	6	109	8·33
Mealy White	5	3	26	0	9	54	8·41
Greenlaw's Seedling, No. 21	9	7	46	0	17	42	8·48
Jaune Tardive	7	10	87	0	15	3	9·06
Lancashire Red	7	17	60	1	0	67	9·18
Greenlaw's No. 5	5	6	106	0	11	32	9·54
Mowbray's	7	16	18	0	17	16	9·90
Ormeskirke's Early Dwarf	9	9	3	0	16	83	10·03
No. 199	6	17	72	0	15	111	10·19
Ormeskirke's Kidney	6	19	77	0	16	49	10·51
Cambridge	6	14	106	0	16	2	10·61
Walton Hall	1	18	106	0	4	72	10·67
Les Orphelines	6	5	0	0	1	5	10·75
Rouge Ecailleuse	1	7	101	0	3	54	11·10
New	5	0	90	0	12	67	11·11
Greenlaw's Seedling, No. 13	8	3	34	1	0	52	11·16
——— No. 6	4	4	34	0	10	102	11·46

	Estimated Produce per Acre.						Per Cent. of Produce Diseased.
	Sound.			Diseased.			
	Tons.	cwt.	lbs.	Tons.	cwt.	lbs.	
Violette de M. Sageret	4	15	71	0	9	78	11·59
Angleterre Hâtif	6	14	0	0	17	69	11·62
Quarry, or Low Lines	6	12	109	0	18	1	11·95
Greenlaw's Seedling, No. 20	3	7	37	0	7	78	13·48
Coul Seedling	7	13	105	1	5	1	13·98
New Hundred-fold	3	16	93	0	13	64	15·00
La Tige Couchée	10	2	29	1	16	69	15·33
" Wild," Saxe-Weimar	7	3	105	1	7	14	15·85
La Marbrée	3	1	41	0	12	10	16·45
American Native	6	17	72	1	7	100	16·85
Oxnoble	6	3	30	1	8	35	18·66
La Jersey (Jersey Blue, from Paris)	3	16	41	0	17	69	18·75
Purple Kidney	2	10	28	0	8	63	18·81
Bermuda, No. 2	8	0	49	1	17	81	19·04
Dutch, or Flat White	8	4	92	1	18	105	19·13
White Kidney	7	16	5	2	0	33	20·53
La Bleu des Forêts	1	18	5	0	10	71	22·41
Bermuda, No. 1	3	11	48	1	0	72	22·42
La Grosse Irlandoise	4	0	52	1	4	1	22·98
Large July	7	5	106	2	9	0	25·14
Early Shaw	3	0	88	1	1	93	26·50
Greenlaw's Seedling, No. 11	4	10	42	3	9	16	34·43
Oxnoble	3	15	94	2	11	91	40·31
Pink Kidney	3	11	3	3	2	111	47·00
Johnson's Pink	2	8	12	2	6	98	48·84
La Blanche Longue	1	3	55	2	1	12	63·64

IX.—*Observations upon the Polmaise Method of Heating Garden Buildings.* By D. B. Meek, Esq., Holmsdale House, Nutfield. In a letter to the Vice-Secretary.

(Communicated November 17, 1846.)

THE attention of horticulturists has recently been much attracted to a new mode of heating commonly called Polmaise; and considering the prominent part I have taken in pointing out its principles, enforcing their truth, and carrying them into practice, you will not be surprised that I seek to obtain for my views and plans, in your Society's Transactions, a more extended circulation and more durable position than I could otherwise hope to procure for them; and perhaps it is not too much to say, that considering our climate, considering our means of collecting plants from every portion of the globe, there is no subject in which your Society should take a deeper interest, than in the

mode of diffusing artificial heat—those very means by which your most splendid results are obtained.

In July, 1844, a communication appeared in the ' Gardener's Chronicle ' from Mr. Murray of Polmaise (Stirlingshire), stating that he had heated a vinery by merely a circulation of air, produced by the well-known principle that hot air is lighter than cold air, and that therefore, if a stove is placed in a chamber, and a drain is made below the level of the floor of a vinery leading into this chamber, and another passage at a higher level is provided from the chamber back to the house, the entire air of the house will gradually flow through this warm chamber and become heated ; that by allowing fresh external air to pass also into the cold drain under control, any required amount of fresh air could be secured and heated before mixing with the general atmosphere of the house; that moisture might be supplied by means of passing the hot air over a blanket, kept moist by strands of worsted hanging upon it from a water-trough, and conducting the water by capillary attraction, its amount being regulated by the number of strands employed ; that on these principles, by means of one of Haden's powerful stoves, he had succeeded in obtaining most excellent grapes, at much less cost than by any of the usual means, without the use either of flues or hot-water pipes ; and he concluded by stating, that all who had seen his vinery expressed much admiration both at the plan and its effects. I will not dwell upon the manner in which this communication was received by some of the first practical men near the Metropolis,—the more than insinuation, that as Mr. Murray's grapes were ripe in September, the vinery was never heated at all,—the sly jeer at the " wet blanket " and the " hole in the wall,"—the bold assertion that it " must fail " or " prove wasteful ;"—suffice it to say, the discussion became personal and offensive, and was wisely put an end to for a time, and those who abused a principle that they either did not understand or care to investigate, and derided a plan they never tried, must be content to look back upon this uncalled for display of their own ignorance. Nothing particular transpired on the subject till the close of the last year, when public attention was again called to it, and doubts as to facts, strong opinions, and prophecies of failure, were again expressed ; there was no attempt on the part of the opponents of the system to investigate its principles and prove them erroneous ; neither did Mr. Murray, or the one or two persons who advocated it, make any attempt to prove its principles correct, to investigate fully their results, or to show that the end Mr. Murray had obtained was only to be expected from the means he had employed ; the facts were denied by some, and those who insisted on them seemed unable to explain

them; and such was the position of affairs when I entered on the discussion. My fondness for horticulture urged me to an investigation, for which my acquaintance with the laws regulating the diffusion of heat seemed to fit me. I soon saw that the success of this mode of heating was independent of any peculiar detail as to form of stove, &c. &c., but resulted from the employment or introduction of a novel principle in artificial heating; this principle being the power the air possesses of acquiring and rapidly distributing heat under certain conditions by its own motion, thus rendering any other means of distribution unnecessary. And I propose to prove the truth of this principle in various ways, to point out the manner in which it may be conveniently reduced to practice, and the advantages likely to result from its employment.

We inhabit a globe surrounded by an atmosphere extending perpendicularly about forty-five miles from the earth's surface; this atmosphere varies considerably in its temperature, being exceedingly heated in certain localities at certain times; and as effects do not occur without means, we naturally inquire what are the means Nature employs to produce atmospheric heat. Does the sun heat the air as its rays of heat pass through the air to the earth? Certainly not, for we find that the higher we ascend, and the nearer we approach the sun, the colder the air becomes; experience also tells us that luminous, radiant caloric has little effect on transparent bodies, whether solid, liquid, or gaseous, passing through them unabsorbed; therefore the air is not heated by the radiant caloric of the sun. Air cannot be heated by radiation, but only by contact; but does it touch the source of heat? Certainly not. Do heated surfaces pass down into it in the form of flues? or do pipes of hot water (without which some say it is impossible to warm the air nicely) run through its extent? None of these *indispensables* exist, and yet the atmosphere is warmed. The radiant caloric passing from the sun through the air becomes absorbed by the earth's surface, the earth is heated, and the atmosphere becomes heated by contact with the earth, Nature's principle clearly being a radiating body and an absorbing body, with which the air is in contact; so far she instructs us as to the right mode of attempting to heat air, not directly by radiation, for it cannot be done, but by contact with a body which has obtained its heat in that manner. By examining more closely, we shall find Nature instructs us as to the distribution of the atmospheric heat so acquired. Not only does the sun heat the earth by radiation, but it heats it unequally, because, as different portions of the earth's surface are differently situated with respect to the sun, and as radiant caloric also diminishes in effect as the squares of

the distance from the heating body increase, it is utterly impossible that the earth can be equally heated by radiation, and we know practically that it is not, but that we have a sphere unequally heated on its surface, this sphere enveloped by an atmosphere, itself consequently unequally heated. And what is the result when liquids or gases are unequally heated in different portions of the same mass? That currents are established for the purpose of restoring the equilibrium; that till the equilibrium be restored they are ceaseless; that the force or velocity of such currents mainly depends on the difference of temperature between the two portions, the result being that the portions which are too hot become cooled, and those too cool become warmed. And but for this principle a considerable portion of the earth's surface would be uninhabitable. The unequal heating causes the current, the current diffuses the heat; they are antagonizing forces: thus the atmospheric variation is the cause of the trade and other winds, while these put a limit to the variation itself. Nature's principle of diffusing atmospheric heat clearly therefore being, the internal movement of the atmosphere itself. We have, therefore, a body radiating heat, a body absorbing it, an atmosphere unequally heated; this very inequality the cause of sufficient distribution. How beautifully simple are Nature's means! how perfect her results! He who created the different forms of matter endowed each with properties exactly fitting it for the purposes it would have to perform. To heat a liquid to warm the air (a gas) was no lesson of His teaching; it was man's error, who, neglecting to study the vast book set before him in the kingdoms of Nature, has used an instrument for a purpose for which it was never intended, and is therefore full of practical imperfections; and surely we shall find that the true principle of diffusing heat artificially is to provide a radiating body, namely, the burning fuel; an absorbing body, such as an iron plate, over which the air we desire to heat can freely move, and this is Polmaise!

I shall now prove its truth by reference to our present state of scientific knowledge, and see how far it is in accordance with the laws which we know regulate the diffusion of heat through different forms of matter; and having shown it a natural mode, I shall have little difficulty (as might be expected) in proving that it is philosophical and sound in principle. I leave the question of the production of heat entirely; a given quantity of fuel will evolve in its combustion a given quantity of caloric. The country is deeply indebted to Dr. Arnott for pointing out the true principles on which the caloric evolved should be economized, and its production regulated! The combustion (and consequently the caloric) should be regulated, not by the supply

of fuel, but by the quantity of atmospheric air enabling the fuel to burn; but the question with which I am concerned is one of diffusion, and this is all important! We have three forms of matter, each having properties enabling them to diffuse heat: solids, liquids, and gases. Which of these instruments of diffusion does science teach us to choose? Heat is diffused through solids only in one way, namely, by the contact of one particle with another; this is called conduction. This property is possessed by all solid bodies; but in some it is very considerable, in others slight, giving rise to the term conductors and non-conductors; it is a comparatively slow process. Heat is diffused through liquids slightly as in solids, from the contact of their particles; but there exists another means of diffusion. The form of matter depends on the cohesion of its particles: if this is great they are solid, if less they are liquid, and where wanting they are gaseous; in these two last forms of matter the particles or molecules are so far removed as to be enabled to circulate among each other, so that when set in motion currents are produced in liquids, and drafts in air; thus, when heat is applied to the upper surface of a liquid, it heats it very slowly, only by contact from particle to particle, but when applied to the lower surface, it heats it with great rapidity, because those particles which become heated first necessarily expand; expanding, they become specifically lighter; becoming lighter they ascend, while the heavier particles descend; for these currents are unceasing till the entire liquid becomes of the same temperature throughout; and it is in consideration of this principle that man has taken a liquid for the purpose of diffusing heat; it is this which enables the hot water to perform its office. Hot water is essentially a go-between—something to take the heat absorbed by the solid body (namely, the bottom of the boiler) to the air. Heat is diffused through gases, perhaps not at all from particle to particle, as these are so far removed from each other in this form of matter, but it is diffused through them with extraordinary rapidity; for owing to their very slight cohesion, their particles are free to move with a rapidity unknown to the liquid form, a rapidity we acknowledge in our expression "as swift as the wind." Gases also, being transparent, allow the free transmission of radiant caloric. Which of these forms of matter, then, shall we employ for the diffusion of artificial heat? Shall we take the solid, with one portion in the fire, the other in the place we desire to warm, allowing the heat gradually to progress, particle by particle, by the slow process of conduction? It is folly, exclaims the philosopher! Certainly, cries the advocate of hot water! for a liquid will diffuse the heat by the internal movements of its particles with great rapidity. But the philosopher

goes a step farther; he desires not to stop at the liquid; he tells us there is one form of matter which diffuses heat with a rapidity unknown to any other; and, moreover, this very instrument of diffusion is the object itself which we seek to heat; thus, instead of employing a go-between, we heat that at once which it is our object to heat. And such is the Polmaise system of heating. We desire to heat a certain amount of air; we provide the heat; the air appropriates and diffuses it with an equality and speed which evidently cannot be attained by any other means. Is it any wonder that a plan based on principles so natural and so philosophical should be eminently successful? That it should be cheap, as compared to any other means, in its first cost, and economical in its use? For the expense of diffusion is saved. What necessity exists of carrying the heat to the air, when the air will travel to the heat? What need of boilers, cisterns, stopcocks, pipes, and water to produce and diffuse atmospheric heat? Is it not certain that such means must involve waste in cost, and use, and constant repairs? Boilers to unset, to clean, occasionally split, pipes oxidizing on the one surface and choking up with incrustation on the other. But the worst evil remains. If the boiler is set within the place to be heated, such a mass of heated material makes one portion of the building far too hot, so that it has been found necessary to banish the boiler from the house, and thus to incur the enormous waste that takes place in the stoke-hole; and some idea of this waste may be conceived when I state, that during one week last February a table of temperatures was taken in your Society's Gardens. A thermometer was placed in the external air, another in the span-roof stove house, a third in the boiler chamber; and the temperature indicated by these thermometers was as follows, the mean being about 60° Fahr. for the stove, 80° Fahr. for the boiler chamber, 40° Fahr. for the external air:—

Temperature in the Iron-roofed Stove, in the Stoke-Hole, and Out of Doors.

Date.	Iron-roofed Stove.						Stoke-Hole.						Out of Doors.					
	Morning.		Noon.		Night.		Morning.		Noon.		Night.		Morning.		Noon.		Night.	
Feb.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max	Min.	Max.	Min.
16	58	58	68	58	59	58	74	74	80	67	83	79	40	40	47	40	45	45
17	64	58	68	62	60	60	82	77	83	74	84	80	43	43	46	43	43	43
18	63	60	68	62	62	60	84	80	84	73	89	82	40	40	47	40	44	44
19	65	60	69	65	61	61	87	82	89	86	89	84	42	42	45	42	43	43
20	61	60	66	60	62	62	87	82	85	80	87	79	40	40	48	40	44	43
21	65	60	68	65	60	60	87	79	89	86	90	80	44	44	45	42	50	45
22	60	58	70	60	64	64	90	87	91	88	90	87	46	44	55	46	53	52

Moreover, the temperature of the house was assisted by there being a separate boiler in another chamber to supply the bottom heat, and the external temperature was singularly high; had this table been taken February twelvemonth, it is probable the loss would have been far more apparent; however, it is sufficient to prove the hot-water system *extremely wasteful* in its use. Another serious objection attaches to hot water, or any other mode which introduces any radiating surface within a building which we desire to heat uniformly, or nearly so—for the very terms radiation and equal diffusion are a contradiction; radiation is a power the effect of which diminishes as the squares of the distance from the heating body increase, so that the instant radiation is introduced, uniformity of temperature is necessarily sacrificed. Are not hot-water pipes radiating surfaces? And that of very unequal temperature in their circuit? Will they not of necessity, therefore, heat bodies unequally, especially since these bodies cannot be all at one uniform distance from them; the result being, that the atmospheric uniformity will consequently become deranged? I do not wish to deny that I consider hot water far preferable to smoke flues; I will admit the heat to be more uniform, the chance of smoke and exhalation got rid of; I acknowledge it to be a step on the road to truth, but it has not gone far enough; it stopped at the water; it should have gone onward to the wind.

While pointing out the errors of our present modes of heating, I would remark that there are other plans of air heating quite different from Polmaise, and which I consider essentially erroneous. I will endeavour to explain them, and show their errors. The principle on which they act is this—to place a stove either in a separate building or in some portion of the building it is desired to heat, and to provide a current of air either from the external air or elsewhere to blow over the stove, to become heated, and then by flowing into the building to warm it; but in this arrangement we apparently forget that the air is material; that gases, though very compressible, still enjoy the property common to all matter, namely, bulk, and consequently, that hot air will not flow into a building to any great extent until some means are employed to remove the air at present within it. This is not only theoretically but practically true; for in a dwelling-house in my own neighbourhood, heated on this principle, the hot air would not flow into one room unless there were a window open, or into another unless there were a fire in the grate, proving that the ingress of the hot air depended on the egress of the cold, and was in exact proportion to it; this is truly what one of its advocates has called it, a system of heating based on ventilation; but a moment's reflection will convince us

at once of the absurdity of such a combination, for on this plan it is evident we can only supply much heat with much air, while probably only a small amount of the latter is requisite. I should even say that the wants of a hot-house, with regard to air and artificial heat, were frequently the one exactly the reverse of the other; that in the depth of some winter's night, with a cutting wind blowing, the requirements of the hot-house as regards heat would be great, while it would experience no want of fresh air. Again, experience has proved to us that plants will flourish in extreme beauty elsewhere than in the open air; and while glass houses may be considered as evils rendered necessary by our climate, these have proved to us that with a certain amount of ventilation plants will flourish within them. Is it not then the most rational and most economical course to ascertain the amount of air required to keep plants in health, and then to provide the means of heating that air? Is it not wasteful to heat more air than the plants require, to be obliged to heat a quantity of cold fresh air, and blow it through the house incessantly, only for the purpose of keeping up the heat, when the air already in is quite sufficient for a time, and probably only wants one quarter the heat to raise it to the required temperature that the external air needs? I well know that the best practical horticulturists allow a great amount of ventilation (some even by night), and with the best results; let it be freely provided! But let us not so combine ventilation and heating, that when one is wanted the least we must supply it the most. Another objection to this mode of heating is, that as the escape of that air which is to allow fresh warm air to enter takes place at the roof, the flow of hot air is at once determined to the very point to which it is probably not required, and thus a thermometer on the floor and another in the roof would indicate considerable variation of temperature; in other words, the heat is not equally diffused, the agitation of the mass is not complete; it arises from an extraneous force, and not from a movement within; the one may be aptly compared to the motion produced among the particles of a liquid by a stream running through it, the other the motion arising from internal fermentation.

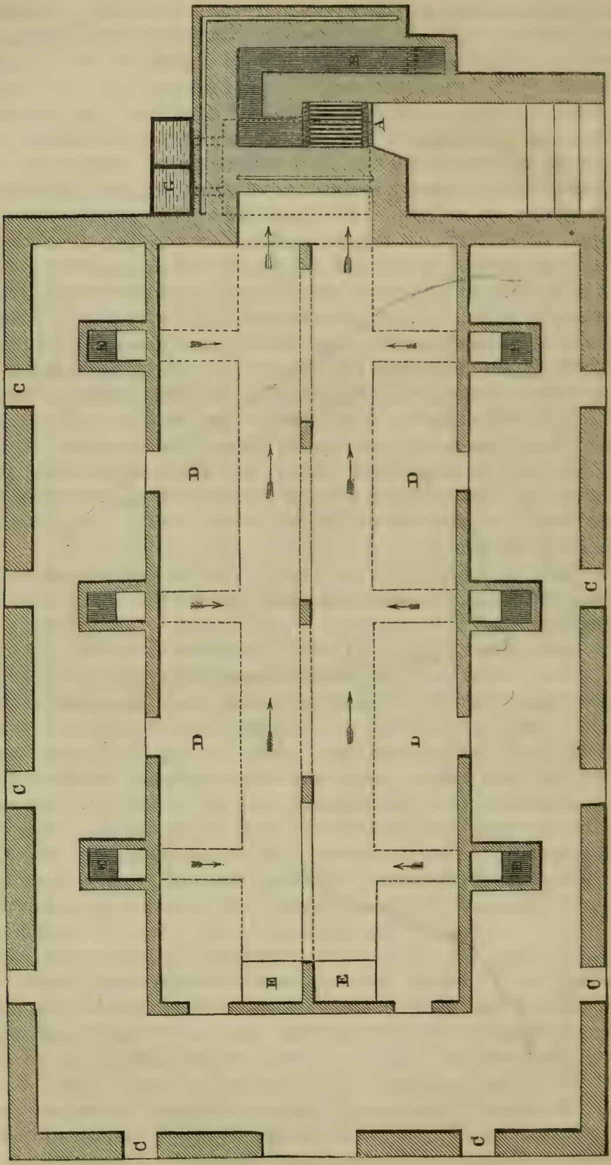
But let us turn from error to the truths of Polmaise. Nature teaches us that the only way to heat air is to bring it in contact with a heated surface,—Polmaise does so. Philosophy tells us that the most rapid means of diffusing heat is to employ that medium which moves with the greatest rapidity, namely, the air,—Polmaise does so. Economy tells us that an agent is an expensive luxury; he takes his per centage; that we do not require his services, nay, they are an obstruction; that our course is to allow the air to diffuse the heat itself, and to warm that air which

we do, and not that which we do not want,—so does Polmaise. Common sense tells us that the air in a building which most requires warming is the coldest,—Polmaise takes it first. Every body cries, "Heat us uniformly!"—Polmaise is the only mode that can possibly approach to it. Having proved the truth of the Polmaise principles of heating, I shall proceed to point out the manner in which they may be easily reduced to practice.

The coldest air in any building (whether room or hot-house) is of necessity on the floor; if it can pass below the floor it will be there; so that if a drain be made below the floor of a room, with gratings opening into it, this drain will be instantly filled with the coldest air of the room. Supposing this drain extends into another building, and the air which it contains is at liberty to pass over a heated surface, and having passed it can again flow back at a higher level into the place from whence it came, it is evident from the principles so recently laid down, that the whole air of the room will flow over this heated surface and become warmed, and that such currents of air will never cease till the air of the two buildings is at nearly the same temperature; and consequently, that in proportion as we burn fuel, and heat the surface employed, so must we by this means raise the temperature of the air passing over it.

Subjoined is a plan and section of the hot-house and stove, showing the simple mode in which I propose to carry out the Polmaise heating.

The outer line of ground plan represents the walls of a hot-house, the openings, C, are external ventilators for the purpose of admitting fresh air; these are exactly such as might be employed for any other system of heating; they have no necessary connection with Polmaise, and the heating principle acts, whether they are closed or whether they are open. It is evident that when open they admit fresh air into the house; and however cold the weather, any air admitted by them, instead of cutting the plants, as is the case when side-sashes are open, will immediately, from its great specific gravity, descend at once into the cold-air drain, and become warmed before coming in contact with the vegetation within the house. The number left open will, of course, be dependent on external circumstances; and when they are all closed, the hot-house resembles any other hot-house that is closed, and thus heating and ventilation are kept apart, the requirements of the two necessarily being different. Within the external walls is a walk round three sides of the house, in which are openings, E, leading into drains, these drains converging into a main drain, as shown by the arrows; these drains are formed of brick on edge-sides, and duchess slates for roof, the soil forming their floor. The main drain is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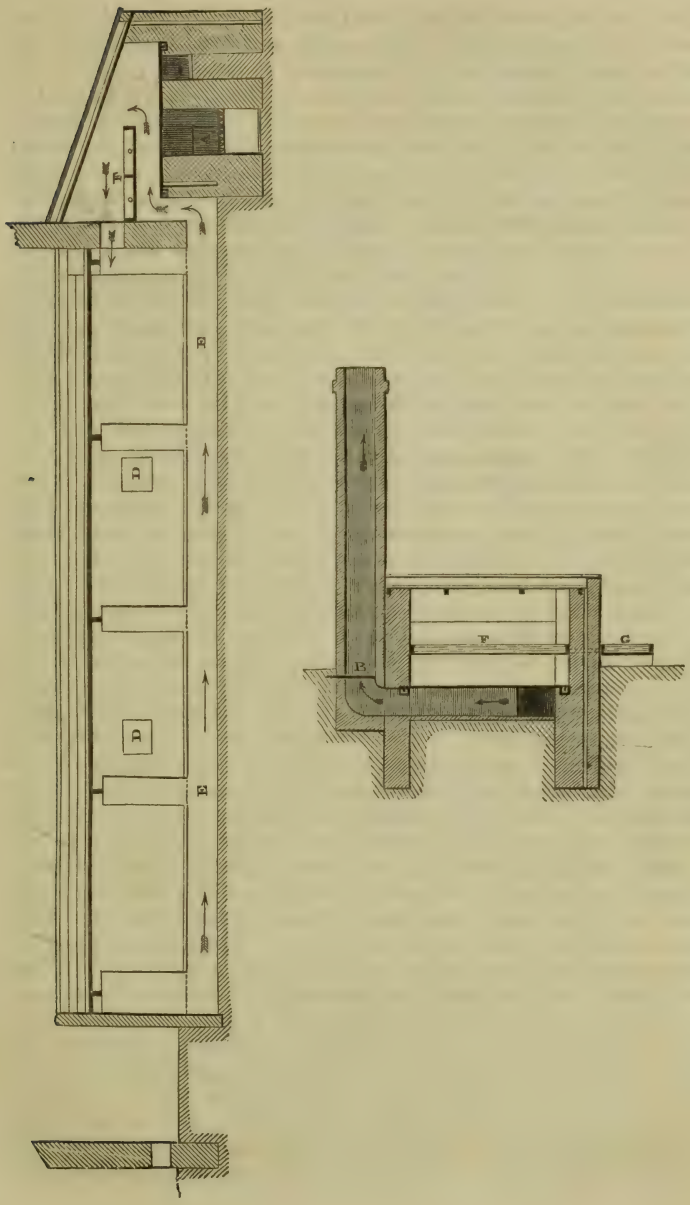
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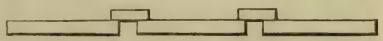
four feet wide and one foot deep, so that by laying a brick flat and four courses high in the centre, and bricks on edge at the sides, two common duchess slates reach to form the roof, and on these is spread some sifted soil to make the drain air-tight; the centre brickwork forms a support on which in several places to build up single brick piers to support the iron rafters which carry the slates, on which rests the plunging-bed, as shown in longitudinal section. This main drain, which should be slightly on the descent towards the chamber, pierces the end wall of the hot-house, the foundation being left out at that point, the end wall of the house being there carried by York flagging, with a centre support; and thus the means are provided for allowing the cold air to travel from the house to the chamber. The openings at E, in the hot-house at Nutfield, are regulated by sliding lids, made of slate, for the purpose of experiment; this, for practical purposes, is unnecessary, and in many cases it will be found very convenient to make the cold-air openings in the centre of the house concealed by some ornamental stage, the floor of the walk forming the roof of the cold-air main drain; or handsome ventilators might be inserted at once in the roof of the main drain, to take down the cold air. These points of detail architects will arrange to suit different places, the great and essential point being to provide a means for the cold air at the extreme end of the house to pass to the hot chamber. The outer wall of the hot chamber is built of 4½-inch brickwork; this chamber is air-tight, as far as regards the external air, having two openings on the side next the house on different levels, the lower one to admit the cold air, the upper one to allow its return when heated. The stove occupies the chief portion of the chamber, standing isolated within it, except at the points where the fuel is supplied and the ashes removed, and where the return-flue passes into the chimney. The area left between the wall of the stove and the wall of the chamber is two inches, except on the side next the hot-house, where of course there is a larger area to allow the cold air to rise and flow over the plate; but it will probably be found desirable to sink the top of the stove to a level with the cold-air drain. The stove is formed of four walls of 9-inch brickwork; the outside measure is 5 feet 5 inches long, 4 feet 4 inches wide; the internal measure, therefore, 3 feet 10 inches long, and 2 feet 10 inches wide. Another wall of the same substance is carried up between the two ends, but not in the centre; it is 16 inches from the wall of the stove next the hot-house, and of course leaves a space of 9 inches between itself and the farther wall. It will be seen by plan, that this wall and the one next the hot-house form the actual furnace or fuel box; in part of their length, where such

is the case, they are built of fire-bricks, as are also the flues; and wherever the walls are likely to be much heated, they are Stourbridge fire-bricks, set in the same clay, being, in my opinion, more durable than Welsh lumps; it will be well to parge the outside of the walls of the stove. The stove is 3 feet high, which allows 3 inches for paving of ash-pit + 1 foot for depth of ash-pit + 3 inches for depth of bars + 1 foot 6 inches for depth of furnace from bars to plating = 3 feet. The iron top is formed of three plates, with a view to allow of expansion; two of these plates have extending rabbets, so that when laid in place they have this appearance. 

They are 1 foot 6 inches one way by 3 feet 6 inches the other, so that when laid in their place, and the space for expansion between each allowed, they form a surface of 4 feet 7 inches by 3 feet 6 inches. This, by calculation, will be found to give them a 4-inch bearing on the four outside walls of stove. Along the wall of stove next the hot-house, a course of thin brick is laid, not close to the edge of plating, but half an inch from it. The two end walls are carried up three courses higher in $4\frac{1}{2}$-inch work, and so also the outer wall; and between all these and the edge of plating there is a half-inch space; the purpose of this groove is to fill it with sand, so that the plates can expand and squeeze up the sand, while, when they contract, this will follow back and keep the joint air-tight. I am assured, however, by practical men of great experience, that it will be found quite unnecessary to have the plates cast in three pieces; that it would suffice if cast in one piece, provided it were cast with a loop round the edge, which should fall into a groove of sand, and that the plate would then expand in the loops: this will greatly lessen the danger of exhalation. The situation of the damper, as shown in section, is bad; it should be placed exactly at the junction of the flue with the chimney; and it will be found to economize fuel, by preventing the loss of heat, if between the brickwork forming the end of chamber and the stove some non-conducting material, such as hair-felt, be placed, and also if double doors be used for the furnace. I find the only loss of heat that takes place in the apparatus at Nutfield is from the furnace-doors and the bricks around them, and this might be prevented by the above plan. The doors employed are Sylvester's patent, which, for all purposes where the regulation of draught is required, seem to be the best that can be imagined; there are no hinges to rust, or machinery to get out of order, or screws to untwist; they simply hang on a frame, in which they slide, the edges of the door and frame being ground to fit; and another advantage which they seem to me to possess is, that if any explosion should take place

within the stove, from a collection of gases (and all economic stoves, where of course the combustion is slow, are liable to such occasionally), instead of the boiler or plates being blown out of their place, these doors would be lifted outwards, and the evil consequence avoided. Within the chamber, extending between the two end walls of the stove, and bearing slightly on the end wall of the hot-house, is a tank of water, F, divided longitudinally, 4 inches deep, as shown in section, also by dotted lines in ground plan, supplied by a check cistern from the outside, G, also of course divided; this may be furnished with a tap, by which to empty it, or at which the gardener can always obtain chilled water.* The roof of the hot-chamber is formed of double slating, with a layer of M'Neil's hair-felt and two or three inches of sawdust between, and the upper surface is never warm. From these arrangements it is evident that the entire air of the hothouse must flow over the plating, through the chamber, and back over the tank of water (as shown by the direction of the arrow in plan and section), and be returned back into the hot-house in a heated form through the upper opening. Here it is received into a large brick pit (as shown by inner lines in plan), and it is allowed to escape through slate ventilators from the sides and end of this pit. Iron bars extend across this pit, and on these slates (thick duchess) are laid; upon these some pebbles and a few inches of tan as plunging material. To those who have been accustomed to hot water, I may say, that if they regard the cold-air main drain as the return pipe, the chamber as an air-boiler, the brick pit as a hot-air tank, they can be at no loss to understand either the arrangement or the principle, and to perceive that there is no difficulty whatever in reducing those principles to practice. And this brings me to the third consideration I had proposed, namely, the advantages likely to result from the employment of Polmaise heating; and the relative importance of these advantages will be differently regarded by different classes of persons. The wealthy lover of horticulture will first inquire, Can I grow my plants better? He

* This cistern or tank is of very unnecessary extent: it is 5 feet long by 3 feet 6 inches wide; if it were 18 inches or 2 feet, it would be ample to supply the moisture necessary; and this should be divided as in plan: for a conservatory, a single trough 9 inches wide would be amply sufficient; and even this, as fires are only required in such structures in winter, when much moisture is not required, would almost be unnecessary; it will be observed from the position of the tank, that its under surface forms a sort of roof to a flue, compelling the cold air to traverse the hot plate before returning to the house: so that if the tank is dispensed with, some other means must be taken to secure this—such, for instance, as a sheet of iron plating or thin casting. My present tank will evaporate 50 gallons per week!

who is equally fond of it, though with less means, will inquire first, Can I grow more cheaply? While the grower for profit will consider both of equal importance. I will consider cost, and first the original cost: this will be regulated by the purpose for which it is required, similarly to other heating powers. An apparatus of equal power with mine may be erected for 20*l*., dependent on the price of brick and slate. It must be considered that for this sum a great amount of bottom heat is secured, from 82° to 94° Fahr., over a bed 22 feet 6 inches by 9 feet wide, together with the requisite amount of atmospheric heat in a house 28 feet by 17. Compared to hot water, I am sure the first cost does not exceed one-half what the latter would be to secure the same amount of bottom and atmospheric air in the same house in the same locality. But the way in which the economy is best viewed is by considering that the entire expense of the distribution of the heat is necessarily saved by the air distributing it by its own motion, and that the expense of the air-boiler and setting is about the same as the water-boiler and setting; the expense of the tank it is fair to charge not to the heating but to the evaporation, as moisture must be supplied in some way under any mode of heating.

The working economy I take to be equally certain. If the stove is properly built, there need be but little loss of heat, the heat of the stove being all swept into the house by the currents, except that portion which is lost at the junction of the stove with the external wall of chamber; while in the hot-water apparatus, if the boilers are set externally (and it has not been found advisable to set them within the house), there is great waste of heat,—I do not speak of every individual case, but of the generality of cases; and since a given quantity of fuel can only evolve a given quantity of caloric during its combustion, it is quite evident that that system must prove most economical in the use which secures the most caloric for the purpose required. With regard to the amount of caloric passing up the chimney, Polmaise stands on the same footing with all other economical stoves in which the combustion of the fuel is regulated by the supply of the oxygen and by means of Sylvester doors, and dampers in the chimney; the amount of heat lost in this manner is inconsiderable. Some heat must always be sacrificed in this manner in all systems; for if there were no caloric in the chimney,—that is, if the air in the chimney were not rarefied, there would be no current of air to the fuel, and the fire would not burn; and if this is to be saved, it can only be done by bringing the chimney through the house,—in fact, by again returning to the flue system.

The next advantage I shall notice is the equal distribution of

the heat. Taking the word equal in its strictest sense, that which is desired will never be absolutely attained; but it is not to be denied that the closest approximation to uniformity must be secured by employing that medium which is most rapid in its motions. But this excellence attaches to all systems where the air is used as the medium of diffusion. What, therefore, is the peculiar merits of Polmaise? If we again look to Nature, we shall see a specimen of the proper mode of heating the air,—we shall see how the heat is diffused, so that the hottest portions become cooled, and the cool heated; but we shall look in vain for an equality of temperature. Such was not Nature's purpose. An earth unequally heated produced and required for its inhabitants, both animal and vegetable, an unequally heated atmosphere. We shall not find her imparting to her favourites a great amount of bottom heat while the atmospheric temperature is low, thus stimulating a flow of sap which the leaves are unable to dispose of; neither shall we find her with high atmospheric heat and a low soil temperature, inducing a foliage which the roots cannot afford materials to maintain. These are man's plans, not Nature's. When shall we, by observing her beautifully-adjusted balance, learn to regulate our own? And as a uniformity of atmospheric temperature around our globe would have been an imperfection, we shall look in vain to Nature for the example or the principle of the objects of our search. But is Philosophy equally silent? Will she point out no way? She has with Nature pointed to the means, but she is left alone to discover how to use them. It will be observed, that in the motions of the earth's atmosphere towards those portions of the earth that are most highly heated,—in other words, the flow of air from the poles to the equator, the hottest portion of the air is always succeeded by the hottest but one,—that a particle of air, for instance, that leaves the poles would travel onwards by degrees to the equatorial regions, acquiring warmth on its way, till arrived at the equator (presuming no other force interfered to derange its course); and while we can easily see in these currents a powerful means of preventing too great a difference in the atmospheric temperature, a means sufficient to secure the end designed, still they are not such as can possibly occasion a uniformity of heat. Surely common sense would tell us, that if uniformity is our object, we should take not that portion of air first to the heat which is hottest but one, but that which is coldest of all. Does not philosophy teach us that rapidity of current depends mainly on difference of temperature, and that therefore we must not only use the means that *can* travel the fastest, but we must subject them to the conditions that shall *insure their doing so*,—such is Polmaise. The air which is taken first to the

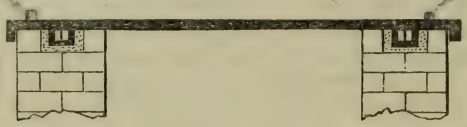
heated surface of the stove is the coldest air in the house, or otherwise it would not be upon the floor; and when I notice certain facts observed by Mr. Murray at Polmaise, and by myself at Nutfield, it will be evident that the result is exactly what we might anticipate from using a power, not only able, but forced to move at the extreme of its speed, namely, a closer approximation to uniformity of temperature.

Another advantage resulting from the employment of Polmaise is, that not only is uniformity of distribution secured, but this uniformity is independent of external circumstances. Many persons, mistrusting anything new, though unable to deny results that are evident to all who choose to verify them, exclaim, that it is all very well now, but how will this plan keep out the frost in the winter?—while those who have so certainly foretold its complete failure look forward to the winter frost as their forlorn hope. But when we examine principles, we find that the velocity of the current between the two buildings is in proportion to the difference of the temperature of the air in the two. It is evident, therefore, that the only effect exerted on the air within the hot-house by the cooling influence from without will be to send it more rapidly to the source of heat; so that, provided a proportionate amount of fuel can be burnt, and caloric evolved in the chamber, the air of the house will take care that the heat so evolved is distributed. It will no longer be necessary, in order to keep the frost out of one end of the hot-house, to parroast the other, as in the old flue system; for while in all systems of heating this same principle operates to check the variation to a certain extent, in no system can it act so efficiently as in that in which the coldest particles go first to be heated, thus insuring the greatest possible amount of velocity of distribution.

The last advantage I shall notice as pertaining to Polmaise heating is, the necessary and constant motion of the atmosphere which it secures; and this will probably be found by horticulturists to be one of the most important considerations affecting the question. My knowledge of vegetable physiology is not sufficient to enable me to prosecute this consideration far, and those who understand the subject best are not unanimous in their opinion as to what are the precise effects of atmospheric motion upon vegetation. Whether it has any other effect than that of bringing fresh supplies of carbonic acid to be acted upon by the foliage or not, it must be evident to the most casual observer that some important results proceed from this cause. We have occasionally very high temperatures externally both by day and night, yet we never see that peculiar appearance called "drawing" among plants grown in the open air. Is not a stagnant atmosphere the cause therefore, rather than the amount of tem-

perature? Should we not expect most excellent results from that system of heating which secures the greatest amount of atmospheric agitation,—which not only warms a certain amount of air, but by its motion secures that the whole of the air so warmed shall be brought in contact with the foliage which it is to nourish,—which, so far as motion of the atmosphere is concerned, puts a plant in the hot-house in the same position as a plant out of doors? May we not reasonably hope that, with a certain amount of fresh air charged with its proportion of carbonic acid gas, and this in motion, we shall always be able to rival nature in the compact beauty of our specimens, as we have done in the profusion of their bloom?

Having noticed the advantages of Polmaise heating, I have no wish to conceal its dangers. Man may take the principles of Nature, and when he reduces them to practice, he finds that he has introduced some human imperfection, and so it is with Polmaise. A boiler may burst, or a pipe choke up with a hot water apparatus, and a gaseous exhalation may escape from the stove of Polmaise. The compounds of sulphur and oxygen appear, even when much diluted, most prejudicial to vegetable life, and the effects of the bursting of a flue are well known; and this is the point of danger. I prophesy that no winter, however severe, will affect the operation of Polmaise; but all the beauty of this principle of heating must be sacrificed, unless we can secure the chamber from gaseous exhalation. With this view, let me urge upon all those who may employ the Polmaise principle to be extremely particular in the manner in which the stove is built. Let the outside be parged; let it be constructed of at least nine-inch brick-work; and if the iron plate can be cast in one, with a projecting rabbet on its under surface, and this rabbet dropping into a sand groove thus:



it appears that all possibility of exhalation must be precluded. Indeed, if even this were insufficient, it is hardly probable that a sound principle of heating should be lost for want of some ingenious mechanical contrivance to prevent exhalation. However, I have thought it my especial duty to point out the weak points of Polmaise; and while I acknowledge that I think the form of stove I have employed has many advantages, and especially the retention of the heat, I by no means wish to prevent others of a more complex and expensive, though probably of a more

powerful character, being employed. All the merits of my stove, whatever these may be, are due to Dr. Arnott; but I trust that the great principle of Polmaise, the conditions under which the stove is placed, will never be lost sight of; for on no other principle can atmospheric heat be so naturally, so cheaply, or so uniformly diffused.

During the last two months I have had repeated opportunities of making thermometric experiments in the hot-house at Nutfield, and also other trials of a very interesting character, and leading to very important practical conclusions. The hot air, as it enters the hot-house from the chamber, passes beneath the bottom of the plunging bed, exactly at its point of entrance; one of the slates on which the bed rests has been removed, leaving an area of about 2 feet, or half the hot-air opening; and by this means a thermometer can be suspended in the hot blast at its entrance. I have seen this indicate 174° Fahr., but it commonly ranges from 120° to 150°. When about the latter point, another thermometer suspended one foot above the former will indicate from 85° to 90°, ; while a third, on the same level with the second, but at one foot horizontal distance, will indicate only 65°; and other thermometers hanging in different parts of the house, at one end or both, or in the centre, indicate 63°; while even a thermometer on the floor, at the extreme end of the house, will indicate 61°. The only unequal portion extends about 2 feet around the hot-air opening, and in the ridge of the house, where we must always expect to find the temperature several degrees higher. The temperature of the plunging bed varies from 80° to 92° Fahr. in different portions, which is accounted for by the fact, that much of the hot air escapes through the open ventilators before reaching the extreme end of the bed; but for many purposes this variation is desirable, and all this may be regulated, according to circumstances, by the side ventilators. The temperature of the plunging bed is peculiarly steady, arising from the material being a bad conductor of heat, slow to heat and slow to cool. The inference to be drawn from all the experiments I have made is, that there will be no occasion to provide any means of distributing the hot air; it will equally diffuse itself. Another point I have determined is, that the lower the external temperature, the greater the proportionate difference between the hot-house and the external air, arising partly from the principle of compensation already noticed. Thus the average temperature of the hot-house above the external air, with moderate fires at night, is about 20°; but on the only occasion in which I have yet had an opportunity of testing it in frost, the house at night was 30° above the external air, and never during the night was the difference more than 26°. It

was a quiet, clear, frosty night, the external air at 31° Fahr.* I find the uniform range of the differential thermometer, from six o'clock in the evening till eight in the morning, is from 62° to 57° or 58°. It must be remembered that this is legitimate atmospheric temperature. There are no means within the house of affecting the thermometer by radiation, either from pipes, or from bricks heated by pipes, or by hot flues, and then attributing the thermometric point to atmospheric temperature, which is partly owing to radiation, a very common error; but it is the temperature of the air taken by a thermometer suspended against the upright side sashes of the house. The house itself is a span roof, containing about 4000 cubic feet of air; it is glazed with sheet-glass, the ends are both glazed, and the upright side-sashes are three feet in height, standing upon stone walls four feet high. It is situated in a kitchen-garden, partly walled, on a very considerable elevation, as will be evident when I state that, though only 20 miles from London, I can from my own grounds, on the same level, distinctly see the Downs in clear weather. I have purposely abstained from using any covering material, such as asphalte shutters, with a view of testing the heating powers. These facts entirely corroborate those obtained at Polmaise by Mr. Murray, which were published in the Gardener's Chronicle of the present year.

Another inquiry of great practical importance is, How far the success of this mode of heating depends upon the conditions under which the principle is carried out? Principles are all-important, but experience can alone teach us the best mode of applying them. When we reflect on the gradual advancement of hot-water heating, the experience that has been slowly brought

* Another experiment was made by closing four of the cold-air orifices, reducing the exit of the cold air to two one-foot openings, and I could not detect that the temperature of the house was always affected, while it was quite evident that the velocity of the currents in these two was greatly increased; neither could I ascertain that the uniformity of the temperature was at all affected; the drains left open were those at the extreme end of the house: had these been closed and those near the chamber opened, I think it probable the uniformity would suffer. I also closed all the hot-air ventilation, allowing only the escape of hot-air at the opening close by the hot chamber; neither did this affect the general uniformity of the distribution. These evidently lead to the conclusion, that a small amount of cold-air drain will prove sufficient: and also that any chamber or means of diffusing the hot air is entirely unnecessary, except where required, as at Nutfield, for the bottom heat. This experiment has not always been uniform in its results: sometimes when only two cold drains are open the temperature of the house is less by two degrees than when all are open, but I can never detect that it affects the uniformity of the distribution; it must also be understood that the temperatures named are not always the same; but the most important and best ascertained point is the equal diffusion of the heat.

to bear upon forms of boilers and situations of pipes, how absurd it would be to suppose that we have got at all beyond the threshold of Polmaise heating; and when we consider what has been accomplished with a system wholly unnatural, and partially unsound, what may we not expect to achieve with a mode of heating where the principles defy attack. But we shall certainly find our error if we suppose that the success of Polmaise is independent of all conditions. There is no question that heat causes currents when applied to liquids; that such currents will cause an actual circulation; but conditions are necessary to this before the principle can become useful; for, provided the boiler is situated above the return-pipe, the circulation will not take place unless express arrangements have been made with the flow. And numerous have been the failures, partial or total, of hot-water apparatus from the relative position of the return-pipe and boiler; and it is, I believe, pretty generally understood, that a rise in the flow-pipe, and a fall towards the boiler in the return, is the best mode of obtaining a good hot-water circulation. May we not expect, then, that certain conditions will equally attach to render Polmaise effectual or otherwise; and already, to my knowledge, two failures have occurred,—one at least partial, and one entire,—and both apparently caused by the situation of the cold-air drains, which are the return-pipes of Polmaise. In the case of total failure, the cold-air main drain rises a foot before entering the chamber, and of course the air, not having yet become warmed, cannot rise, but lies dead in the drain, and the circulation is effectually impeded. And these failures promise to be more instructive than even the success of the house at Nutfield; for there the main drain runs on a level into the chamber, as shown in longitudinal section, and even after its arrival in the hot chamber it ascends before reaching the iron plate, which may be regarded as the air-boiler. Surely, well as it acts, there is every reason to think its operation would be far more effectual provided the cold-air drains had a gradual fall, say of 1 in 30, towards the chamber, and if the stove was lowered in such a manner that the top of the plate should be level with the bottom of the drain, that the air might not have to make any ascent till it received the full impetus arising from expansion. The best form of stove, the most desirable position in which to place it, the relative size of drains, and their proper inclination,—for the solution of all these points we must quietly wait for accumulated experience; and as at the commencement of this paper I alluded to the importance which the subject of the diffusion of artificial heat assumes in this country, so at its close I would again venture to urge it upon your Society. However much horticulturists may be indebted to your Society for

the advancement caused by your encouragement,—whatever they may owe to your exertions in bringing into and spreading through this country many of the plants which now adorn our gardens and hot-houses,—in no way could your Society more effectually increase this obligation than by devoting some portion of your means and attention for the purpose of investigating the relative merits of different modes of artificial heating.

Now that the cost of glass structures has become so much lessened, and consequently their erection so much more general, this subject is daily increasing in importance. A series of carefully-conducted experiments made under like circumstances, in buildings similarly situated, and constructed with a view to determine the relative merits of different modes of heating, especially as to their economy both of first cost and use, the amoun of artificial temperature produced, its regularity, the uniformity of its diffusion, and their general effects on vegetation, would be of extreme value to horticulturists, who, for the want of some standard of the kind, are daily imposed upon by designing people for their own individual gain; and one thing at least will be admitted by all, that it is much to be wished that some cheaper means should be devised than at present exists for horticultural heating. Brick flues (may they not be said to be the most economical means of all?) seem to be generally abandoned on the score of various imperfections, especially their unequal diffusion of heat and their liability to exhalation. Hot water (even admitting all its fondest admirers can say of it) is limited in its usefulness by the cost of erection. Surely, under these circumstances, it well behoves all lovers of gardening to try the merits of Polmaise. The soundness of its principles who can dispute? Hostile opinions have been plentiful, but arguments few: it remains for individual ingenuity to exercise itself as to the most effective mode of reducing them to practice.

Since the above observations were in type a sudden change has taken place in the atmospheric temperature. At the beginning of the present month the external temperature at night was as low as 21° Fahr.; there was no difficulty in keeping up the temperature of the house to its usual point, 57° or 58°, during the night—the fire, as usual, being only supplied night and morning. It will be found necessary to employ some means of lessening the bottom heat at the end nearest the furnace—94° at the winter season being, I apprehend, out of all proportion to the atmospheric heat and light. This may easily be effected by employing at this portion of the bed a double bottom, with an area, say of one inch, for air between the two, or by using some non-conducting material. Another practical point to which at-

tention must be drawn is, that the heated air, acting upon the slates forming the bottom of the bed, will of necessity exert a drying influence on whatever rests upon them; and that, supposing this to be soil in which plants were bedded out, this would become extremely dry and ungenial: the roots which found their way downward would soon perish. Exactly the same difficulty arises where the bottom heat is communicated by hot-water pipes running beneath the plunging-bed, namely, their parching effect on the superincumbent soil; while, if open tanks are employed, then the other extreme is incurred, and the soil is soured by incessant steam. It has been suggested to me that this difficulty is best overcome by making the bottom of the bed water-tight, and placing on the two or three inches of broken brick, rubbish or pebbles, down among which water can be poured in different places, which will diffuse itself and become absorbed, and gradually moisten the soil above it as it is converted into vapour by the heat below, while any excess can be let off by having holes at the requisite level fitted with plugs. All these points will be made more or less perfect according as they fall into the hands of ingenious men or otherwise. I only wish to draw attention to them as affecting the good practical working of the system, leaving others to make the application which their own peculiar and individual case may require. The only other subject I wish to notice is the form of the top of the stove, especially as connected with gaseous exhalation: with plates formed as mine are, there must always exist a liability to this, and on one or two occasions I have clearly detected the presence of gas slightly in the house—when there has been fresh fuel supplied and the damper pushed in so as to stop the chimney (thus forcing its escape, as it were)—now though very slight, and only occurring when forced to escape, I think it desirable so to construct the plating that even this shall be prevented, which may be effected by having the plates cast in one, with a projecting rim on the under surface sinking into a sand-groove. However, it is with much pleasure that I take this opportunity of stating that a form of plating has been prepared and shown to me by a well-known and very eminent firm largely engaged in the horticultural trade, which I consider far superior to the flat plating I have employed: it is in several pieces to allow of expansion, and yet arrangements are provided which are calculated to prevent the possibility of exhalation, and at the same time in the same area a much larger surface is exposed to absorb heat from the fuel and communicate it to the air; and, should it accomplish these points, I am sure it will meet with every encouragement it deserves.

Dec. 10, 1846.

X.—*Remarks on the Culture and Habits of the Cephalotus follicularis, accompanied by Meteorological Tables of the Temperature of Cornwall.* By Thomas Corbett, Gardener to Sir William Molesworth, Bart., M.P. F.H.S.

(Communicated Nov. 18, 1846.)

We have a large rock-work at this place; it faces the pleasure-grounds. There is a large recess in this rock-work, where we have a flight of steps winding from the bottom to the top; about half way up these steps a bog or swamp was made, and in this bog we grow our Cephalotus. It is sheltered from the north, east, and south by granite rocks weighing from half a hundred weight to several tons. There are shrubs and different trees growing on and about the rock, which help in summer to shade part of the sun's rays from it. The bog extends nearly on a level; the shape of it is rather irregular; its average diameter is about 9 feet. Above the rock, and some distance from it eastward, there is a reservoir, from which the fountain in the centre of the flower-garden is supplied by a large leaden pipe. As the place where we can turn the water off or on to the fountain is contiguous to the bog, where there is a small pipe attached to the large one, there we have another stoppage to the small pipe; it extends partly round the bog; there are small perforated holes all round it as far as it goes: from this we can turn on little or much water to the bog, just as we think it requisite. At the commencement of making this bog there was rather a low place across the bottom, and as the under-ground was very porous, I put a layer of wet clay all over it; the next covering was a mixture of turfy peat, and a little very much decayed leaf-mould; and on the top of that was a layer of sphagnum, with some of its decayed roots, and some of its natural soil that was under the roots. The surface of this composition was not all kept equally wet.

The first thing that I planted in this bog was Sarracenia purpurea, which was about four years ago. It was a very small plant at that time, but it has grown very much, and is still doing very well, and it had nine flowers on it at one time last summer. I put a hand-glass over it to protect it in winter. Occasionally we put other materials over it to keep out the frost. The spring following I planted the Cephalotus under the same hand-glass, and there it remained, doing very well, and treated in the same manner as the Sarracenia, until last April, when, to my surprise and regret, our poor little Cephalotus was rooted

out of the mossy ground by some mouse or large snail, and was to all appearance dead. The roots were all dried up, but I fancied there was a little life in the stem; I brought it into my cottage, and laid it on some damp sphagnum. I then went up into one of the woods, and found a rotten stump of an old tree; I cut off from it what I thought suited my purpose. There were some chasms in it, and it had living moss growing in it, and some perfectly rotten wood. I next put into one of these holes a little fine and sandy peat, a few knobs of rotten wood, and some very much decayed leaf-mould, and also a little sphagnum. I then planted my poor withered little plant in this mixed holeful of living and decayed matter, and I sunk this old stump in the middle of the bog up to nearly the level of the rim of this hole, where the percolating water gently moved past, and pressed probably in a small degree through the lower fittings of the hole. I afterwards put a small bell-glass over the little plant; but the edge of the hole being rather uneven, the glass was not air-tight. Over this I put a square iron hand-glass: it being in two parts, the air got in a little between the top and bottom; and in the middle of hot sunny days I have this partly shaded with a piece of old mat. In this situation no mice or snails are likely to be enabled to invade it.

In about a fortnight after, I was delighted to find my little favourite returning again to the evidence of vitality, and *now* I never saw it in such a vigorous growing state. At first it threw up healthy plain leaves, and soon after it had eight or ten of them. It has now brought into sight about six or eight of its beautiful pitchers; some of them are three parts grown, and some are less. It has divided itself into two stems. In summer I generally take off the bell-glass altogether, except when the night air is rather cold; and in very fine weather I turned the top of the hand-glass, so that through the angles the air had full access to the plant.

In this bog all last winter were also the following plants:—

Dionæa muscipula.
Sarracenia flava.
——— Drummondii.
——— adunca.
Parnassia Caroliniana.
——— palustris.

Lycopodium circinatum.
——— helveticum.
——— caudatum.
——— ludovicianum.
——— denticulatum.
——— Selago, &c.

The following tables will show in what sort of climate this experiment has been tried:—

Meteorological Observations taken at Pencarrow in Cornwall.

Lat. 50° 19′ N.—Long. 4° 54′ W. Time 19 m. 36 s. after Greenwich. 230 ft. above high water mark.

Date. 1841.	Thermometer. Maximum.	Thermometer. Minimum.	Thermometer. Mean.	Barometer, at 1 o'clock each day.	Hygrometer. Degrees of Dryness observed.	Hygrometer. Real Dryness.	Hygrometer. Dew Point.	Amount of Rain for the Year.
Jan.	43·	32·68	37·84	29·69	·87	2·09	41·01	3·72
Feb.	43·25	34·08	38·66	29·6	1·72	4·1	39·15	3·77
March	56·3	37·7	47·	29·7	1·3	3·03	53·27	2·94
April	58·3	38·73	48·51	29·71	2·78	6·43	51·87	2·92
May	66·3	47·33	56·82	29·41	4·4	9·9	56·4	3·98
June	69·13	42·79	55·96	29·82	4·86	11·43	57·7	2·64
July	66·2	49·4	57·8	29·75	3·58	8·84	57·36	4·12
Aug.	65·6	52·	58·8	29·71	3·12	7·32	58·28	3·42
Sept.	65·13	50·73	57·93	29·53	2·84	7·62	58·51	9·92
Oct.	62·52	50·24	56·38	29·46	2·5	5·96	56·56	6·85
Nov.	50·7	38·6	44·65	29·59	1·89	4·5	46·2	6·34
Dec.	47·16	38·49	42·82	29·59	1·45	3·5	44·11	6·6
Average	57·79	42·73	50·26	29·63	2·68	6·14	51·65	57·29

The hottest days were on the 29th of April, 25th and 27th of May, viz. 80°. The coldest night was on January 7th, viz. 12°.

The first oak-leaf was expanded on the 30th of April. The same circumstance took place in 1839 on the 15th of May, and in 1840 on the 9th of May.

Date. 1842.	Thermometer. Maximum.	Thermometer. Minimum.	Thermometer. Mean.	Barometer, at 1 o'clock each day.	Hygrometer. Degrees of Dryness observed.	Hygrometer. Real Dryness.	Hygrometer. Dew Point.	Amount of Rain for the Year.
Jan.	43·38	31·26	37·32	29·81	1.8	4·22	39·16	4·33
Feb.	49·96	35·86	42·91	29·76	2·49	5·89	44·07	3·85
March	52·29	38·58	45·43	29·76	2·7	6·48	45·81	4·12
April	59·57	36·03	47·8	29·85	7·	16·17	43·4	·81
May	56·2	43·	54·1	29·7	6·2	14·5	50·7	1·75
June	77·57	51·73	64·65	29·84	9·5	22·26	55·31	1·57
July	73·26	49·96	61·61	29·78	5·8	13·7	60·19	2·97
Aug.	74·84	54·58	64·71	29·85	10·	23·26	51·58	3·23
Sept.	64·93	48·33	56·63	29·73	5·	11·7	53·23	3·55
Oct.	56·61	36·39	46·5	29·78	5·5	12·5	44·11	3·06
Nov.	50·66	39·27	44·96	29·45	2·6	6·26	44·4	8·15
Dec.	51·	41·06	46·03	29·8	1·3	2·96	48·04	3·25
Average	59·94	42·17	51·05	29·76	4·8	11·49	48·45	40·64

The hottest day was on the 16th August, viz., 90°. The coldest night was on the 7th January, viz. 18°. The driest day was on the 16th August, viz. 44°. The first expanded oak-leaf was seen on April 29.

Lat. 50° 19′ N.—Long. 4° 54′ W. Time 19 m. 36 s. after Greenwich. 230 ft. above high water mark.

Date. 1843.	Thermometer.			Barometer, at 1 o'clock each day.	Hygrometer.			Amount of Rain for the Year.
	Maximum.	Minimum.	Mean.		Degrees of Dryness observed.	Real Dryness.	Dew Point.	
Jan.	47·6	39·35	43·47	29·56	1·5	3·51	44·09	4·69
Feb.	42·64	32·18	37·41	29·36	2·3	5·3	37·34	3·1
March	51·6	37·6	44·6	29·78	4·5	10·5	41·1	1·87
April	55·63	40·63	48·13	29·57	2·1	4·23	51·4	3·51
May	59·9	44·13	52·01	29·54	3·4	7·91	51·99	4·82
June	63·81	49·81	56·81	29·32	4·5	10·8	53·01	3·11
July	69·22	52·45	60·83	29·75	5·4	12·34	56·88	2·08
Aug.	70·4	49·06	59·73	29·73	6·9	16·03	54·37	3·54
Sept.	70·73	51·33	61·03	28·88	6·7	14·16	56·57	1·41
Oct.	57·2	41·97	49·58	29·6	3·62	8·45	48·74	8·20
Nov.	50·73	38·7	44·71	29·63	2·6	6·06	44·67	3·98
Dec.	48·87	40·97	44·92	30·09	1·35	3·16	45·71	1·48
Average	57·36	43·18	50·27	29·65	3·66	8·53	45·49	41·79

Date. 1844.	Thermometer.			Barometer, at 1 o'clock each day.	Hygrometer.			Amount of Rain for th Year.
	Maximum.	Minimum.	Mean.		Degrees of Dryness observed.	Real Dryness.	Dew Point.	
Jan.	45·67	35·64	40·65	29·8	2·35	5·5	41·17	3·62
Feb.	45·06	32·34	38·7	29·46	2·6	6·	39·06	4·16
March	49·06	32·51	40·78	29·86	4·09	9·54	39·52	2·45
April	61·2	37·37	49·28	29·86	5·9	13·83	52·37	·53
May	63·4	38·09	50·74	29·81	8·07	18·83	44·57	·19
June	67·6	47·96	57·78	29·76	8·43	22·48	45·12	1·14
July	71·22	50·13	60·67	29·75	8·2	19·	52·22	1·33
Aug.	65·93	48·93	57·43	29·65	6·7	15·6	50·33	3·29
Sept.	65·56	47·1	56·33	29·8	6·96	17·03	48·53	2·82
Oct.	56·93	41·22	49·07	29·69	4·1	9·5	47·43	5·09
Nov.	52·76	38·1	45·43	29·59	2·46	5·75	47·01	10·64
Dec.	41·84	28·8	35·32	29·68	1·48	3·45	38·39	2·67
Average	57·18	39·84	48·51	29·72	5·29	12·21	44·97	37·93

The hottest day was on the 23rd of July, viz. 78°. The coldest night was on the 21st December, viz. 12°. At St. Breoke, rain 38·74. Pentilly, rain 43·827.

Date. 1845.	Thermometer. Maximum.	Minimum.	Mean.	Barometer, at 1 o'clock each day.	Hygrometer. Degrees of Dryness observed.	Real Dryness.	Dew Point.	Amount of Rain for the Year.
Jan.	48·12	33·48	40·8	29·64	2·42	5·64	42·48	4·44
Feb.	47·68	29·	38·34	29·73	9·	21·	26·68	2·8
March	47·32	26·64	36·98	29·78	5·1	11·9	35·42	·86
April	61·96	37·76	49·86	29·6	6·26	14·6	47·36	2·47
May	64·16	40·9	52·5	29·71	5·38	12·56	51·61	1·59
June	74·1	47·	60·6	29·78	5·47	12·7	61·4	3·6
July	70·64	49·7	60·17	29·7	4·65	10·93	59·71	2·38
Aug.	70·5	47·3	58·9	29·72	4·33	10·	60·5	3·03
Sept.	66·93	42·77	54·85	29·73	5·1	11·9	55·02	4·65
Oct.	59·	41·	50·	30·08	3·806	8·88	50·12	2·06
Nov.	52·73	38·27	45·5	29·49	2·8	6·53	45·2	5·69
Dec.	48·5	36·	42·25	29·69	1·71	3·99	44·51	1·76
Average	59·3	39·15	49·22	29·72	4·67	10·88	48·42	35·33

The hottest day was on the 12th of June, viz. 94°. The coldest nights were on the 13th and 10th of March, viz. 10°.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

1. Aconitum autumnale.*

Received from Mr. Fortune April 6, 1846, as a "species of Aconite flowering in winter." From Chusan among his dried plants.

In its manner of growth this Aconite resembles A. Napellus; in the form of its flowers A. Cammarum. It grows about 3 feet high, and produces its flowers, which are lilac and white, in a simple spike, which however in time becomes a panicle by that retrograde development which seems common to all Aconites. The smell of the blossoms is heavy and unpleasant; and they have a great tendency to form subulate petals in addition to the ordinary hammer-headed ones; in one flower as many as seven of such processes were counted, and of them one was an inch long.

It is most nearly related to *A. japonicum*, from which it appears to differ in its pubescence, in its helmet not being exactly conical, but very blunt and rounded, and in the filaments having broad wings expanded on each side into a tooth.

This species was found cultivated in the gardens of Ningpo, in the north of China. It is prized there chiefly on account of its habit of blooming late in the autumn or winter. As it will certainly prove quite hardy in Europe, and retain its habit of flowering in winter, it will therefore possess some interest to the collectors of new hardy herbaceous plants. *Nov.* 23, 1846.

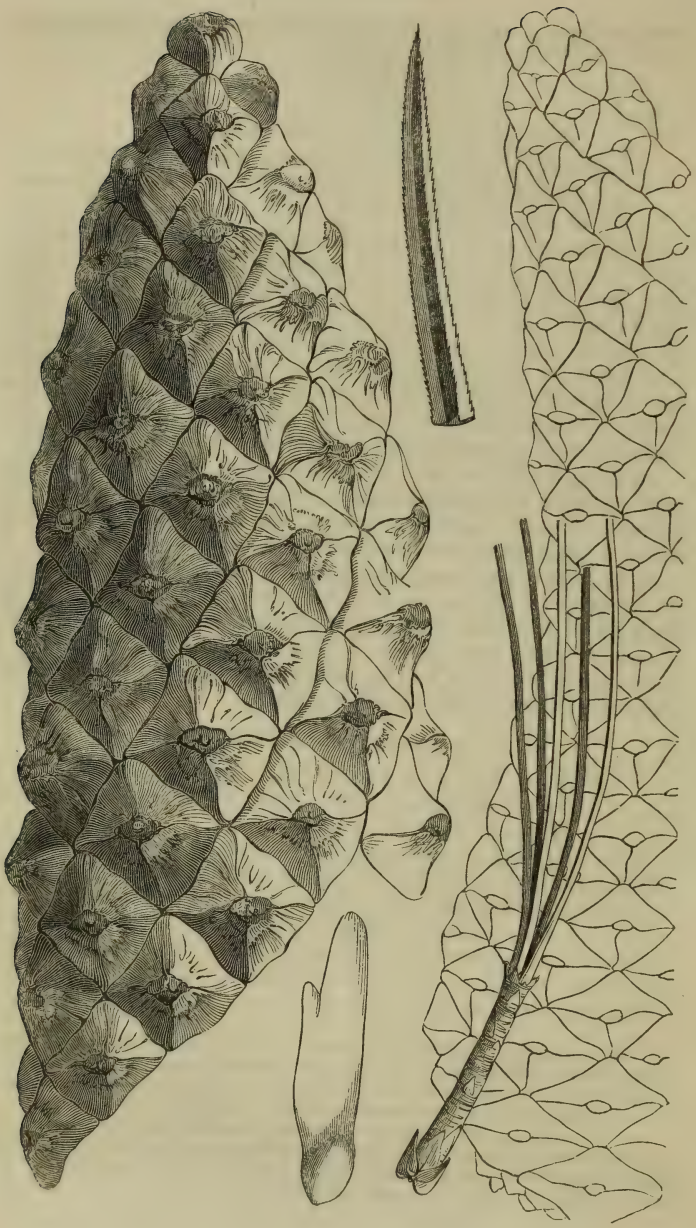
2. Pinus Grenvilleæ.†

Found by Mr. Hartweg on the Cerro de San Juan, or Saddle Mountain, near Tepic, in Mexico, attaining a height of 60 or 80 feet.

Leaves in fives, 14 inches in length on the wild specimens, very robust, triquetrous, thickly set on the branches, dark-green, and very much resembling those of Pinus macrophylla, but rather longer; sheaths persistent, nearly 1½ inch in length, rather rough and scaly; seed-leaves on the young plants mostly ten in number, and rather long; branches mostly solitary, rarely in pairs, irregular, and very robust; buds very large, imbricated, non-resi-

* *A. autumnale;* (Cammarum) pubescens, foliis palmatifidis laciniis pinnatifidis lobis subfoliatis acutissimis, spicâ simplici strictâ, galeâ compressâ rotundatâ sensim acuminatâ, cucullis obtusis circinatis, filamentis utrinque in alam latam acuminatam productis, ovariis 3 villosis.—J. L.

† *P. Grenvilleæ;* foliis quinis longissimis triquetris validis serrulatis, vaginâ longissimâ subscariosâ, strobilis pendulis solitariis sessilibus rectiusculis longissimis, squamis rhombeis tetragonis rugosis obtusissimis, alâ semine multò longiori bilobâ,—G. Gordon.



nous, and thickly set with long narrow brown scales; cones pendulous, solitary, sessile, quite straight, tapering regularly from the base to the point, 16 inches in length, and 3½ broad at the base, with from 28 to 30 rows of scales; scales nearly all of a size, six-eighths of an inch broad, slightly elevated and blunt, particularly towards the base, from which a small portion of clear resin sometimes exudes; seeds about the ordinary size, with bifid wings, which are rather broad, and more than an inch in length.

This noble pine is very easily distinguished from all others by its very long straight cones and stout foliage. It is called "Ocote macho," or male pine, by the natives, on account of its robust habit, and is found plentifully on the highest parts of the Cerro de San Juan. It has had its present name given in compliment to the Right Hon. Lady Grenville, who possesses one of the finest pinetums in Europe at Dropmore.

3. Pinus Gordoniana.* *Hartweg.*

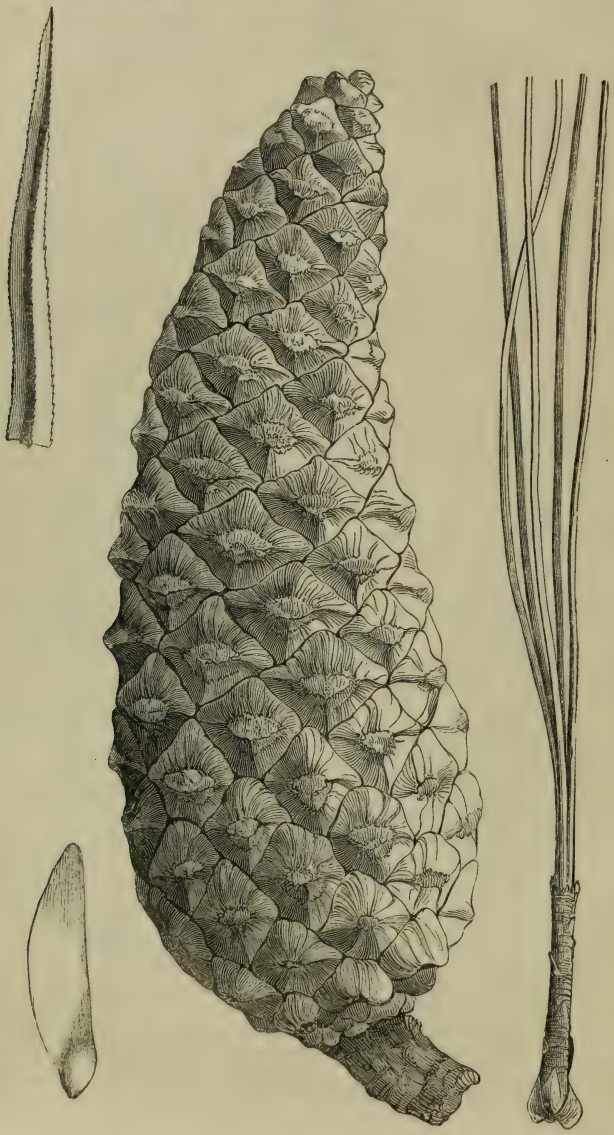
Received from Mr. Hartweg, who found it on the Cerro de San Juan, or Saddle Mountain, near Tepic, in Mexico, attaining a height of 60 or 80 feet.

Leaves in fives, 16 inches in length on the wild specimens, rather slender, triquetrous, very dense, light-green, and longer than any of the other kinds; sheaths persistent, about 1¼ inch in length, rather rough and scaly; seed-leaves on the young plants mostly seven in number, and rather short; branches rather numerous, regular, slightly elevated at the points and not very robust; buds very scaly, non-resinous, and of a moderate size; male flowers rather large, in dense clusters, and very numerous; cones pendulous, mostly solitary, slightly curved, and tapering regularly from near the base to the point, from 4 to 5 inches in length and 1½ broad near the base, with 14 or 15 rows of scales; scales half an inch broad, slightly elevated, particularly those about the middle and towards the points, while those next the base are nearly flat and much smaller; the cones are quite destitute of resin, and on footstalks about ½ an inch in length; seeds small, angular, with rather narrow wings, about 1¼ inch in length.

This handsome pine has the longest and finest foliage of any kind yet introduced, and is called by the natives "Ocote hembra," or female pine. Mr. Hartweg, who discovered and named it,

* *P. Gordoniana;* foliis quinis tenuibus minutissimè serrulatis longissimis, vaginâ squamosâ subscariosâ, strobilis pendulis subsolitariis ovato-oblongis rectiusculis, squamis rhomboideis vix pyramidatis rugosis obtusis, semine parvo alâ semilanceolatâ obtusâ.—G. G.

states that it is not frequently met with on the colder parts of the Cerro de San Juan, and is likely to be hardy.



ORIGINAL COMMUNICATIONS.

XI.—*On Hybridization amongst Vegetables.* By the Hon. and Very Rev. William Herbert, LL.D., F.H.S., Dean of Manchester. Part the Second.

(Communicated Oct., 1846.)

I have mentioned that different species of Zephyranthes did not intermix willingly, but seedlings of Z. tubispatha by Z. carinata flowered at Spofforth, which produced no seed, and have been lost since. One was raised from Z. sessilis var. Guatimalensis by carinata, which has borne seed and fertilized var. verecunda. The dust of H. concolor and other species of Zephyranthes and Habranthus, and of Sprekelia formosissima and cinnabarina, has been very frequently applied to Hippeastrum, but always in vain. Hippeastrum, however, both here and in America, has willingly produced seedlings by the curious plant figured as Sprekelia cybister, and supposed by me to form a second section of Sprekelia, differing in the relative length of its several stamens and in the Hippeastrum-like breadth of its leaves. Professor Lindley was therefore right in looking upon it as an anomalous Hippeastrum; and I think it gives reason to believe that Sprekelia is rather a very strongly marked section of Hippeastrum approximating to H. aulicum than a genus *originally* distinct; in which case the question would be yet open, whether, under very favourable circumstances, a cross might not be still obtained, for no Sprekelia seems willing to bear seed in our climate and under our cultivation.

The genus Crinum goes round the belt of the world not exceeding a certain distance from the equator. A portion of it was originally included in the genus Amaryllis, being supposed to conform with the Belladonna lily, on which it was founded. The greater part of that portion breed as willingly with those within the old Linnæan limitation of Crinum as with each other; but those from the west coast of Africa (although one of them, C. spectabile, is naturalized in Brazil) usually fail to breed with any other species. One of them, however, C. Broussonetianum, comes so near to the East Indian species, that Mr. Ker united it with them as a variety under the name Amaryllis ornata. I raised after repeated failures one seedling from C. Capense by pollen of C. spectabile, as I believe, but I lost the plant when two years old, before I could feel certain of its correctness. Here is one of the unintelligible freaks of nature;

that is to say, one of the departures from analogy in the dispositions of the Allwise, of which I at least cannot fathom either the cause or the mode.

The genus Crocus, with great uniformity of aspect, branches into an infinity of species and local varieties, being found in peculiar situations and soil, but with greater similarity of habits and constitution than Crinum; and it might have been supposed that, when brought into cultivation, their seminal produce would become confounded. On the contrary, I have tried in vain for years to obtain any cross; I have not one as yet on which I depend; and, if I have any, not above three or four such bulbs, and about as many seeds. The cross-impregnation seldom produced a pod, and, if it did, the seed was usually shrivelled and bad. Look at the geological map of Bory St. Vincent. Half the island of Milo consists of igneous rock, half of marble and schist. On the schist he found C. lævigatus. The same schist appears in Thermia; C. lævigatus is there. I know that it passes thence to Hymettus and to the neighbourhood of the quarantine station at Zeitun. I doubt not that a like calcareous formation will be found there. But why does C. lævigatus jump from the summit of Milo to the summit of Thermia, and thence by Hymettus to Zeitun, without touching the hills of Epidaurus or Nauplia, or any part of the Moræa, as far as it has been searched? I believe because the soil, subsoil, and climate, in which it grows, have forced Crocus to take that form and aspect which botanists call C. lævigatus, not that it has a predilection for such, for experience leads me to think that few local bulbs or even plants prefer their native soil, though they are found in it because they can endure it, while the rivals, which would otherwise oppress them, cannot thrive vigorously in it. Many such are found to perish if potted or cultivated in their native soil removed to another situation, finding either an injurious increase or diminution of moisture in the new position, which makes a different soil expedient for them there. Griffinia grows in mountain woods in very strong loam; it will scarcely live in such soil in our stoves, where it seems to like sandy peat. Ismene Amancaes grows in Bolivia in loam strong enough to break an iron crow; here it must be cultivated in pure white sand. I find such European Orchideæ and Croci as grow in chalky or calcareous stuff, very much disposed to canker and die if potted in the like, while the fresh tubers and corms of almost every kind turn out well from a yellowish crumbling loam of moderate tenacity. No Crocus grows naturally in alluvial soil, probably because other plants would there smother it; but many, if not all, delight in it in a sufficiently dry situation, when cultivated. Different soils, therefore, suit the same vegetable

under different circumstances, because in different positions they will have to contend with other difficulties and other rivals for the occupation of the soil. I consider a due quantity of moisture, without excess or deficiency, to be the main requisite to every plant which has peculiar local affections, premising that it must have space, unincumbered by stronger rivals that would overpower it, and a suitable temperature. I have found a blue Statice growing aloft in solid stone at the back of Portland island, and elsewhere on the brink of a runnel in a saltmarsh; I have found Gentiana verna on the firm turfy brow of the St. Gothard, and in the flooded marshes at the head of the lake of Thun. The clouds and the sea-spray and fog furnished in the high position that incessant moisture which those plants demanded, and which the rival grasses found to be superabundant for their use and injurious to their vigorous growth.

To return to C. lævigatus: one of two views must be adopted, either that schist, in a position where it receives a certain degree of moisture under a certain temperature, is essential to enable a variation of the genus Crocus which originated in such a position to reproduce and maintain itself against all intrusion, or that the like data tend to produce a similar variation in different insulated spots; but it is not easy to suggest a satisfactory reason why such an indisposition to intermix should exist in a genus which branches into so many local species with so much general conformity both of habit and aspect. It has sometimes occurred to me, that the variations produced by circumstances of poverty, where the plant exists by superior powers of endurance, become more fixed than those which arise from luxuriance. Crocus seems to me to live in a state of constant mountain warfare, avoiding the presence of powerful rivals; Narcissi shoot both early and vigorously, and usually domineer over the grasses, &c., in the position they choose. The attempt to cross Crocus vernus with other species led to some interesting observations. Plants thereof were taken up and potted at the flowering season for that purpose. I found that no excision, however deep, of a flower that had expanded itself, and of which the pollen was set free before it was taken up, could prevent the underground germen within the sheaths of the plant from perfecting its seed in due time. The fertilization had taken place and could not be arrested. On the other hand, no application of its own pollen would fertilize a flower after the transplantation; the check received prevented the fertilization; prevented, as I believe, the plant from supplying that which the pollen required to enable it to elongate its tubes. But a further remarkable circumstance was observed. The roots so potted were plunged in a sand-bed, that they might be ready for the next year's operation without

transplantation ; but two seasons succeeded, and those roots produced no flower. A small bulb of a variety of C. vernus from the Splugen had been also potted two years, and did not flower. It was planted out, and no longer failed. What does this imply? I suspect that the relative cold and moisture of the crown and the base or fibres of a plant is an important point which cultivators have overlooked, and which may be one of the agents by which local variations have been produced. C. vernus on the Alps, at an elevation of 5000 feet, frequently flowers by piercing the yet unmelted remnant of snow. In that position its head is wet and very cold, while its tail descends to the warmer and drier stone. In a pot at my window the vernal sun warms its head, while the pot detains the wet round its fibres and the evaporation from the pot chills them. The relative circumstances are therefore reversed. When I find that Crocus vernus does not descend below 5000 feet on the mountains of the South of Italy, and that its near kin C. Imperatonius flourishes there between 2000 and 3000 feet above the sea, I cannot avoid suspecting that the variation was worked in times by-gone by the difference of position, and I ask myself whether the different relative moisture and warmth of the two extremities of the plants, and not the mere difference of soil and temperature, caused their diversity, and now prevent their juices from co-operating for mutual fertilization.

I will now turn to the genus Colchicum, not because I have raised crosses therein, which I have not tried, but because it well exemplifies the confusion of ideas that exists on this subject amongst botanists,* both as to facts and theory. Colchicum with great general similarity varies infinitely not only in different localities, but even in the proportions of the several flowers of the same plant. The natural consequence is, that many species have been described, insufficiently defined and not easily determined, to which my own collections can make a considerable addition. A strong feature of difference is size; the bulb or corm of some being large, and the leaves wide and a foot long, while in others the bulb is small, and in one species the leaves almost filiform. Consequently, in R. and Sch. Syst. we find very long dissertations on the question of the identity or difference of several species of this genus, and Professor Bertoloni (Amœn.) refers a lot of them, great and small, to Colchicum autumnale, saying the difference is in proportion of parts, the

* I wish to take this opportunity of doing justice to my scientific friend, Dr. Brown, having stated incorrectly, Amar. Pr. Tr., p. 5, that the germen growing below or above the flower was undetermined in his order Asphodeleæ. I overlooked the word by which he indicated it, from its being misplaced, on comparing the definition with that of a cognate order.

smaller being from a more arid situation, and that it flowers earlier on account of the colder climate in which it dwells; meaning, I suppose, where the autumnal rains are earlier. There seems to be a disposition to accept this as sound reasoning; but what does he mean? I believe neither he nor those who would accept it know exactly what they assume. Does he fancy that the small forms are peculiar to dry and cold situations? I can assert that the fact is not so. I have found one of the very largest (which I propose to call C. pulchrum) on a high mountain in Cephalonia, very near to the small C. Bertolonicum and other diminutive kinds, and I have found small kinds not much above the sea level in Corfu. Does he mean that the small sorts, in which he sees some affinity to C. autumnale, will acquire the stature and proportions of C. autumnale when removed into the soil and climate in which it is found? The fact is not so; the small forms remain unchanged in cultivation. Does he fancy that the mean temperature of the southern hills, on which the small forms are found, is colder than the meadows of Yorkshire, in which the larger autumnale grows? The reverse is the case. Upon what principle then is it asserted that some forms, permanently very different, are of one individual species, and others in the same genus of several species, because they differ in having the margins of the leaf more or less parallel, or the stigmas straight or bent, and so forth? There is nothing rational in this; and yet the whole science of botany lies under that cloud. The true fact is, that Colchicum is one created type; that it has branched in by-gone ages into various forms, through various circumstances of climate, soil, subsoil, and altitude, and the altered features have become durable. In the sub-division of this genus or kind into existing species or permanent forms, the botanist has to consider, and guess as well as he can by analogy, what are the features which will prove permanent when the species is multiplied by seed in different situations. Cultivation will bring his specific divisions to the test, in the same manner that cross-breeding is the test of the genera or kinds. No man can be a consummate botanist without some access to horticulture, or at least some attention to its results. The greater number of botanical genera have been formed on the view of dried specimens, in which the parts collapse and cannot be truly discerned; consequently, I find scarcely a genus to which I have occasion to refer, in which false facts are not asserted, from the want of opportunity or industry to investigate truly and compare its general form with all its occasional variations. In the genus Colchicum, three sepals larger than the three petals which they enclose, the alternate length and insertion of the filaments, and the thickness of their base, are, I be-

lieve, true generic features. If they should be found deficient in any species, a thing which I do not much expect, it will be one of the many instances in which a feature becomes obsolete without affecting the general character of the type, as in the section Azalea five of the stamens of the genus (Rhododendron) are oftener deficient than present. Cross-breeding shows that such a deficiency is not original, but an incident. By true generic features I mean features that belonged to the type of the genus, whether that was the created type, or whether the genera themselves had diverged from fewer created individuals; an inquiry which would be superfluous and vain.

The facility with which the larger Rhododendrons intermix with some sorts of Azalea is now well known, and it is quite clear that Azalea is a condition of the same genus, in which half the anthers are usually deficient (half in the perfect form being of inferior power), and the leaves disposed to be deciduous, although they are deciduous also in Rhod. Kamchaticum, Dahuricum, and one or more Chinese species. Some seedlings of the yellow Pontic Azalea frequently produce seven, eight, or nine anthers, and Indica with evergreen leaves has usually a fuller complement, but is much more unwilling to cross with the evergreen Rhododendrons, showing clearly thereby that the feature which had been assumed for the generic character, is even of less importance than some secret difference which we cannot discover amongst the species. Az. (so called) squammata has ten stamens. From Rhodora Canadensis impregnated by A. Pontica I obtained a plant (A. Seymouri, Bot. Reg.) which would everywhere pass muster as Azalea. It is therefore preposterous to look upon Azalea and Rhodora as other than strongly marked and defective sections of the genus Rhododendron. It was my original notion that the cross-bred produce from such plants, if placed alone in a soil and climate perfectly congenial to their fructification, would perpetuate the cross-bred type. I am satisfied that in many cases that would occur, but perhaps not where the diversity is as wide as between Azalea and Rhododendron. The crosses between the Nepal, Pontic, and American Rhododendrons are fertile, and doubtless would perpetuate themselves, though with a good deal of sporting. I formerly mentioned that the result from the impregnation of the shrubby Calceolaria integrifolia by Calceolaria plantaginea, which is quite as humble and herbaceous as a plantain, was remarkable, the whole produce having a similar aspect, that of a very dwarf plant, with long serrated leaves on very short stiff branches, the inflorescence being exactly intermediate between that of the two species. It appeared at first to be sterile, but last year I obtained a pod from it, and it has reproduced itself as perfectly as if it were a natural species

from the mountains of Chili; set with the pollen of other hybrids it has produced handsome varieties perfectly herbaceous. The whole produce of the pod I have mentioned having been similar to the parent plant, and quite distinct in appearance from any other Calceolaria, there can be no doubt that, if they were planted in a wild spot, of which the soil, circumstances, and climate suited their growth and fructification, a new species, according to the terms and acceptation of botanists, would have been there established; and yet any person who cultivated Calceolaria integrifolia by impregnating it with C. plantaginea would obtain the like. We learn that most of the fine heaths of South Africa are very local. Above thirty years ago I announced that I had crossed E. vestita coccinea with jasminiflora (though Mr. Salisbury fancied they were of two separate genera, on account of the shape of the seed-pods); and it is now ascertained that Mr. Rollisson, of Tooting, raised E. jasminiflora by mule impregnation between E. Aytoni and ampullacea, and several others, of which no wild specimens have been found, and kept his secret until his death for the sake of profit. The genus Erica not yielding its pollen till the anthers are forcibly touched, and having the stigma therefore extremely likely to be hybridized in a wild state, there seems reason to believe that the species have been multiplied on the African wastes not merely by the variation of soil and position, but still further by the intermixture of the various forms which had so arisen. Such things occur occasionally even between plants widely distinct. A single bulb of Crinum submersum was found in a pool of water in Brazil in company with plants of a variety of C. erubescens, one of which had been impregnated by pollen of C. scabrum which grows on woody hills, and of which the pollen must have been brought by an insect or humming bird. I must not quit the mention of Rhododendron without stating that the mules of the late Mr. Smith of Norbiton by Azalea Sinensis were raised, as I know for certain, from a white Rhododendron of the cross between R. Ponticum and the white maximum, which abounds on the hills of Jersey in the United States, being a distinct local plant, impregnated by Azalea Sinensis; and that it is erroneously stated in the Ghent 'Flore des Serres' that they are crossed by Rh. arboreum. I saw the mother plant when the seed-pods were still green. Mr. Smith crossed R. arboreum with Dauricum sempervirens, but I could not prevail upon him to sell the plants, or house them, and they all died young from frost and neglect. My own Rh. Aprilis was raised from a Pontic Rhododendron by Dauricum sempervirens, and has made no seed.

Let us now take a view of the circumstances attending the genus Gladiolus. With the exception of the few species of

which the lower lip is abbreviated, on which account those were erroneously formed into a separate genus Anisanthus by Sweet, they are pretty uniform in the shape of the flower, with much diversity of size, colour, foliage, stature, and even seed, which last feature induced Sweet to build up another false genus Sphærospora. Forty years ago I first crossed the large and brilliant scarlet and white Gladiolus cardinalis with the smaller, but more freely flowering, G. blandus, which sports with white, purple, and rose coloured flowers, and (under the name of carneus, which was in truth rather a local variety of the same) of a coppery flesh-colour. The result was a fertile breed of great beauty, of which the prevailing colour was purplish roseate. Crossed again with cardinalis it yielded florid plants, scarlet, copper-coloured, rose-coloured, white, and purple with endless variation. By a cross of the first mule and of cardinalis itself with G. tristis, of which the flower is pale yellow with brown specks, deeper tints and rich speckling were introduced, with a difference in the foliage and seeds, the seed of G. tristis being smaller and longer, its leaves rigid and quadrangular, the transverse section exhibiting a cross. The seeds of cardinalis are like those of blandus, but larger. There can scarcely be two species more dissimilar than cardinalis and tristis in any genus which has the form of the perianth uniform, the latter having such remarkable leaves, narrow, rigid, and erect, a slender stem, with night-smelling flowers, and the former very broad semi-recumbent glaucous foliage, and an inclined half-recumbent stem with large scarlet and white blossom ; yet the produce of these intermixed is fertile, and where the third species blandus has been also admitted into the union, it is fertile in the extreme (incomparably more so than the pure G. cardinalis), and by that triple cross the tall strong Gladiolus oppositiflorus of Madagascar has also produced offspring, which, though not disposed at present to make seed freely, has produced some this year. Again, the first of these mules was fertilized by G. hirsutus (known at the Cape by the name roseus), a plant with flowers straighter than usual in the genus, and strongly scented, the leaves hairy and margined with red. That cross has not as yet proved fertile. The same G. hirsutus was crossed by Mr. Bidwill at Sydney, where the Cape bulbs thrive more freely than here, with G. alatus (which Ecklon wished to turn off into a genus Hebea), having hard rigidly ribbed leaves, a short stem, and orange flowers. The cross-bred plants flowered here last autumn, being intermediate in foliage and flower. The only opportunity I have had of crossing G. alatus with the first-named mules was defeated, notwithstanding much precaution, through the introduction of pollen by the humblebees, which are dan-

gerous marplots to such experiments. The showy G. Natalensis (called also Psittacinus) of the Natal country, which endures more frost than any of the Southern Gladioli, though it suffers much from July rains in many positions, has been freely crossed by myself, by Mr. Belfield, by Mr. Bidwill, and by cultivators on the Continent, with G. oppositiflorus, a Madagascar plant, found perhaps also in Caffraria, and often called improperly in the shops floribundus, an old name for a very different plant. The cross named G. Gandavi (for the adjective name Gandavensis to a garden cross is very objectionable) has been figured in the beautiful Ghent periodical work of M. Van Houtte and his fellow-labourers in botanic and horticultural science. It is there stated most erroneously to have been raised between Natalensis and Cardinalis. It flowered at Ghent for the first time in Europe, the soil and climate being much more congenial to Gladioli there than at Spofforth and in the west of England, but some of the seedlings raised in Devonshire and taken to Sydney had flowered earlier. Abundance of beautiful seedlings have been raised here and abroad between cardinalis and oppositiflorus, and *vice versâ*, many of which have been sent over from the Continent under the name G. ramosus, as if they were plants of a natural species. Those from abroad have generally perished soon here, the soil and climate being too damp, but my own seedlings, probably the opposite cross, have a much stronger constitution, more variety of colour, and have this season ripened much seed. This statement might perhaps induce the reader to think all the species easily convertible; but it is not so. If I am asked why, I can only say, that the ways of God are not as our ways, and are past finding out. The cross erroneously stated to have been made between G. Natalensis and cardinalis, if not absolutely impossible, is so difficult, that repeated attempts made during successive years by myself, and by J. Trevor Alcock, Esq., who interested himself in this matter, and probably by many others, have all proved abortive; and no cross has been effected, as far as I know, between G. Natalensis and any species from the Cape territory, although both Natalensis and the Cape species mix readily with the Madagascar plant. I am now trying whether the cross G. Gandavi, being half-blood, will mingle with the Cape species, and the result is not yet quite certain. I lately set nine flowers of G. oppositiflorus with pollen of G. hirsutus. Large pods were readily produced, but unexpectedly they proved to contain only chaff and perishing kernels, the fertilization having perhaps extended to the seed-vessel and the outer coat of all the ovules, without having vivified them; but I believe one frosty night in August caused the failure. Five equally fine pods were produced at the same time on a

scarlet ♀ cardinalis mule. Few of their ovules were at all fertilized, and the greater part of those were chaff, but a few apparently good seeds were amongst them, which will probably vegetate. G. Gandavi itself has ripened its seed three successive years, and one from the first batch of its descendants is now in flower. It preserves the cross-bred type, and might be accounted a distinct species, if I did not know that it was raised from oppositiflorus by pollen of Natalensis. It reverts, however, a little towards the male parent, the purple stripes of the female parent being less strongly marked than the original mules, and the flower is scarcely as large or bright coloured, following the course I have observed in other cases, that seedlings from a cross-bred plant by its own pollen sometimes degenerate in the size or brilliancy of their flowers.

We must next turn to the Gladioli of the northern hemisphere, there being, however, a plant of intermediate position, G. æquinoctialis, on the heights of Sierra Leone. The northern Gladioli are all purplish, with a tendency to rose-colour, and in a few cases to blue, excepting the whitish and the white varieties. They peremptorily refuse to breed with the Cape species; and, although I will not say that the cross is impossible, I have failed in so many attempts that I have abandoned them. But although the northern species differ somewhat from those of the Cape territory, and agree with G. Natalensis in a more direct presentation of the flowers to the front from an erect stalk, there are a great many different local forms of them, with a great general similarity of aspect and intermediate forms, which almost defeat the attempts to distinguish them specifically, but furnish, with a similarity of flower, a strange diversity of seed—the winged or foliaceous margin of the African species being conspicuous in Byzantinus, communis, Boucheanus, and some others; totally disappearing in G. segetalis, Fischerianus, and some others; curtailed in some varieties, and almost obsolete in others, of G. communis. The gradual curtailment of that margin in varieties of communis, as well as the close resemblance of G. segetalis to them, shows that the separation of the latter as a genus is preposterous. But there is another strange circumstance connected with them, which tends to show how species originate. G. Byzantinus will grow and increase greatly in almost any soil or situation; G. segetalis is very apt to die at Spofforth—I supposed it tender and fearful of wet. The white Gladiolus commutatus of Bouché, communis albus of the Dutch, but in truth a white G. segetum, always dies at Spofforth—I believe they perish because the soil, however good for barley, is too light for them. Near Trieste and in Santa Maura G. segetalis engrossed strong yellow ploughed land that lay flat and

wet, and was also pestered by Aristolochia clematitis; but G. Illyricus is only found in meadows of alluvial soil subject to inundation; and where I saw it in flower in May, near Trieste; the sod was then three inches under water. Yet these three species require nice discrimination to separate them. Their case is somewhat like that of the wrens, Silvia sylvicola, trochilus, rufa, loquax, and Temminckiana, which are only distinguished by skilful persons, yet differ greatly in note, nest, and habits. Although the northern Gladioli, which conform with cardinalis, &c. as to their seed, will not breed with them, I believe, on the contrary, that there is no obstacle to their breeding with their European congeners that have round, unwinged seeds. In the genus Schizanthus, retusus refuses to breed with pinnatus; though they conform with each other in all respects except the size of their seeds—a circumstance which is not an obstacle in Gladiolus, but is so in Anomatheca, as I have already stated. I can suggest no direct solution for that mystery; but some difference of constitution probably prevents the pollen from deriving what is essential from the juices of the female plant. I should conceive that G. Byzantinus and communis, which have seeds like the African sorts, and are not particular as to position, are nearest to the northern Gladiolus of the oldest days; that some of its offspring, having fallen into peculiar situations, have acquired constitutional peculiarities, with some alterations of aspect and structure, that have become fixed characters.

There are some classes of plants with great diversity of forms, but so graduated as to render it almost impossible to subdivide them satisfactorily into distinct genera and species. I find the undescribed Colchicums from different localities varying so much from each other generally, and yet so little fixed in their own usual peculiarities, that all specific names for them seem vain. Again, the difference which separates Colchicum from Merendera, viz. a compact slender tube in the former, and in the latter, instead of a tube, six long slender bases to the leaflets of the limb, which are fastened together by little hooks at the mouth of the seeming tube, but easily separable, would appear to furnish a good generic distinction; but the perfect agreement of the two in habit and general appearance induces me to think that they were united even in comparatively late periods of the world, and I should expect to find them capable of intermixture, and I shall take the first opportunity of making the experiment. The Sisyrinchioid plants include a mass of individuals which it is most difficult to class under distinct genera, but which are very remote from each other in habits and appearance, and they slide away through the Tigridialike plants towards the real Irises and their near kin, in a manner that cannot be readily brought

within the scope of regular systematic views. When we turn to the multitudinous iridaceous plants of the Cape territory we find no less difficulty, and the subdivisions are baffled by forms, of which it is difficult to dispose consistently. Sweet's small Orthrosanthus multiflorus was naturally remanded by Dr. Lindley to the Sisyrinchiums, because its flower seemed to conform with some which were not peculiarly allied to it; but no person can look on Mr. Mangles's Orthrosanthus cæruleus, a plant of the largest growth amongst those races, and another lovely species introduced by him, which I call O. gracilis, and not at once recognise the aspect of Orthrosanthus, the inflorescence being borne on the axils of the flower-stems, instead of being simply terminal, which is a feature of considerable importance, and seems to indicate that the race is at least now distinct. We are labouring, therefore, under great difficulty in assigning the just demarcations to the genera or kinds; and it is evident that attention to the cultivated forms and intermixture of plants is no less essential to botanical knowledge than the inspection of wild specimens. By that we are enabled to learn how far the offspring of individuals can sport at the present day, and how far those which seem to be distinct are capable of union; and by a survey of the results it may perhaps become apparent at last whether that union is in truth only a reunion of things that have been severed in ancient times.

The genus Hymenocallis was mainly separated into species, as Dr. Roxburgh had distinguished the East Indian forms of Crinum, by the proportionate length of the tube and limb. That answered tolerably well as a prevailing feature, while the known forms were few, although we often found great difference in the proportion of flowers on the same umbel; but the species have poured in upon us from so many localities, without certain indications of their natural habitation, and so many mules, bred accidentally as well as intentionally under cultivation, have been mixed with them, that it becomes almost vain to attempt to continue subdividing them further into species; and it can only be said of each fresh variety, without the particulars of its habitation, that it is an Hymenocallis. I was able on the first sight of two forms brought by Mr. Cuming from Manilla, though new to me as to their peculiarities, to say that he had got them from a garden where they had been probably introduced on the removal of some governor and his family from Spanish America to the East, because Hymenocallis is peculiar to the western hemisphere; and he at once admitted the fact to be so. The more deeply plants are investigated, the more will it be felt that the establishment of kinds or genera, the discrimination of their higher affinities, and the pursuit of specific diversities

to their local habitations and associations, with research into the causes that are in operation there, are the duties of the botanist; but that the distinctions between species and variety are not sufficiently substantial and positive for any scientific reliance to be placed upon them, and that a dispute on such a distinction is waste of words and battling with the air. The genus Hymenocallis, however, though sliding into variations almost indiscriminate, is perhaps one of the races most deserving consideration of all that exist in the world. It is confined to the New World (that is, to the American continent and the West Indian islands), within a certain range from the equator; it rejoices in wet, and in cultivation may be kept in pots immersed in water. I have not found any one form of it object to immersion during its season of growth. In the form of its flower it approximates, especially through H. speciosa, which has the filaments shorter and rather converging, to Pancratium of the Old World so nearly that it is difficult to separate them very satisfactorily by the inflorescence, though the stamens of the former have rough pollen, and are longer and looser; those of the latter stiffer, shorter, and conniving. But no Pancratium has been found in a swamp; they abhor excess of wet, and one which it is difficult to cultivate, P. tortuosum, *mihi*, grows in the sandy desert of Arabia, near Gedda. Pancratium has shelly black seeds, and Hymenocallis large fleshy green seeds, which have been usually called albuminous, so that they stand in two widely distinct sections of the order Amaryllidaceæ, separated by a feature which in other orders has been admitted even amongst the insuperable limitations of the order itself. Will Pancratium and Hymenocallis now blend their offspring? I believe they will not; and, if produced, I am persuaded that it will be sterile. Were they created distinct from each other at the beginning? I cannot compare their flowers, and presume to say that I think they were. I will now state a fact which I had hoped to elucidate further, but either I had not opportunities of repeating the experiments, or other matters prevented me from availing myself of them. At p. 211, Amar., I gave a detailed account of the origin of four seedlings, called H. amœna var. lorata, *hortensis*, from four weak discoloured seeds of H. amœna, which had been deprived of its anthers and touched with the pollen of another genus. That pollen was taken from P. Illyricum. The lorate leaves, and the weakness and discolouration of the seeds, at first made me think that a bigeneric cross was obtained; but there was no increased hardiness of constitution, and no difference in the inflorescence derived from the male parent. I have, therefore, no reason to assert that P. Illyricum had had any influence. Accidental admission of its own pollen, or of that of

some other Hymenocallis in an impoverished and half-effete state, probably produced the variety. The four seedlings were precisely similar to each other: they have not often flowered, and have not borne seed, but they have been rather neglected. It is desirable that further experiments should be tried on Hymenocallis by pollen of P. Illyricum, and *vice versâ;* but I do not think they will blend, though I am a little less confident on that point than I should have been some years ago. If these four seedlings had been raised by the accidental access of pollen nearly effete from some other Hymenocallis that had flowered lately in the same house, their flower should have been modified. Is it possible that a grain of its own pollen, nearly effete, had touched the stigma, in spite of my precautions, and that its defect was the cause of variety? If so, an important clue would be obtained. Is it possible that the pollen of the cognate genus Pancratium, without being able to fertilize the ovules, could help the defective grain of its own kind to some ingredient in which it was defective, and so obtain some influence over the produce, without being actually its parent? If, as I believe, two grains of pollen cannot act simultaneously in the same ovule, that could not be; but it is a point open to inquiry, and upon which I merely say, that where I have carefully mixed the pollen of twelve species of Calceolaria, that of one only took effect, and that I have not succeeded in any attempt to effect a double or mixed fertilization at the same time.

In former publications I laid very great stress—and I now believe too much stress—on the form of the fruit, for I think that important part of vegetation is no less capable of modification and change than other parts thereof. The extensive genus Iris, with great general similarity of aspect, exhibits some anomalous diversities. In Iris setosa, otherwise very like I. Virginica, the conspicuous erect petals of the genus have disappeared, and given place to three slender bristles; in Iris Sibirica, and the species closely connected with it, the solid flower-stalk has become a fistulous pipe; in the Gladdon, the outer and second coats of the seed, which in the fistulous sorts is hollow, becomes filled with pulp, and the seed assumes the colour and semblance of a ripe berry. The bulbous races have their own peculiarities. Theory and experience lead me to think that the whole of the extensive bearded race that occupies the Mediterranean formation and its skirts, creeping on as far as Nepal, from the many very dwarf species to the large Germanica and pallida, are easily convertible, and stand almost on the footing of local varieties. I cannot blend them with the fistulous Siberian or with the species belonging to the Virginian type. I think the bearded Mediterranean, the fistulous Siberian, the Virginian

type, the Gladdon, the bulbous race, perhaps the American vernal, the so-called genus Dietes, and some other portions of Iris, to have been departures from the first created type, which occurred in much older times than the more extended diversification of species, and that we shall now find it difficult, if possible, to pass those limits in cross-breeding; and such is my view of the whole vegetable kingdom, though in some families it will be found more easy to confound the new forms and revert to ancient associations than in others. In the genus Rosa (though herein I speak from observation and not from experience) there is probably no impediment, not even respecting R. berberifolia, the singular link by which the rose is connected with the Cistus. In Rigidella, on the contrary, it is most difficult to cross the two pendulous species, and I am not sure whether I have at last succeeded in effecting it or not, though the plants are very conformable, except that one flowers in the morning and the other exactly takes its place in the afternoon. The genus Pelargonium, as well as Calceolaria, has furnished much beauty to florists who have crossed *ad infinitum* the different varieties first obtained by hybridizing. Pelargonium has been subdivided into various genera, which have not been generally adopted, because their limits are obscure and unsatisfactory; and it is only by trying to cross them that we can find where the positive impediments lie. It is impossible, as far as I have seen, to cross the race to which the horseshoe scarlet belongs, or that to which tricolor belongs, with those which the florist has intermixed. With very little apparent structural difference, there seems to be a secret insuperable bar; and I think they were probably severed in a much earlier period of the world than the kinds which will breed together. The first great step for the florist in that race was the production of the plant called Ignescens, by the intermixture of the family, to which betulinum, Citriodorum, &c. belong, with a tuberous-rooted scarlet one, that might however have been thought less likely to breed with them than those which refuse to do so. The fertility of that plant set wide the doors of innovation, but the stream is confined within certain limits. Florists, however, have not availed themselves of the further help they might have drawn from the colours of the tuberous sorts that might be brought into action, their aim being directed more to size and form than to variety; but as the scarlet-colour has been drawn from a very small flower to one as large as their rising-sun, so the blood-red of P. sanguineum, as well as the black and the yellow of the tuberous kinds, might probably be brought into like conspicuous manifestation.

I am not aware that any difficulty has been found in crossing

the various species of Fuchsia; but the natural forms of F. virgata, gracilis, globosa, and discolor, appear to me so superior to the mixed shapes produced by gardeners, that I have been unwilling to deteriorate them by intermixture. In one Fuchsia of a mixed race I was struck with the appearance of the green colour of the fruit of F. fulgens, but more vivid, though in all other respects it seemed to conform with those that bear red berries. As the natural green fruit of Fuchsia is agreeable to the taste, it is possible that a hardier green-fruited race may be obtained with the same quality. The supposed sterility of mules has very much deterred cultivators from trying how far plants that bear palatable and wholesome fruit may be intermixed, and, excepting Mr. Knight's experiments, very little has been done in that branch. Our climate does not suit experiments, to ascertain whether the lemon, orange, shaddock, citron, and lime are indefinitely convertible, and, if not, exactly what insurmountable impediments occur; but I believe no one has even tried to blend the very highly-flavoured Fragaria viridis with the larger and more fruitful kinds, and gardeners adhere to the chance of improved seedlings from the most approved individuals, though they are aware that size, without flavour, is unsatisfactory. It is remarkable that in some genera bearing eatable fruit the crosses are usually fruitful, and in others not—a circumstance which requires deep investigation. The few mule Passifloras raised seem indisposed to make seed, and still more to fill the fruit, if formed, with succulent pulp; but it does not follow that the case will be such with all. P. quadrangularis bears a large, rich-flavoured fruit in a stove under peculiar treatment; edulis, a better-flavoured fruit in a greenhouse; laurifolia and maliformis very different fruit in a stove; a small species sent to me by Mr. Maclean, from Chorillos above Lima, under the name of suffruticosa, bears a delicious fruit of the size of a gooseberry in a stove; P. alata, nearly akin to quadrangularis, has a vile fruit; cærulea, no better; but it remains to be tried whether no hardier species of passiflora will give a fertile, succulent, and well-tasted fruit by intermixture with the best, tenderer kinds. In the genus Cactus it is so. Well-flavoured mules are obtained at once from C. Ackermannianus, of which the fruit is very bad, by crossing it with C. speciosissimus or Phyllanthoides. It is remarkable, that in the section Cereus the mules are as fruitful, and have the fruit as juicy, as the natural forms, however dissimilar. Nothing can be more unlike each other in the same genus than the two species I have last named, yet they breed willingly together, and the fruit of the mule differs from that of either parent as much as the flower. I stated (Amar. p. 345) that I could not see a single point in the generic

character of Echinocactus to separate it from Cereus, and that I expected them to be found able to intermix. I observe that it was once proposed to take the stem as the distinctive generic feature, unless it should be thought better to combine them in one genus. To that I say, that, while species of Cereus disagree, in that some of them have fleshy, angular, thorny stems, and others flat, leaf-like, smooth stems, but are proved to be of one genus, we have not sound grounds for separating Echinocactus on account of such a feature; and I contend that the separation is a question of fact, not of option and preference, as if the botanist were a commissioner to set out the fences for an enclosure of waste lands. I have very few Echinocacti, and have had no opportunities of testing the point; but I requested Mr. Beaton, a most intelligent gardener, when he had the care of Mr. Harris's rich collection, to do so, and he very soon sent me seed from the mule Cereus called Jenkinsoni by Echinocactus Eyresii, but they were only outwardly perfect, and did not germinate. If he had remained longer there, I think he would have effected the union. Mr. Beaton produced the cross between Ribes sanguineum and one of the yellow-flowering species, which brings that genus to my recollection. The gooseberry and red or white currant are held to be of one genus, but it has not been found practicable to blend them, and probably it is not; but it does not follow, because they will not breed together directly, that they might not through some other species, as in the genus Gladiolus G. cardinalis and Natalensis refuse to mix with each other, but do freely with G. oppositiflorus. Since both these crosses with Oppositiflorus make seed, I consider that, by perseverance, the impracticable cross can be nearly forced, by reducing both crosses one step further from the dissentient parents, till the two crosses are found able to intermix, and then crossing the produce upwards, step by step, with a greater approximation to them. I am not aware that any attempt has been made to cross the acid with the sweet currants, which might so perhaps yield a new and pleasant fruit, and the attempt should be made. It is very difficult to foresee which combinations, when made, will produce a fruitful offspring. The genus Nerine strongly exemplifies that difficulty. It consists of two portions, those with regular corolla and straight filaments and style, and those which have them bent and the corolla distorted and inclined. There is a cross section of the genus not tallying with the above-mentioned distinctions, viz. those with centripetal inflorescence, *i.e.*, beginning to flower on the outside of the umbel and flowering last in the centre, and those with centrifugal inflorescence. The cross between N. curvifolia of the first section and pulchella of the second is very fertile, both being

centripetal; that between N. curvifolia and undulata of the second is absolutely sterile, because the latter differs in being centrifugal. The mule, however, follows the male in being centripetal, but is quite barren. A difference, therefore, which had been overlooked by botanists till I observed it, seems to be the outward mark of the impediment which makes the mule unfruitful. Cross-breeding, therefore, shows that feature to be more important than it had been thought.

The blending of colours amongst cross-bred plants is rather capricious. The golden-flowered Swedish turnip crossed with the yellow-flowering white turnip did not give an intermediate shade of colour, but some plants with golden and some with yellow flowers. The orange and the blue Anagallis gave a pale, dull pink. The scarlet G. cardinalis with a white G. blandus, and with the yellowish G. angustus and G. oppositiflorus, gave a purplish rose-colour. Rhododendron ponticum and Rhodora Canadensis by the yellow Azalea very much discarded colour, instead of taking an intense mixed hue. The yellow and red-flowered Ribes, however, gave a dull rust-colour. It generally requires two crosses from the scarlet to fix the bright colour in the mule. G. Natalensis impresses its colour much more strongly on G. oppositiflorus than G. cardinalis does, being more nearly akin; whether from that cause or not I will not presume to guess.

Hybrid Alstrœmerias have been raised, but with difficulty, and they seem delicate. I believe it was a mistake to suppose Mr. Van Houtte's fine collection of many-coloured Alstrœmerias to be cross-bred. Poeppig had long ago informed us that A. hæmantha sported in the Subandine meadows of Antuco with every shade, from white to citron, orange, rose-colour, vermilion, and crimson; and I believe his plants to have been obtained by seed from that quarter, which I had long vainly tried to obtain. I have raised a Bomarea between variabilis and acutifolia, which seems to be fertile. I do not believe it would be possible to cross a Bomarea with Alstrœmeria. I think I may venture to say that, as far as I have observed, the prevailing disposition of cross-bred vegetables seems to assimilate more to the male than to the female parent, though the appearance may possibly be sometimes the reverse, and often strictly intermediate; but, as far as I have seen, if we obtain a cross between a hardy and a tender species, the produce, where the male is hardy, will be much more hardy than where the female is hardy and the male tender. This is very important and very conspicuous in cross-bred rhododendrons. I do not think it is so with animals, where the cases seem analogous. Having bred many horses, I have found mares that were roarers almost invariably produce

roarers, and very little, if any, evil occur from breeding by a roaring horse. Many years ago Mr. Milne, of the Fulham nursery, obtained three mules, which are well known, from Passiflora racemosa set with the pollen of cœrulea. The produce did not require stove cultivation, like the female parent, but they have been generally sterile. From their first distribution to the present day they have grown in my cool conservatory, flowering abundantly, but sterile, with this exception, that many years ago one shrivelled, pulpless fruit was formed and ripened, containing twelve good seeds, which vegetated. The flowers of all were nearly similar to those of P. cœrulea, the male. One of them is growing in the same conservatory, with the flower, I think, rather finer than that of the common cœrulea, and it has never borne fruit. The rest having been planted or left out of doors at different times, have been killed by frost or neglect. At the time when this dry fruit was ripened, there was a plant of P. cœrulea in another house in the garden, though disconnected, and eighty or ninety feet distant. Therefore, either the flower was fertilized by pollen of cœrulea brought by an insect or by accident, and two crosses by the pollen cœrulea. made cœrulea itself from the ovary of the tender scarlet racemosa, or the mule was fertilized by its own pollen, and the offspring diverged to the male type, throwing off the similitude of the female altogether. The natural cœrulea did not fruit here while I possessed it, and it dies when planted out at Spofforth.

I have already stated the possibility of raising the poetic narcissus by two or three crosses from a daffodil, and I have also shown that the Gladiolus crossed from G. oppositiflorus (which breeds freely with the Cape species) by pollen of G. Natalensis (which will not), produces seedlings, one of which having flowered, reverted a little towards the male type. Here then we have the like fact. The Passifloras were produced by the pollen of the mule, or by accidental access of the pollen of the male parent. If by the former, these widely-separated species are convertible, and a new form originates from their union; if by the latter, the male type may be obtained by repeated crosses from the ovary of a very different plant; and, whichever be the case, the origin from one created kind is proved in that instance, and, by implication, in all cases of similar difference. I believe all the Cape species of Gladiolus to be convertible; I have found no positive impediment. The rare G. abbreviatus might be almost made between G. cunonius and tristis; it has the curious leaf of the latter, and a flower approaching to that of G. cunonius. Mr. Plant's mule consists of the two, with the addition of G. cardinalis. Perhaps I have forgotten to mention that Corbularia will not breed with the other Narcissi. I have crossed the com-

mon honeysuckle with hirsuta, lutea, and Fraser's scarlet; but the berries of the latter were devoured by a robin. It is advisable, in such cases, to tie a cap of muslin over the bunch of flowers, both to exclude pollen and ward off the robins and blackcaps at a later period. I have had a whole umbel of berries, supposed to be poisonous to man, of Hæmanthus multiflorus eaten in one morning by a friendly robin in the stove.

I mentioned in a former treatise a remarkable circumstance concerning the purple hybrid laburnum, on a plant of which a small branch with the habit and nearly the leaves and flowers of the diminutive Cytisus purpureus had sprouted and maintained itself in the garden of my brother. The circumstances, which afterwards came to my knowledge concerning that remarkable plant, are still more extraordinary. In the garden of the late Mr. Loudon, at Bayswater, upon a large shrub of the same hybrid, one of the limbs resolved itself into its elements, diverging into two branches, one of which had the small weeping habit, leaves, and flowers of C. purpureus, the other nearly the leaves and racemes of yellow flowers belonging to the common laburnum; and those two branches ripened good seed, while the rest of the shrub producing the hybrid blossom was absolutely sterile. The seeds borne by the smaller branch were less abundant, and had been lost; those on the yellow branch were plentiful, and I raised many plants from the seeds, which were kindly given to me by Mr. Loudon. They returned nearly to the form of the common laburnum, excepting that two of the seedlings showed a little purple tinge on the green stalks, which might, perhaps, have extended to the flowers, but they were lost by neglect. In the same season the diminutive branch on my brother's tree bore seed, and from it I raised plants, differing very little from the usual C. purpureus. I have since learned that in many places, where this mule has stood some years, the like phenomenon has appeared. The history of the plant is, that it was not raised from seed, but made its appearance in the following remarkable way:—A number of stocks of laburnum had been budded with C. purpureus in a French nursery-garden, and the bud on one of them died; but the wood and bark inserted lived, as frequently occurs in such cases. After some time new eyes formed themselves, one of which produced this hybrid, C. Adami. I suggested, in a communication to Mr. Loudon, that it must have broken from the exact juncture, and proceeded from a cell of cellular tissue formed by the union of two cells, which had been cut through, and had grown into one, and which, therefore, belonged to the two different plants, half a cell of the tissue of C. purpureus having been spliced to half a cell of C. laburnum. The necessary consequence would be that

a bud formed from that compound cell would derive qualities from both species, but qualities less fixed and innate than those which are derived from generative union. This has been looked upon as a speculation, but I consider it nearly amounting to a certainty, because I think that the consequence is necessary, and that the phenomena cannot be accounted for in any other manner; and nothing of the sort has occurred to any known mule production, vegetable or animal. Since that time my brother's shrub has put out many of the large-leaved yellow branches and of the small branches, and they are fertile. It occurred to me that it would be a confirmation of my view, if the reverted branches of each kind should keep to opposite sides of the stem; and on examination that proved to be decidedly the case. Whether that circumstance occurs elsewhere or not, I do not know; but it looks as if one side of the wood adopted the character of one half of the original cell, and the opposite side the other character. I think that clever gardeners might thus obtain crosses between plants which will not intermix seminally. The olive and privet might be tried with hope of success; for the privet, when the olive is grafted upon it, is very persevering in throwing shoots from the old wood. A long slice of privet should be inarched on the olive with a very sharp and clean cut of both the woods, and then teized by rubbing off the buds, till it breaks on the exact suture. Of course many failures must be expected before a bud will be obtained from a compound cell; but I think, with perseverance, it will be produced; perhaps most easily by uniting half of two young stems of equal bulk from just above the root upwards. Let us, however, pause to reflect on this phenomenon, whatever be the mode of its operation. Here we have not only two plants, so very dissimilar as the almost arborescent yellow laburnum, and the weak, humble, small-leaved, purple-flowered Cytisus purpureus, produced from the seed of the same individual; but, if we strike cuttings from the two varying branches, we have the individual plant itself actually resolved into its elements, and those perfectly separated. Can we for a moment hold, after contemplating that fact, that the Almighty certainly created those two plants distinct, and allowed them to become, from two individual kinds, one; and from one be resolved again into two? Have we any analogy in the vegetable or animal kingdom that can warrant such an extraordinary doctrine? and is not the plain inference, that they were one individual kind when they proceeded from the Creator, and are so still, though diversified in appearance? If two plants so dissimilar are admitted to have so diverged, the like course of change must be attributed to other genera also; for I cannot think it will be shown that those two are by

any peculiarities entitled to form an exception from the general law imposed upon vegetables. The only things that I know at all analogous are these, that a layer from a striped carnation, that has run to red, continues so; that a branch of the variable Pompone variety of Camellia Japonica, that has run to red, continues so also; that branches of the copper-coloured Austrian briar occasionally revert to the usual yellow colour, and the peach and the nectarine have been known to be produced on the same tree from one source; but in those cases there is no supposed diversity of kind, or even of species. The seminal variety in the three former cases merely falls back to the more usual colour; and in the latter, two different cultivated improvements of the almond manifest themselves in the same plant. Whatever analogy they offer, confirms the view of the original identity of laburnum and Cytisus purpureus. It must be remembered that, if the smallest piece of bark be inserted into a different stock, and lives, whatever bud shall break from its tissue, exhibits the qualities of the plant from which that piece of bark was taken, without regard to the juices, root, or bark of the stock. If it proceeds from the stock, it exhibits its qualities; if exactly from the suture, how can it avoid exhibiting the joint qualities?

I know not whether C. laburnum and purpureus can be made to intermix seminally. The very handsome Erythrina Bidwilli, which flowered at Spofforth last August, having been sent to me from Sydney by Mr. Bidwill, and raised in that neighbourhood, either by himself or by Mr. M'Leay, from E. herbacea by pollen of E. cristagalli, is, I believe (unless Wiegman's asserted mules, between vetches and beans, were truly raised), the first well-authenticated hybrid amongst papilionaceous or pea-shaped flowers. Mr. Knight only blended varieties of the pea. The papilionaceous forms are, however, so numerous, and the genera are divided by such inconspicuous differences, that it might be supposed that their intermixture would have been easy and frequent. Why they are of rare occurrence I know not, and have not tried to cross them. In this case the union of the two plants is remarkable, because the former produces its spike of flowers directly from the root, the leaf-bearing stems being barren, while the other parent is almost arborescent in a favourable climate, and blossoms from the axils and ends of the leafy branches, in which respect the mule follows it. Wiegman asserted that he had obtained fertile mules between the vetch and the bean, by merely making the plants grow in contact, tying them together, and leaving the operation to the bees. I mentioned formerly that there exists in England an obscure plant, which is a strong handsome pink-flowered prehensile

pea, and bears fruit that has the appearance and flavour of a small bean. At the time I mentioned it, plants of the kind were fruiting plentifully in my curate's garden. This is an important fact in the consideration of our subject; for, if it is a cross between a pea and a bean, being very fertile, it must prove the singleness of their origin; if it is a variety of the pea having acquired and perpetuated the fruit of a bean, it seems to give the same result, that the two must have proceeded from one created type. When the generic characters, as ultimately stated by Endlicher, of Pisum, the pea, and Vicia, to which the bean belongs, are carefully compared, it will appear that, except a little prolongation and straighter position of the flower, which in some other races would be immaterial, the only fixed feature of difference is the asserted roundness of the seed in pea, and its lateral compression in the vetch and bean, a feature which, if the fact were undeniable, is insignificant in many other genera. If the pea, vetch, and erect bean have sprung from one type, and are convertible, to what result does that fact lead us? Can we maintain a multiplicity of created roses, cistuses, potentillas, cornflags, and irises in the face of that fact? Are we not forced thereby to the points, which I urged above thirty years ago, that the genera are the substantial divisions in botany; that the asserted difference between the species and local varieties of botanists has no firm basis; and that it is a matter deserving grave consideration, whether even a multitude of established genera are not variations from fewer original kinds, of which the real limitation may be found in a higher position amongst tribes, classes, or orders? And, if that point be established, as I humbly think it must be in the vegetable kingdom, upon what footing will the species and varieties of zoologists stand, when the analogies between plants and animals are fully considered, which it is not my province, and which I do not pretend to have sufficient depth of knowledge, to investigate?

The Orchidaceous plants exhibit the most confusive diversities. When it is made a question whether Maxillaria Warreana and costata should not be removed into the genus Peristeria, and whether Bifrenaria and Dicrypta should not merge in Maxillaria, we seem to stand on very loose footing as to those genera, though the doubt may be perfectly consistent with the most skilful botanic discernment. And how should there not be such doubts, when we find the genus Catasetum produce at times, on the same stalk with its usual flowers, others that seemed, according to analogy, to belong to a different genus? Cycnoches Egertonianus produces at random forms of inflorescence almost as different, both in form and colour, from each other as those of any two genera in the order. Can we, in face of those

phenomena, assert that no vegetable since the period before the sun and moon gave it light, no bird or fish since the Almighty called them forth from the salt mud, no creature of the earth since it was evoked from the dust, can have departed from its precise original structure and appearance? Let us be more humble in our assumptions of scientific knowledge, less bigoted and self-sufficient in our examination of revealed truth, and let us give glory to the infinite and unfathomable power and wisdom of God. I call it self-sufficient to hold that ancient and obscure words can have no possible meaning, but that which we have been in the habit of attributing to them inconsiderately. It may be unacceptable to the botanist, who has been accustomed to labour in his closet over dry specimens, and think he can lay down precise rules for the separation of genera, and look with complacency upon the scheme he has worked out, to find that the humblest gardener may be able to refute him, and force him to reconsider the arrangement he has made; but the fact is so. The cultivator has the test of truth within his scope,—

> Examenque improbum in istâ
> Castigat trutinâ;

and, far from being an evil, I look upon it as a great advantage, because it will lead the industrious and intelligent gardener to take a higher view of the objects under his care, and to feel his own connection with science, and it will force the scientific to rely less on their own dictation, and to feel that they must be governed by natural facts, and not by their own preference. Cross-breeding amongst Orchidaceous plants would perhaps lead to very startling results; but unfortunately they are not easily raised by seed. I have, however, raised Bletia, Cattleya, Orchis (Herminium) monorchis, and Ophrys aranifera from seed; and if I were not during the greater part of the year absent from the place where my plants are deposited, I think I could succeed in obtaining crosses in that order. I had well-formed pods last spring of Orchis by pollen of Ophrys, as well as other species of Orchis, which had been forced; and if I had remained on the spot I think I should have obtained some cross-bred Orchidaceous seed. An intelligent gardener may do much for science by attempts of this kind, if he keeps accurate notes of what he attempts, and does not jump at immature conclusions.

It was not surprising that the late Mr. Haworth should have told me many years ago that *he* did not thank me for my mules; not that I had sent him any, but because he probably began to have an indistinct misgiving that they were striking at the very root of the minute divisions which it had been the favourite labour of his life to establish, as definite and absolute. With

accurate discrimination of individual specimens, and great industry in searching them out, his mind had not capacity even to combine the seminal variations of particular species, and he found the high-road on which he was travelling broken up by a troop of unexpected invaders. I mentioned long ago that I had raised at Mitcham primrose, cowslip, oxlip, and dark polyanthus, from the seed of one plant highly manured without any hybridization.

Concerning Petunia, and the genera allied to it, I have nothing to add to the observations in my treatise on hybrid intermixtures, Amaryl. p. 377–9, to which I beg to refer the reader. I have no reason to alter any of the views expressed in those pages, but I do not recollect that I pushed the experiments relating to them any further.

In a treatise on this subject I must not forget Plant's vegetable monster, of which I gave the particulars, with an engraving, at the commencement of the miscellaneous matter in the 'Botanical Register' of 1843. The sketches were made by myself with the most careful accuracy, from the three plants which were sent to me by Mr. Plant, in a dormant state, from which they never awoke. They were, in fact, seemingly past hope, or nearly so, when I received them, and began to turn mouldy as soon as they were watered. I believe he lost at the same time the fourth, which he kept for himself. Whoever will examine the engraving, and read the particulars detailed there, can form as just an opinion as I can, whether he really had obtained four anomalous monsters from Gladiolus blandus, impregnated by an Hippeastrum, or whether they were something else which he had confounded with his supposed mule seedlings. They were like no vegetable known to me, and their strange form has certainly the appearance of fluctuation between the structure of a dry-coated annual corm, and a fleshy tunicated bulb. Even Mr. Plant thought they would prove incapable of flowering. Their leaves, which I did not see, were stated to have been more glossy than those of a Gladiolus; and they scarcely appear to have been capable of a protracted existence, unless under the most unremitting care. He stated that they had suffered from neglect while he was ill. I am inclined to believe that they were biordinate and semiabortive mules; for I cannot absolutely repudiate the possibility of monstrous impregnations, though I believe the produce to be doomed to a very brief existence, if ever brought to life.

P.S.—It appears from a communication lately received that I have not made myself clearly understood in the first article respecting the diversified features that have become fixed characters

in the human and other races. I consider that causes of change must have been in active operation in the first period after the deluge, which subsided, and no longer produce such powerful effects; and that it is probable (whatever those causes may have been) that they were still more cogent in the periods which preceded the creation of man; producing alterations of a much stronger character than any which have since arisen. If I am asked what those causes were, I cannot pretend to answer. But I think the cooling of the body of the earth, with consequent variations in the gases that emanated from, and were absorbed in, and surrounded it, a very likely cause of variations in the things that sprung therefrom. I imagine that at this moment the relative temperature and moisture of the fibrous roots and of the bulb or point of union between the root and shoot in vegetables, and between the feet and the head in men and animals, is of infinitely greater importance than either cultivators or medical practitioners have suspected. I am told that some persons who devoutly hold that mankind sprang, as we are told, by generation, from one created pair, nevertheless think that the peculiar aspect of the various races of men was a judgment afterwards miraculously stamped upon them by God, as their speech also was diversified to separate them at the dispersion; but, if that be admitted to the exclusion of natural causes, we must hold like judgments to have been inflicted upon dogs, of which the distinct races are quite as various, and their origin as much enveloped in obscurity. Neither do such persons consider rightly what a miracle is. It is a thing arising contrary to the usual and apparent course of events, and shown either by prediction, or by the circumstances of the event, to have arisen for a peculiar object; but it may have been produced by the unexampled or even unusual operation of natural causes, which we cannot easily fathom, working together by the Almighty will to produce the marvel. The appearance of three suns in the heaven by an extraordinary effect of refraction is a well-authenticated fact, and it was a great marvel, but not a miracle; that of the sun, continued after its hour of setting, whether caused by refraction or by some disturbing power that deranged the usual course of the earth's movements, was not merely a marvel, but a great miracle, because it happened at the prayer of Joshua, for the purpose of giving him light to overthrow those who were striving against God's people. The driving back of the Red Sea by a wind of unparalleled strength and continuance acting upon an unusual ebb tide so as to lay bare a transverse sand-bank was in itself a great marvel, but occurring at the precise moment and place of the arrival of the Israelites, so as to let them pass, and ceasing exactly at the fit moment to destroy all their pur-

suers, was a stupendous miracle. The plague of locusts fell last year on Zante, and the murrain both of beasts and potatoes has fallen on our own land; but in Egypt they were miraculous, because specially invoked by God's prophet. The demonstration of the natural means through which the Almighty worked a miracle, which could have been performed by no slight of hand, but by the power of Him alone, increases (instead of diminishing) the force of the miracle, by strengthening its credibility, and distinguishing it from the pretences of impostors; and its force is infinitely greater when those natural means, unsuspected by the persons who witnessed and reported it, are brought to light by the progress of science in confirmation of the fact. I assert, therefore, without hesitation, that, if the diversification of the human races was intended with a view to effect their dispersion, such a miracle would, in all probability, have been effected by the operation of natural causes, and that the like diversification of other races proves that it was so effected.

In the first part of this treatise I observe the following misprints:—p. 6, latter *for* later; p. 7, creeping *for* creeping things; p. 19, in inconsistency *for* of inconsistency; and the omission of the words 'and cruenta' after 'juncea' at the end of the second paragraph in p. 28.

XII. — *Observations on the Propagation of Bunt* (Uredo Caries, D.C.) *made with an especial reference to the Potato Disease.* By the Rev. M. J. Berkeley, M.A., F.L.S.

(Communicated Jan. 18, 1847.)

Another year has brought with it a recurrence of the ravages amongst potatoes, but has added little to our knowledge of the cause of the disease. On the Continent, where it has in general appeared under a milder form, little attention, comparatively, has been paid to the subject, and at home, where unhappily we are suffering to such an alarming extent, while various causes have been assigned in a more or less dogmatic spirit, and the atmospheric theory seems very generally to have been abandoned, and indeed could not have been maintained in the face of the notorious difference between the cosmical phenomena of the two years, apart from all consideration of the history of the disease, the fungal theory has met with more favour, though by no means with universal credence.

Professor Liebman in Denmark, Mr. Moore of Glasnevin, Mr. Queckett, Mr. Graham, and several excellent observers in the 'Gardener's Chronicle,' have more or less decidedly recurred to the notion that the disease is dependent on the influence of

parasitic fungi. My own opinion rests as it did at the time of the publication of my former memoir; certainly it has not been made less strong by another year's experience. Be the degree of uncertainty however on the subject what it may, I make no apology for again adverting to it, especially as the observations I have to record bear upon a question of much importance, and which, in the hands of persons of more leisure and ability, may, if followed out, increase our knowledge in several matters of which we are at present ignorant.

It has been known for many years that the principal diseases of cereal plants, such as rust, bunt, mildew, &c., are of vegetable origin. Unger attempted to overthrow this notion, and to prove that they were mere exanthemata, analogous to eruptive diseases in animals. The observations, however, of Corda, Léveillé, and others, have now completely established the fact, that the productions in question are not mere modifications of the cellular tissue, but that they spring from a distinct mycelium, and are as certainly vegetable as any other fungi. It was long since also ascertained by Bauer that one of them, viz., bunt, could be propagated with certainty by rubbing the grains of wheat with the spores, and the practice of steeping wheat previous to its being sown, whether founded on more or less correct notions of the nature of the disease, a practice seldom neglected with impunity, is in accordance with his experiments. As regards the mode of propagation of these diseases the most vague and ill-founded notions have prevailed, the more general opinion being that the reproductive organs themselves were absorbed by the spongy tissue of the roots, or by the stomata, and so traversed every portion of the plant by means of the intercellular passages, or rooted in the tissue at the base of the stomata. It has not in general been understood that those bodies which, as far as has been observed, are the only ones destined to produce mycelium, are far larger than the intercellular passages, and frequently than the individual cells, or even the stomata themselves. The figure given by Bauer of the contents of the spores of Puccinia graminis is not correct, as may be ascertained by actual examination, or by comparison of Corda's admirable figure. The spores, in point of fact, contain merely a grumous mass, with one or more oil globules, and by no means distinct sporules, as supposed by Bauer.

Now, whatever may be the cause of the disease in potato tubers, I look upon it as matter of absolute certainty that the destruction of the aërial portion of the plant is due to the developement of Botrytis infestans. The notion that it is a mere consequence of a previously diseased condition is, I firmly believe, quite untenable. It becomes then matter of interest to

ascertain, if possible, the conditions under which such parasites are developed. Probably from the lateness of the season, when my attention was more particularly called to the subject by a communication from the Irish Commissioners, I did not succeed in 1845 in making the spores germinate, though M. Decaisne informs me that he found no difficulty in doing so. They germinated, however, readily enough in the summer of 1846. My attention, indeed, was turned more particularly to the point at an earlier portion of the year, when it was difficult to get more than one or two infected leaves, and even had it been possible to collect the spores in any quantity, experiments seemed more likely to give a speedy result if directed to some cereal parasite, such as bunt. The spores are of a peculiar structure, of sufficient magnitude to be easily observed, and the mycelium produced of considerable size, and as the disease was to be developed ultimately in a particular organ, to the production of which the ultimate energies of the plant were directed, there seemed a good chance of being able to observe the progress of the mycelium. I hoped then to ascertain whether the actual penetration of the mycelium into or amongst the tissues of the plant were necessary, or whether the grumous contents of the spores, if circulated amongst the juices, might not be sufficient for its propagation. The latter notion had been lately advanced as a mere theory by Dr. Greville, and I felt inclined to believe, from various observations and considerations, that there was some probability at least about it. The importance of obtaining, if possible, correct information on the point is at once obvious.

Having determined then to direct my attention to bunt especially, I procured as good a sample of wheat as possible, and divided it into two portions, washing the one carefully, and then sowing it with every precaution, that there should be no contact with any of the spores of the bunt with which I was experimenting; the other portion was steeped in a thick mixture of bunt and water, a portion of the black liquor being poured on the surface of the soil after the impregnated grains were sowed; the progress of the grains and spores was then daily examined. The clean wheat sprang up as usual, but there was soon an evident difference in the infected grains, a difference which was distinctly visible till the ears were perfectly developed, when every infected plant was bunted, while from the unimpregnated seeds not a single bunted ear was produced. In one of the bunted plants not only the ear was diseased, but there was a streak of bunt upon the stem, in which the fetid smell and peculiar structure were not to be mistaken, a circumstance which I have never before observed, nor am I aware that the fact has been noticed by others, and confirmatory of the opinion that the

disease is not a mere alteration of structure in the grains of fecula, were such testimony wanted.

Four days after sowing I found that the spores of the Uredo had been sucked in, doubtless by capillary attraction, between the young root and its investing membrane, which was ruptured, germination at that period having scarcely taken place. The spores were quite as large as either of the two distinct series of cells of which the young root is composed.

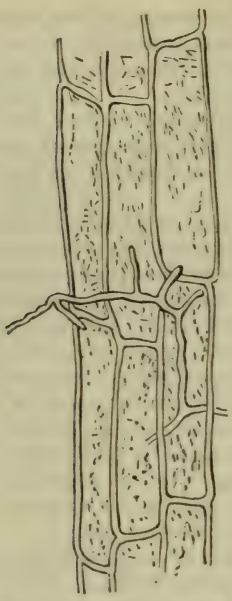
Three days later I perceived the first traces of germination in the spores. A little obtuse tube thicker than the pellucid border of the spores, in a very few instances only, and appearing like a short peduncle, scarcely so long as their diameter, was protruded through the external membrane. This surprised me extremely, because on the mass of spores, whether on the surface of the soil or on the grains of wheat, there was a white, very delicate, extremely short, down. On a closer examination the greater part of the grains of bunt were found to be clothed on one side with fascicles of white filaments, from two to four times longer than the diameter of the bunt spores, and producing towards their apices extremely long and slender, somewhat curved acuminate multiseptate spores.

Three days later a large portion of the grains of bunt were ruptured, either irregularly or in a stellate form; a few more had germinated, the filaments being evidently protruded from the internal membrane, and either straight or curved, and occasionally branching off in two opposite directions, the tips of the threads being in all cases very obtuse, and many times larger than the intercellular cavities of the tissue of the roots.

The parasite, meanwhile, had undergone a very curious change, the spores being no longer separate, but connected with one another by one or more short transverse tubes, exactly as in the threads of Zygnema.

Two days later many more of the bunt-spores were ruptured, and the mycelium more elongated; and, after three more days, the parasite was vanishing, and scarcely visible any more "en masse" to the naked eye, while the mycelium had increased to the length of six or more diameters of the spores. The young infected wheat-plants were now evidently diseased, the sheaths and base of the leaves looking crumpled, and spotted either with white or brownish specks, and the whole appearance less healthy than that of the unimpregnated plants.

The diseased sheaths were now, in most cases, full of mycelium, but no such appearance was visible in the healthy state. Though the disease had evidently commenced, it is to be observed that the tubes protruded by the spores were but slightly developed, and that, though the utmost pains were taken, I could trace no



Tissue of diseased sheaths traversed by mycelium 15 days after inoculation.

connection whatever between these and the diseased tissue. There was not the slightest doubt as to the fact that the two sets of wheat plants exhibited quite a different appearance ; and my own observations were confirmed by several practical men who saw them. It is of course incapable of proof without tracing the connection of the internal mycelium with that produced by the spores, that the two were really derived from the same origin ; but as the peculiar appearance was exhibited only by the impregnated plants, there is a strong presumption as to identity. All the plants were afterwards more or less infected with U. Rubigo vera, which appears to be the infant state of Puccinia graminis, and which afterwards was developed, and there would of course then be matter of doubt to what fungus any observed mycelium might belong.

In a single instance only, ten days after the first appearance of disease, in examining some little white specks which appeared on the leaves of the bunted wheat, I saw a curved filament passing through one of the stomata, but whether from the outside to the inside, or the contrary, I cannot say. The mycelium in these white specks was not abundant, but thicker than the walls of the cells.

In a month from the sowing of the wheat, the fecula of the grains being then nearly absorbed, it was difficult to find any spores, and no further developement of mycelium, directly from the spores, had taken place.

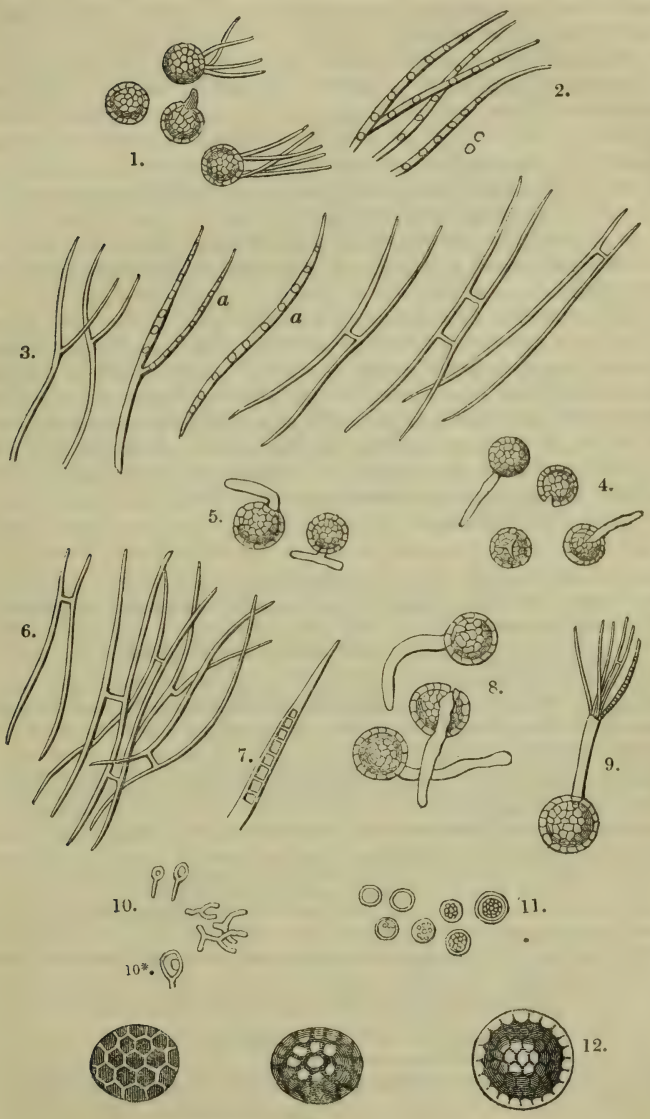
The first bunted ear appeared four months from the time of sowing, and while every impregnated plant produced bunted ears, not a bunted grain appeared on the plants which sprang from uninfected seed.

The experiments were repeated with precisely the same results. In a single instance the parasite was developed on the tip of the tube protruded from the germinating bunt-spore. It should seem then, as far as may be concluded from the observations noted above, which I am ready to confess should have been more varied to lead to any certain result, that a penetration of the mycelium directly protruded from the spores of fungi is not always necessary for the developement of the fungus, but it is probable that the grumous contents of the spores are imbibed by the plant which is destined to be the prey of the parasite, and that these, circulating with the juices, carry the principle of disease to every part, and under favourable circumstances are capable of reproducing the parasite.

To establish a point of such delicacy would require ample leisure, and very varied observation; but there are few subjects more likely to reward the observer, either directly or indirectly, with new and valuable results.

Should it prove true, there would no longer be any surprise how a disease originating in the leaves might be propagated through the stem to the tuber, or the contrary, and Martius' or Morren's notions of contagion would no longer be regarded as mere reveries of fancy. It is indeed opposed to the general notion, that no reproduction takes place except by the separation of a cell from the parent stock; but, as knowledge increases, too many of our most favourite and general notions are overthrown to justify us in being diverted from research, through the mere stumbling block of preconceived opinions.

There is another direction to which observations also may be led by the subject. The production of the parasite on the spores of bunt was constant in my experiments, and was repeated at Bristol and Clifton under the eyes of Mr. Thwaites and Mr. Broome, to whom I had communicated bunted grains of wheat, for the express purpose of seeing whether the same circumstances would take place at a distance. I was at first inclined to think that it had something to do with the reproduction of the bunt; and it is quite possible that in plants, as well as in the lower animals, there may be an alternation of generations. This is, however, merely thrown out as a hint which may be followed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out by those who have fewer avocations than myself. Many anomalous appearances, amongst Algæ especially, seem to indicate something of the kind.

It remains only to characterise the parasite on the bunt, which is certainly quite new to science. It would be easy to form a new genus, from the circumstance of the spores ultimately conjugating; but as this does not seem connected with the reproduction of the species, and the other characters are altogether those of Fusisporium, I shall place it in that genus. The characters then will stand as follows :—

Fusisporium *inosculans;* minutissima, fasciculata, alba; sporis longissimis incurvis vel flexuosis multiseptatis demum conjugatis.

Hab. in sporas germinantes Uredinis Cariei, D.C.

It forms extremely minute white tufts, visible to the naked eye only where the spores on which they grow are thickly spread. Threads at first simple and erect; rather obtuse, soon forked above, and producing much elongated fusiform, multiseptate, curved or flexuous acuminate spores, which ultimately contain globular sporules, or nuclei, at length connected with one another by one or more short transverse tubes.

King's Cliffe, Jan. 15, 1847.

Fig. 1. Spores of bunt seven days after sowing. One is still in its natural state, another germinating, and two crowned with a fascicle of the parasite (Fusisporium inosculans).

Fig. 2. Threads of the parasite more highly magnified, filled with globules, two of which are free.

Fig. 3. Various views of the parasite and its spores, three days later, magnified. The spores of the parasite are fully developed, and once or twice conjugated. The globule-bearing thread and spore, marked *a a*, are more highly magnified than the others.

Fig. 4. Spores of Uredo at the same date; two with the germinating thread more elongated; one ruptured and empty, and another with the disc split in three directions.

Fig. 5. Spores of Uredo two days later; in one the germinating thread gives off a branch on either side.

Fig. 6. Spores of parasite of the same date, conjugating with each other.

Fig. 7. Portion of spore of parasite more highly magnified.

Fig. 8. Spores of Uredo three days later; the germinating thread elongated. The parasite now very scarce.

Fig. 9. Parasite produced on the germinating thread of Uredo, in an experiment made some days later.

Fig. 10. First appearance of spores in the diseased germen, with the mycelium.

Fig. 10*. One of the spores more highly magnified.

Fig. 11. Gradual developement of spores.

Fig. 12. Three views of perfect spore, by Mr. Broome, as seen at different focal lengths.

XIII.—*Experience in the Transmission of Living Plants to and from Distant Countries by Sea.* By Mr. Fortune, Curator of the Botanic Garden of the Society of Apothecaries at Chelsea.

(Communicated Nov. 5, 1846.)

Having been engaged by the Horticultural Society of London to proceed to China for the purpose of examining the Horticulture and Botany of that country, and of sending home such vegetable productions as might be useful or ornamental in England, the Council deemed it an excellent opportunity for sending out at the same time a collection of living plants and seeds, with the view of ascertaining precisely the effects produced upon such things during a long sea voyage, as well as of introducing to China some of the best flowers, fruits, and vegetables which are cultivated in Europe. For this purpose they ordered some glazed cases to be prepared, and filled with such kinds of fruit-trees and ornamental plants as were likely to succeed well in the climate of China, and be of use both to the Chinese and to the foreign residents. They were made fast on the poop of the vessel, and we sailed from England on the 1st of March, 1843. The weather during the early part of the voyage was cold, dull, and wet, and the plants grew very little until we reached the latitude of Madeira, which we saw on the 13th of the month. The thermometer averaged 62° Fahr. at this time in the shade, and the plants feeling the effects of the sudden change of temperature began to grow with great rapidity, completely filling the cases in a few days with young shoots and leaves. This took place before we reached the equator. The vines, peach-trees, and figs seemed quite at home; the roses also grew fast and began to blossom, but were evidently in an atmosphere which was too hot and close for their constitution, and in a short time their leaves began to suffer from pressure against the damp glass in the same manner as we frequently see plants in crowded hothouses in England.

About this period—that is, when we were in the vicinity of the equator—the thermometer averaged 77° in the shade, and was frequently higher in the night than during the day. From the condition of the plants at this stage of the voyage, it was evident that a most important point in the preparation of cases is always to select specimens which are strong, healthy, and well established; weak plants, in many instances, are sure to perish, because the stronger kinds overgrow them, keeping them from the light and air, and preventing them from forming stems and leaves for their support.

We passed the longitude of the Cape of Good Hope in the beginning of May, but in order to have the advantage of westerly winds we kept well south—in lat. 38°—where the thermometer ranged from 55° to 65° Fahr. This change was evidently a most trying one for the plants, which, after having grown rapidly when sailing through warmer climates, and having filled the cases with weak, half-ripened wood, were now suddenly checked by dull weather and a temperature which was comparatively low. Mildew and other fungi now attacked them, and most of the leaves which were in contact with the glass were rotted by the damp.

It was curious to remark the similar effects which were produced upon animals and plants by this change of temperature; both suffered more from comparative than from actual cold. A few weeks before this, the plants began to grow most rapidly in a temperature about the same as that in which they were now suffering from cold; in fact, they grew considerably then, in a temperature several degrees lower. The very same effects were produced upon my own feelings, as well as upon those of the other passengers in the ship. We felt the heat much in lat. 33° or 34° N., with a temperature of 58° and 60°, and were then putting on our thin white clothing; while with the same warmth on the south side of the line we felt cold, and were obliged to resume our thick, warm dresses.

Having kept in the same degree of latitude all along from the Cape until we reached the Islands of Amsterdam and St. Paul's, in the Indian Ocean, we then stood northerly, in the direction of Java Head. The temperature, of course, gradually increased as we sailed northwards, but the excitability of the plants was, in a great measure, gone, and even when we reached the Straits of Sunda, where, owing to the proximity of land, it was much warmer than it had been under the line in the Atlantic Ocean, still they grew again in a slow and languid manner, and the shoots were weak. It is these rapid changes from summer to winter, and from winter to summer, which destroys so many plants in a long voyage round the Cape, to or from India or China.

When we reached Hong Kong I found that most of the plants were alive, although some of them were in a very exhausted state. Some olive-trees which I took out were as healthy and green as the day we started; vines, pears, and figs also stood the voyage remarkably well. The soil, although it had received no water for four months, was nearly as moist as when we left England, which proved the closeness of the cases.

Having described what actually takes place during a long sea voyage, I shall now proceed to give some instructions relating

to cases, packing, shipping, and general management, which, I trust, will be useful to those interested in such matters.

Glazed Cases.—"Ward's Cases," or air-tight cases, as they are commonly called, are so well known in all parts of the world, that a minute description of them here is unnecessary. They are not, strictly speaking, air-tight, but they are so close that the moisture cannot escape, and therefore, if the soil is well watered before the case is closed, the moisture is retained in sufficient quantity to support plants during a voyage to or from the most distant parts of the world. When the sun shines, evaporation goes on in the usual way, but the vapour finding no outlet condenses on the glass and wood of the cases, as well as upon the leaves of the plant, and in the evening again falls down like dew upon the soil. In this manner the vapour goes on forming and condensing, according to the heat of the weather during the voyage, without much actual loss, providing the cases are tightly made.

After this explanation, any one will be able to see that it is of the greatest importance to have the cases made of well-seasoned wood, which is not liable to split or open at the joints when exposed to the hot sun of the tropics. If this happens, the plants will either perish from drought, or sea-water will probably be admitted, which is equally fatal to vegetable life.

Another defect in the construction of many of these cases is the shortness of their feet. The bottom of the case should always be at least six inches raised from the deck of the vessel. Washing decks is the first part of the sailors' business every morning at sea, and they are not generally very particular as to where they throw the water. If the feet of the plant-case are shorter than six inches, there will not be sufficient room for the sailors to dash the water below it, and consequently both the bottom and sides will stand the chance of being washed every morning as regularly as the decks. In the course of a four or five months' voyage, the salt water is certain to find its way into the soil, which it then saturates, and destroys the roots of the plants. I have no doubt that this is one of the reasons why plants generally arrive in such bad condition from India and other parts of the world, for I have frequently seen the soil of such cases in a complete puddle when they come to hand in England.

Plants, Soil, &c.—I have already noticed the great importance of choosing strong, healthy plants, which are not liable to be overgrown or to damp off during the voyage. I found that grafted plants were also more liable to suffer than others, as one or two of my young scions died, while the stocks remained healthy enough.

The soil of the cases should be at least nine or ten inches in depth. After the plants are put in, each case should be placed perfectly level, and liberally supplied with water. It is much better if this can be done ten days or a fortnight before the plants are to be sent off, so that they may be well established in their new quarters. During this time they can have frequent waterings, and then, when the soil has filled up all the crevices in the cases and become firm, it may be fastened down with cross bars of wood. A little moss, where it can be obtained, is an excellent thing to sprinkle on the surface, as it both helps to keep the earth down, and at the same time prevents evaporation from going on too rapidly.

This mode of packing applies to shrubs and trees; orchids, or air plants, require different treatment. As the latter do not draw much nourishment from the soil, there is no occasion to have so much of it in the cases; indeed, a large body of damp soil is very apt to rot the plants. Two or three inches is quite sufficient. As these plants are generally found growing upon trees, the best way is to cut the portion of the branch on which the plant grows, and send it home with the plant upon it. In the majority of cases it is a bad plan to pull the roots off the wood, if the plants are to be sent in glazed cases and exposed to a sea voyage for five or six months. When I despatched some cases filled with Phalænopsis from Manilla, I had them made with only one glazed side, the other was wood. After packing the bottom of the cases full of plants I nailed a great number to the wooden side, and from the number which arrived in good order in this country the plan must have answered the purpose. It is well known that many of these air plants require so little nourishment from the soil, that they may be sent home in common packing cases if the voyage does not occupy more than six weeks or even two months, such as from the West Indies or South America. The above remarks, with regard to air plants, therefore, only apply to long voyages, such as from India or China to this country.

Ships and Shipping Plants.—When the vessel is about to sail, the cases should be closed firmly, and the joints must be made perfectly tight. Narrow strips of canvas dipped in a boiling mixture of tar and pitch, and put on the outside of the joints, answer the purpose admirably, and should always be used where there is any difficulty in making the joints close.

Large vessels with poops are the best for plants, and should always be preferred where there is any choice, as their deck is higher and consequently less liable to be washed by the sea. The poop, either in small or large ships, is the best place for the cases to be placed—in small vessels they should either be put

there or not sent at all. The main or mizen top is sometimes recommended, but most captains object to have such heavy articles placed so high above the decks.

In 1841 or 1842 the Horticultural Society received a case of plants by the 'Emu,' from Van Diemen's Land, the whole of which were dead when they reached this country. As I happened, in 1843, to go out to China by the same vessel, I made some inquiries of one of the officers regarding the treatment this case had received on board during the passage home. He candidly told me that they had considered it too much in the way when on the poop, and had sent it forward near the bows. When, therefore, the vessel was "on a wind," or had a heavy head sea to contend with, she shipped a great quantity of water over the bows, and, of course, deluged the poor plants. This at once accounted for the bad order in which the case had been received. I should therefore recommend botanical collectors, and those individuals who are in the habit of sending home cases of plants from the far distant East to their friends in Europe, to obtain a promise from the captain that the cases shall remain upon the poop of the vessel during the whole of the voyage. If they are sent forward, or even placed upon the quarter deck, the contents are sure to be destroyed. It is also the best way to ship the cases in the usual business manner, taking a bill of lading for the same, with the freight payable in England, or in any other place to which the ship may be bound.

Unless there is some one on board who understands the cultivation of plants, the cases should never be opened from the time they are shipped until they arrive at their destination. The only directions I was in the habit of giving when I took the plants on board, were the following:—"Do not move them from the poop; never allow them to be opened; should any accident happen to the glass repair it immediately, either with glass, or, where that cannot be had, a piece of thin board will answer the purpose; in stormy weather, when there is any probability of spray coming over the poop, throw an old sail over the cases; and, lastly, *never allow the sailors to throw a drop of water over them when they are washing decks in the morning.*" These directions are short, easily understood, and easily acted upon.

Treatment during the Voyage.—When the botanical collector returns with his plants, or when there is any one on board of the ship who understands their management, the cases may be opened and the plants examined from time to time with the most beneficial results. In order that those who are going out or returning from the East may understand how this is best done, I shall detail, shortly, my own practice during the voyage home, and its results.

Eighteen cases were packed in the manner I have already recommended and taken on board of the 'John Cooper,' then at anchor in the Bay of Hong Kong. As it was in the end of the year, the monsoon was fair down the China Sea, and we reached the Island of Java in eleven days. After passing the Straits of Sunda we had variable winds for a week or ten days, and then got into the south-east trades. In these latitudes the weather is generally settled and fine, the sea is smooth, and the vessel is wafted gently onward in her course towards the Cape of Good Hope. In ordinary circumstances, therefore, it is perfectly safe to open the cases frequently during this part of the voyage. Those under my care at this time were made with sliding-doors at each end, so that I could give air and get my hand in without unscrewing the sides. These slides were drawn out almost every day in the morning *after decks were washed*, and on very fine days the side-sash of each case was unscrewed and the plants fully exposed. At these times all the dead or damping leaves were removed and the surface of the soil dressed and cleaned. I always made it a rule never to leave any of them open at night, however fine the night might appear to be.

This mode of treatment was carried on until we began to get near to Madagascar. As bad weather is generally experienced off this island, I made all the cases tight as possible with putty, and never opened them again until we got round the Cape. After the "Cape of Storms" is passed, the mariner generally gets again into fine weather, and with a fair south-east trade wind runs direct for St. Helena. Knowing that I would be able to procure a supply of fresh water there, I exposed the plants as much as possible every day, in order that all the dampness might be removed, and that the young wood which was then formed on many of the plants might be well hardened. When we anchored at St. Helena I took care to give the soil as much fresh water as it could take in, and then screwed the sashes down again. The weather continued fine and the winds fair until we reached the equator. During this time the end slides were generally open every day. When near the equator we again got into variable winds, having run out of the "trades," and were frequently deluged with heavy rains. At these times I was in the habit of opening the sashes and allowing the plants to receive a refreshing shower, which did them a great deal of good. In circumstances of this kind, however, great care should be taken that the water does not come down out of some of the sails which have been exposed to the salt spray of the ocean, as it would then be impregnated with salt, and would probably injure or destroy the plants. I notice this more particularly, as an accident of the kind nearly happened to myself.

After coming through the "variables," we got what are called the north-east trade winds, and steered for the Western Islands. As the weather was now bad, and the vessel "close hauled," that is, sailing very near the wind, we often had a considerable quantity of spray coming over the deck. Before coming into this weather I took care to have the cases again perfectly closed; the end slides now had often to remain closely shut down, not only on account of the spray, but also on account of the saltness of the air, which would, doubtless, have been very deleterious. After having three or four weeks of this weather, we got at last into smooth water in the English channel, where, as the weather was fine, I again opened the cases and found them in excellent order. No detention taking place at the Docks, the cases were immediately conveyed to the garden of the Society at Chiswick. The following numbers will show the results of this shipment:—

Number of Plants put into the cases in China . .	250
„ reported in good condition when landed .	215
„ which died during the voyage	35

In a communication from Mr. Livingstone of Macao, read to the Society in 1819, and published in the 3rd Vol. of Transactions, it is stated that, at that time only one plant in a thousand survives the voyage from China to England, and supposing on an average that plants purchased in Canton, including their chests and other necessary charges, cost 6*s.* 8*d.* each, consequently each surviving plant must have been introduced at the enormous expense of upwards of 300*l.*; the results which I have given above will show, however, that we have made some improvements in the introduction of Chinese plants since the days of Mr. Livingstone.

XIV.—*Journal of a Mission to California in search of Plants.* By Mr. Theodore Hartweg, in the service of the Horticultural Society. Part II. Continued from Vol. I., p. 185.

(Received Nov. 4, 1846.)

On the 23rd of February I returned from an excursion to the Rio Grande de Santiago, the largest stream in Central Mexico, taking its rise from the swampy plains between Lerma and Toluca, near the city of Mexico, and traversing a space of more than 600 miles in a north-westerly direction. During the late rains the water rose fourteen feet above its ordinary level, destroying the early crops of Indian corn, and carrying everything before it that impeded its course.

The vegetation is in no respect different from that observed on the descent to San Blas; and the only object derived from this excursion were an Epidendrum, an Oncidium, and another orchidaceous plant resembling a Catasetum in habit, but producing a flower-stem 8 to 10 inches from the *apex* of the pseudobulbs, which at its extremity is much branched. This species occurs exclusively on palms, and seems to flower during the rainy season.

On the 7th of March, I despatched a tin case containing the seeds collected about Tepic to Guadalajara, to be forwarded thence by diligence to Vera Cruz. On the 9th I sent off to Tampico the Orchids and pine cones, occupying two chests. About the same time my luggage arrived from the city of Mexico, where it had been detained a month from the want of an opportunity, and the change of government, which took place about the beginning of the year. On such occasions the muleteers contrive to keep out of the way from fear of having their mules embargoed, or losing them altogether.

On the 14th of March, I finally left Tepic for San Blas, whither my luggage had preceded me, and embarked the following day on board of a small schooner for Mazatlan, where I arrived after a passage of five days. Mazatlan is now the most important port on the west coast of Mexico, as the customhouse officers are more accommodating than at San Blas or Acapulco.

Upon making inquiries about merchant-vessels proceeding soon to Northern California, I found to my consternation that no opportunity had offered for the last six months, nor was it likely there would be any for some time; but that the United States ship 'Portsmouth' would sail in a few days for Monterey. The day previous to her sailing I applied to Commodore Stoat for a passage, backed by a letter of introduction from an influential house in Mazatlan, but I was told by him in very few words that he could not serve me; that under the present circumstances, when a rupture between the United States and Mexico was hourly expected, he could not let his movements be known: thus wishing to keep the 'Portsmouth's' destination secret—her purpose being well known three weeks before she sailed.

More successful was an application I made about the beginning of May to Rear-Admiral Sir George Seymour of H.M.S. 'Collingwood,' who kindly allowed me a passage in H.M.S. 'Juno,' then proceeding to Monterey. Towards evening of the 11th of May, I went on board, and, sailing the following morning, we arrived at Monterey on Sunday the 7th of June, after a passage of twenty-six days.

On the 8th I delivered my letters of introduction, and the following morning I settled down in the quiet little town of Monterey.

The verdant fields and pine-covered range of mountains at the back of the town form a pleasing contrast to the dried up vegetation about Mazatlan. The predominating trees are an evergreen oak (Quercus californica), forming a tree 30 feet high, with a globular crown, and having the branches much distorted. It occurs principally in low but dry situations. The higher parts are occupied by Pinus insignis, a tree 60 to 100 feet high, with a stem of 2 to 4 feet in diameter. This species is liable to vary much in the size of the leaves (which stand in threes) and in the cones, according to local circumstances. In close woods, a mile or two from the sea-shore, at an elevation of 200 to 300 feet, the leaves usually measure 4½ to 5½ inches, and cones 4 to 4½ inches in length by 2½ broad; towards the beach, where the trees are mostly one-sided—a defect caused by north-west winds, which blow for the greater part of the year—both leaves and cones diminish in size. These differences, which are too insignificant to establish even varieties of Pinus insignis, have given rise to the names Pinus tuberculata and radiata, which were, according to Loudon, collected by the late Dr. Coulter near the sea-shore at Monterey; that locality, no doubt, is Point Pinos, as it is the only habitat near Monterey where pines grow close to the beach; it is at the same time the place where I made the foregoing observations. In all situations the cones grow three or four together in a cluster, remaining on the trees several years after shedding the seeds; are pendulous, with the apex somewhat recurved; deformed, that is, the scales on one side are more developed than on the other, and enclose two winged seeds under each scale. The cones are about eighteen to twenty-four months in ripening.

On the dry banks of ravines, to the north-east of the town, the Californian horse-chesnut (Pavia californica) is common. This extremely ornamental shrub or low tree rises to the height of 25 feet, is of a globular shape, and produces its fragrant white flowers of a delicate pink hue in great abundance on spikes 12 inches long; one of these spikes, which I had the curiosity to count, had more than 400 open flowers and buds upon it. Of shrubs I observed Ceanothus thyrsiflorus very common in the pine-woods, and forming an evergreen shrub 10 to 15 feet high; Sambucus, No. 28;* Lonicera racemosa; Spiræa ariæfolia; Rhus 3 sp.; Caprifolium Douglasii, No. 4; Diplacus, No. 65; Garrya elliptica; Rosa, No. 12; Lupinus arboreus and ornatus; Ribes speciosum and malvaceum; Adenostoma fasciculata, a neat little evergreen shrub allied to Spiræa; Arctostaphylos 3

* This and the subsequent numbers refer to the Herbarium not yet received.

sp.; a Vaccinium; Gaultheria Shallon; and an evergreen Prunus, No. 102, resembling the Portugal Laurel. Of annuals and perennials, No. 13; Hugelia, No. 5; Delphinium, 3 sp., No. 24, 26, 61; Leptosiphon androsaceus and densiflorus; Collinsia bicolor; Convolvulus, No. 23; Malva, No. 25; Lupinus succulentus, and densiflorus; Castilleja, No. 39; Œnothera, No. 3, 44; Chironia, No. 64. Of bulbs, Calochortus luteus, Cyclobothra alba, Brodiæa congesta, Calliprora flava, Hesperoscordum lacteum, and a Zygadenus called Amole, of which the bruised roots serve as a substitute for soap.

On June the 22nd, I left Monterey for the mission of Santa Cruz, in company with an American gentleman, who obligingly furnished me with a horse for the occasion. Santa Cruz is across the bay, due north, of Monterey, and at a distance of sixty miles by land, whilst by water it does not exceed twenty-five miles. Passing along the sea-shore over the plains, which present the same vegetation as about Monterey, we arrived in the afternoon at the mission, after a gallop of seven hours. This speed is the usual mode of Californian travelling; on longer journeys some horses are driven before, to serve on the following days.

The mountains of Santa Cruz are well wooded with Taxodium sempervirens, called by the American settlers redwood or bastard cedar. In close forests it grows to an enormous size, averaging 200 feet in height, with a stem of 6 to 8 feet in diameter, which is as straight as an arrow, and clear of branches up to 60 or 70 feet. One tree, that is termed by the Americans "the giant of the forest," is 270 feet high, with a stem measuring 55 feet in circumference at 6 feet from the ground. The bark of the redwood is from 6 to 12 inches thick, reddish and smooth; the timber is of a beautiful red colour, like pencil-wood, fine, close-grained, light but brittle; it is well adapted for in and out door work, as the boards when seasoned do not warp, nor is it attacked by insects. Large quantities of lumber are annually exported to the Sandwich Islands; 1000 feet of 1-inch boards, delivered on the beach at Santa Cruz, are worth 8*l*.

Some fine trees of Abies Douglasii are found in the mountains of Santa Cruz; they do not form masses of themselves, but are thinly scattered among the redwood trees, with which they vie in size. The mountain oak (No. 84, Castanea chrysophylla?) also occurs here, forming a tree 50 feet high, of a pyramidal shape, with persistent lanceolate leaves four inches long, serrulate on the margin; below they are covered with a rusty, yellowish down, which in the young leaves also covers the upper surface. The fructiferous catkins are produced on the points of last year's wood, and do not exceed 2 inches in length, whilst the catkins on the young wood are from 4 to 5 inches long, and

sterile. The nuts, or rather acorns, are covered, in an unripe state, with down, and enclosed in an open cup, which on the outside is clothed with coarse scaly hairs. The mountain oak grows invariably in close shaded woods, and seems to be widely dispersed over the country west of the rocky mountains. Some Indian tribes eat the acorns either raw, or make a sort of bread of them.

On the outskirts of the woods I observed Arbutus procera 50 feet high; a Lauraceous tree with linear light green leaves of nearly the same dimensions; two species of Ceanothus; Corylus, No. 85; a Spiræa; Solanum No. 90; Zauschneria, No. 97, with scarlet flowers like a Fuchsia; and No. 87.

XV.—*On Pruning Pear Trees.* By Mr. Henry Baily, Gardener to His Grace the Archbishop of York, F.H.S., at Nuneham Park.

(Communicated October, 1846.)

A FEW years ago my attention having been called to the presence of a number of fruit buds at the base of a shoot of a pear-tree which had been *accidentally* broken in the course of its season of growth (the tree itself being trained upon the plan called Quenouille), and my impression at the time being that it had induced a greater amount of fruitfulness than generally resulted from the plan (usually adopted, and certainly a judicious one) of tying down the young shoots, I was led to make some experiments, the result of which so fully corroborated the justness of my first conclusion, that I have since made it a part (and consider it an important feature of my system) of pear culture to twist the young shoots so as to fracture them slightly in the growing season.

The soil here being a very light gravelly loam, and the pear-tree not succeeding well when worked upon the Quince stock, it became a desideratum with me to devise some mode by which early productiveness might be induced upon the Pear stock. I am now convinced that I have hit upon a mode which (upon this soil) gives me an equivalent for the loss of the Quince, which is well known to bring the varieties which are worked upon it into early bearing.

It is therefore my practice to go over the trees immediately after midsummer, and with the finger and thumb fracture the young shoots, just breaking their tissue and leaving them hanging (they are broken at about four or five buds from their bases); this checks their luxuriance without exciting the leaf-buds to push again, which is always a natural consequence of the old mode of pruning out the summer shoots of wall and espalier

trees. When the time of winter pruning arrives, an abundance of fruit buds are found to have developed themselves adventitiously, and the dexterous, but *too frequently misguided, pruner* finds that this simple operation has accomplished more than the knife, and that his "occupation," is almost "gone."

The same practice is applied here to the wall and espalier trees (trained horizontally) with the same results.

If I am asked to give the rationale of my mode of treatment, I will say that it is one of many modes of inducing early productiveness; such as frequent removal, ringing, planting in poor soil, root-pruning, &c., but it is one which inflicts no injury upon the tree, as is the case sometimes in ringing. I will conclude by the following extract from the invaluable 'Theory of Horticulture:'—"Whatever produces excessive vigour in plants is favourable to the formation of leaf-buds, and unfavourable to the production of flower-buds: while, on the other hand, such circumstances as tend to *diminish luxuriance* and to check rapid vegetation, without affecting the health of the individual, are more favourable to the production of flower-buds than of leaf-buds."

Nuneham, 30th October, 1846.

XVI.—*Note upon Azalea Ovata, a new Species introduced from China.* By Mr. Robert Fortune, Curator of the Botanic Garden of the Society of Apothecaries at Chelsea. (With a coloured Plate.)

(Communicated Feb. 23, 1847.)

This is another of those fine flowering shrubs lately introduced from the north of China by the Horticultural Society. It is a very distinct species, and was named and described by Professor Lindley at p. 149 of the first volume of this Journal. I met with it, for the first time, in the autumn of 1843, and sent home seeds by the overland mail, which were found in a good state for vegetating when they arrived in England. Subsequently I also sent living plants in Ward's cases on several different occasions, part of which arrived in safety. From these importations the plant has been extensively distributed to the Fellows of the Society, either bearing its present name or that of "Azalea 274."

It was found growing on the sides of the green tea hills in the province of Chekiang, and also on some of the islands of the Chusan Archipelago, where it is called the *King-sze-wha*, or "silver silk flower," by the Northern Chinese. There are two

Azalea ovata.

varieties of this species, both of which are now in Europe. One bears flowers of a rich white colour; the other is pink—and both are beautifully dotted with dark spots on the under petals: I think the white variety is the more beautiful of the two. The corolla in form is nearly round, and not unlike the *Rhododendron Chamæcistus*, or a finely-shaped Pelargonium, in appearance.

In the woods this species has an arborescent habit, and grows from 8 to 12 feet in height, but on the exposed hill sides it generally forms a dwarf bush 2 or 3 feet high. Its flowers are produced in great profusion in the months of April and May.

I never met with this species in the south of China; and it is probable that it will be found hardy, or nearly so, in the climate of England.* It may be propagated easily enough by seeds, cuttings, or layers, or it may be grafted on some of the hardy species. Some of the hardy varieties of Rhododendron would probably make good stocks for this purpose. One of the chief points to be attended to in its cultivation is thorough drainage. I invariably found it growing on the hill sides, often amongst rocks and stones, where no stagnant water could remain near its roots. This point being attended to, it will be found to thrive well in the same kind of soil in which the other species of Azaleas are generally grown.

XVII.—*On the Culture of the Chrysanthemum.* By Mr. J. B. Whiting, C.M.H.S., Gardener to Henry Thomas Hope, Esq., F.H.S.

(Communicated Feb. 16, 1847.)

THERE has never been a season within my recollection in which Chrysanthemums blossomed so superbly as in 1846; owing, doubtless, to the unusual fineness of the autumn; and as this circumstance will in all likelihood bring this esteemed flower into still greater favour, the present seems a proper period for describing a simple method by which excellent plants may be produced with less labour and greater certainty than by any other method that I am acquainted with. I shall therefore detail the course of culture followed by me last season, beginning with the propagation of the plants. Cuttings of all the kinds intended to be grown were planted in the usual way about the middle of May, and, when sufficiently rooted, they were potted singly into sixties, afterwards keeping them close in a pit until

* It has been this winter found to bear a temperature of 4° Fahr., in a low damp situation, both on a south and north aspect, without exhibiting any appearance of suffering.—J. L.

they had recovered from the check of parting. In this situation the plants soon commenced a new growth, and when this was observed they were all stopped with the intention of making them bushy. Early in July they were shifted into sixteens, using a good loamy soil moderately enriched with dung. Some of the strongest plants were potted singly, two or three of the weaker being put into one pot, and the pots set upon a bottom of coal-ashes in the open air. Being carefully tended, the plants soon began to grow rapidly, each producing several shoots, when they were sticked and tied, some to three sticks, in order to form tall plants, but the greater part into round bushes; afterwards they were allowed ample room, and never permitted to suffer for want of water. At this stage of their progress, the pots being well filled with roots, a few plants were set aside for the purpose of trying the effect of guano-water upon them; and finding after a few applications that it deepened the rich green of the leaves and increased the general robustness of the plants, the whole stock was treated in the same manner, applying it liberally twice a-week in lieu of ordinary waterings. As the weather was dry and warm, the plants required water every day, frequently twice a-day, so that a considerable portion of the manure would no doubt be washed away; but in moister weather, when few of the guano particles would be unavailable, once a-week would probably be often enough to give the manure-water. When danger from night-frosts was apprehended, the plants were removed into a conservatory, where they blossomed beautifully, retaining their foliage almost down to the rim of the pots. Plants of Rival and Surprise, not much exceeding 2 feet in height, expanded nearly a hundred flowers each; while other varieties of less spreading habit, which produce their blossoms upon shorter branchlets, such as De Crequi and Madame Pompadour, had from fifteen to twenty flowers on a branch, forming almost a close spike of bloom. No doubt this result must partly be attributed to the last splendid summer, which resembled that of the Chrysanthemum's native country; still I can confidently say that those who follow the course of culture here described will find it less troublesome and more certain than most other methods.

XVIII.—*On the Genus Æschynanthus, and its Management.*

By Mr. William Wood, Pine Apple Place.

(Communicated Feb. 10, 1847.)

THERE is perhaps no genus of plants of recent introduction possessing stronger claims on the attention of cultivators than that which forms the subject of the following remarks, whether considered in regard to the ornamental character or comparatively easy culture of its species—enduring opposite extremes of temperature and exposure, not easily injured by excess of moisture, resisting the most intense sunlight with impunity, thriving in almost every possible mixture of vegetable matter, accommodating themselves to situations in which many other plants would perish; and withal, repaying the attention bestowed on them with a profusion and long continuance of beautiful flowers. Less formal in its features than Kalosanthes, and more lasting in its beauty than the Cactus, it affords a finer combination of rich and gorgeous effect throughout the spring, summer, and autumn months, than probably any other genus with which we are acquainted. It is indeed difficult to assign a reason for the almost total absence of Æschynanthus from our metropolitan exhibitions until within a very recent period, since the merit of the last introduced species over that of their predecessors does not so much consist in their greater beauty (beautiful as they are) as in their smaller and neater habit of growth. The difficulty of obtaining uniform and successive bloom may perhaps, however, be regarded as the principal reason for the gradual disappearance of such fine objects from public competition.

The following remarks are intended to explain the cause of abortive growth in the species of Æschynanthus generally, founded upon an inquiry into their natural conditions of growth, with a view to ascertain how far such conditions can be adopted with advantage under artificial culture.

The species of Æschynanthus may be popularly described as a class of semi-epiphytal shrubs, of a neat decumbent habit, with slender succulent stems and leaves, readily emitting, by the aid of atmospheric moisture alone, numerous aërial roots, by which the plants adhere to vegetable substances. The flowers are principally produced in clusters from the extremities of the branches, and in some instances from the side or lateral growths, approaching in form that of the common Foxglove, and varying in size and colour from bright orange-scarlet to all the intermediate shades of vermilion and rich crimson. The absence of uniform bloom under the ordinary methods of growth may in part be ascribed to a mistaken notion being entertained on their first introduction as to the best means of obtaining it. For a

considerable period the species were almost wholly considered as epiphytal plants, and, as such, were grown principally in sphagnum or moss attached to branches or logs of wood in pots, or suspended promiscuously with other plants, and thus exposed to the alternating influence of light and shade, drought and moisture, in an atmosphere many degrees less humid than was congenial to their growth; and they were seldom or never indulged with rest, which is so essential to their fertility.

Though generally found in their native localities on the trunks and branches of trees, in moist and shady woods, the fact appears to have been overlooked, that the design and adaptation of such situations was but in accordance with a primary law of Nature, which often seeks the perpetuation rather than the perfection of the species, leaving the skilful cultivator the means of obtaining the highest results of growth by a well-regulated artificial management.

The position in which epiphytal plants are found (attached to vegetable substances and in elevated positions) implies a habit of growth and structure unable to resist stagnant moisture, whether under natural or artificial treatment; nevertheless, where perfect growth is sought, experience teaches us that such treatment as enables them to secrete the greatest amount of nutriment (subject to a regulating power) may be rendered conducive to their highest fertility.

A partial exclusion of light and a moist warm atmosphere are powerful stimulants to growth, whilst the reverse is essential to fertility; and since the former of these conditions are those in which the species of Æschynanthus are naturally found, whilst they are fitted to endure much more light, heat, &c., the following inference is drawn:—that their natural habits of growth do not necessarily imply the conditions most favourable to fertility, and that therefore the principal cause of abortive growth in the species generally may be mainly attributed to adhering too closely to the conditions in which they are found in their natural state. The practical application of the subject admits of a twofold division of the genus in relation to its culture:—1st. As epiphytal plants suspended upon or adhering to other vegetable bodies, and principally sustained by atmospheric moisture; 2ndly. As pot-plants, deriving nourishment principally through the medium of their underground roots in soil. For the former, the most essential conditions of growth and fertility consist in a due exposure to strong sunlight, heat, and moisture; and for the latter, in an intermediate exposure to a modified low and dry atmosphere, equal to an entire cessation of growth until the formation of bloom.

The pliant texture of their stems renders them admirably

adapted for cultivation as "epiphytes," for they can be easily attached to grotesque logs of wood or branches thickly inlaid with sphagnum or moss, in which they should be fixed with copper wire, and suspended in the stove or orchid-house. Still more picturesque, however, are they when planted within vase-like wire baskets, inlaid with the same material (sphagnum). Within these baskets should be placed a hollow dish equal to their inner diameters to retain moisture, the remaining area being filled up firmly with equal portions of turfy heath-mould, and coarse half-dried leaf-soil. Managed thus, they produce a fine effect, their rich crimson and orange-scarlet flowers forming a striking contrast with the glossy dark green foliage. One of the most important features of the genus consists in its requiring less moisture whilst in bloom than at any other period, and in the blossoms retaining their freshness and beauty nearly two months, rendering them invaluable for decorating town conservatories or saloons, and also for ornamenting classic vases and artistic pedestals.

As epiphytal plants, the following practical directions are essential to their highest culture. In attaching them to portable logs or branches, the latter should be so formed as to admit of the plants being inlaid with the greatest possible amount of sphagnum. This might be effected by fixing strips of board edgeways to a common centre-piece, widening towards the base in a pyramidal form, or any other outline according to taste. Each longitudinal piece or board should have parallel heads or bits attached to its side, to admit small portable cross supports, whereon each plant might rest; or spokes projecting at right angles from the centre-piece, and at alternate distances, might answer the same end. By adopting a contrivance similar to the one just described, the roots of the plants would be less exposed to the drying effects of the atmosphere, and a far more uniform state of moisture would be kept up than could be maintained in the ordinary way of fixing such plants to blocks. The sphagnum should be used in its fresh growing state; and the roots of each plant (with its ball of soil where practicable) covered with a layer of the same, and secured with tying material previously to being attached. Perhaps the most efficient contrivance for admitting the greatest amount of damp material, as moss, &c. for epiphytal plants, requiring excessive moisture during their growth, would be to adopt fanciful designs of well-seasoned basket or wicker-work (which would last during two seasons), by which the difficulty of securing sphagnum or moss to ordinary round blocks would in a great measure be obviated. When thus prepared, the plants should be hung up in the hottest part of the stove or orchid-house, and exposed to the strongest light,

avoiding all shade from sunlight. During the season of growth, moisture must be freely supplied by syringing, and when the plants have become duly established, each log or support should be taken down and immersed in water once or twice a week. As the plants attain mature growth, the water should be enriched with liquid manure in the proportion of one gallon to four, or one handful of guano to four gallons of water. The first season should be devoted to growth alone, and the plants should be excited to bloom in the following one. As the stronger growing species of Æschynanthus are very sparing in lateral growth, attention must be paid to shortening the extremities of each shoot when 6 or 8 inches in length, taking off at least two joints. When the growth has again branched off to four or six joints, and the terminal leaves are approaching mature size, water should be gradually lessened in amount (but not in quality), in order to ripen the growth; and as the latter manifests a uniform and proportionate vigour, the plants should be gradually removed for a few weeks to a lower temperature, say from ten to fifteen degrees, and placed in a position well exposed to light; and such varieties as bloom the following season may be finally placed in a cold close pit or greenhouse, and preserved from currents of cold air, water being applied once in ten days or a fortnight until it is desirable to excite them to bloom; such as flower in the current year may be retained in a dry warm greenhouse.

The second mode of culture is that with respect to their growth in pots, and in this way alone can uniform and perfect growth be obtained in connexion with equal success in bloom; for when so treated, greater uniformity of moisture can be maintained, and there is less evaporation by exposure to the atmosphere. Though excessive vigour of growth may be generally regarded as unfavourable to fertility, yet it is only so when the growths are badly ripened, which is generally the case. The greatest vigour of which plants are capable may be rendered favourable to bloom by a due appropriation of the elements essential to fertility in the proper season.

In pot-culture there are two ways in which these plants may be successfully grown—first, by using soil; and, secondly, by substituting sphagnum and decayed branches, &c.; and as each method possesses its peculiar interest, I will consider them separately. The soils most suitable are coarse vegetable composts, varying to almost all mixtures from pure unmixed heath-mould to all the medium qualities of leaf-soil, decayed branches, sphagnum, and small portions of sandy loam, but all requiring to be so arranged as to admit a full but uniform distribution of moisture, both by ample bottom-drainage and by a regularly porous texture

throughout the mass. 1st. When heath-mould is naturally deficient in vegetable matter or fibre, add one-third half-decomposed leaves or decayed branches; but if the latter be too coarse for the size of the plants, rub it through a sieve three-quarters of an inch in width in the mesh. 2ndly. Where sufficient vegetable matter exists in the mass, but in unequal proportions, pass the most decayed portion through a sieve of a quarter of an inch square, and use the remaining portion. 3rdly. Where the quality of the entire mass appears worthless or inapplicable, collect the coarsest turfy pieces from the store heap, and bruise them with the hands as far as possible through the first-mentioned sieve. By this process, and with the addition of vegetable matter, as leaves, branches, &c., almost every requisite degree of porosity may be obtained; the last-mentioned materials being less or more, in proportion to the strong and retentive quality of the soil—the strongest soils admitting of the greatest degree of mechanical texture (or porosity) by the addition of coarse vegetable matter or broken sandstone, potsherds, &c. The lightest and finest soils also admit of a nearly equal amount of vegetable matter alone being added to improve their quality and counteract cohesiveness. The strongest soils require the least pressure in the process of potting plants, and *vice versâ*, but, where coarse vegetable matter or sandstone or other opening material forms a component part of the whole bulk, the process of potting should be "firm" in proportion. In selecting plants for potting, those should be preferred which are uniformly young and vigorous, and such as have been struck from parents whose growth was unimpaired by excessive bloom. Plants intended for superior growth should be uniformly vigorous or excitable, this being the first condition on which the fitness for transferring small plants to large pots depends; in the absence of this, all other conditions are inefficient. The second essential point in potting, where much growth is required before the flowering season, is, as has been already stated, porosity of the soil. The greater the amount of soil used in potting, the greater should be its porosity, and *vice versâ*. Plants in suitable health may be removed from pots of 4 inches in diameter to those of 8, 10, or 12; their vigour being the only rule of fitness, and their consequent exposure to a suitably modified atmosphere the only condition of success.

The correct management of the species of Æschynanthus, when grown in pots, depends upon the same general treatment as when placed upon blocks or in baskets, in their exposure to strong sunlight, exclusion from shade, and in their being kept, until sufficient growth be obtained, in a congenial moist temperature. The gross and succulent structure of the species offers

a striking illustration of the fact, that the ability of plants to resist sunlight is in proportion to the power they possess of secreting moisture; and hence it is inferred that, as one of the principal causes of abortive growth and paucity of bloom is solely attributable to a partial exclusion from light by the ordinary modes of cultivation, thereby excluding the principal agent for inducing fertility—the importance of a full exposure to its influence cannot be too strongly urged, "the amount of assimilation in plants being determined by the degree of light to which they are exposed." *

Now admitting the correctness of these remarks, the following inference may be drawn, that those organs of plants upon whose maturity the formation of bloom depends, should, under artificial growth, be so arranged as to admit of their receiving the direct rays of light upon them. Those species whose bloom is formed at the extremities of the branches, as Æ. grandiflorus, pulcher, Lobbianus, and ramosissimus (maculatus), should be trained as near to an upright position as possible, whilst those whose flowers are formed laterally from the axils, as Æ. Boschianus, miniatus, Horsfieldii, &c., should be so disposed as to admit an equally diffused light to their lateral or side-growths by a symmetrical arrangement of their shoots—the inward growths being trained in an upright and oblique line, and the outward retained at equal distances by small upright stakes or hooks over the margins of the pots.

The second mode of cultivating Æschynanthus in pots is by treating the species as semi-epiphytes, by planting them in sphagnum and decayed vegetable matter (as rotten branches, leaves, &c.) intermixed with broken sandstone, charcoal or pot-sherds, in the proportions of two-thirds of the first-mentioned materials and equal parts of the latter. By this system the largest plants may be obtained in the shortest time, as the nature of the material admits of the quickest circulation of moisture, and enables the plants to assimilate a great amount of nutritive matter in a short period. The ultimate success in obtaining bloom equal to the extent of growth so obtained will greatly depend upon a course of treatment applicable to the conditions by which they have been grown. The power of plants to store up food should in this and similar cases be regulated according to the means whereby they are enabled to ripen their growth for the formation of bloom; for it has already been shown that the peculiarly gross and succulent habit of the species is such as to enable them to appropriate fluid matter to a degree greatly disproportioned to their ripening powers, unless exposed to the

* Lindley's Principles of Botany.

strongest influences of light, heat, &c., and kept almost wholly from growing previously to the flowering season. Where plants are stimulated to growth in a much greater degree than is favourable to fertility, the influences of light, air, heat, and other fertilizing agencies should be applied in proportion. The peculiarities of management consist in potting the plants firmly in proportion to the absence of soil, using considerably less bottom-drainage, and exposing them to the highest temperature of which the stove or orchid-house will admit, avoiding all shade from sunlight; water should also be applied more freely and uniformly than when grown in earthy soils, and during vigorous growth it should be enriched to a greater degree with liquid manure. Where it is desirable to have large masses of bloom, the species may be grown in the above manner by adopting stone pots or boxes, containing from six to twelve plants in each. The porosity of the material in which they are grown dispenses with the ordinary practice of shifting from smaller to larger pots.

The most beautiful species are:—1. Æ. ramosissimus (maculatus), a slender growing species, but capable of forming a large specimen. Its flowers are principally produced from the extremities of the previous season's growth, expanding in succession from February till May; after this period the plant should be re-excited to growth by being partially pruned back, which, on being matured, will admit of its being progressively hardened off in a lower temperature, and of its being removed to a light, cool, close pit until autumn, finally placing it on a dry shelf or platform in the greenhouse or cool end of the stove until required to bloom in spring. During its season of rest water may be applied once in ten days or a fortnight. This species is one of the most valuable for its being easily excited to bloom throughout the mid-winter and spring months, when its rich clusters of crimson flower-tubes present a very gay appearance. When removed to the stove or warm conservatory, water should be gradually applied, as the plants exhibit a tendency to absorb it, syringing now and then being sufficient on their first exposure to increased temperature. 2. Æ. grandiflorus is a summer and autumnal flowering species, producing its flowers on the extremities of the current year's growth, from July to September. Having obtained a sufficient extent of growth during the early spring months, according to the conditions previously stated, watering should be gradually lessened, and syringing wholly discontinued, which, aided by exposing the plants to a decrease of from 10° to 15° in temperature, will encourage the formation of bloom. When the blossom-buds show colour, remove the plants to a dry light greenhouse, where an intermediate temperature is maintained during the first week, after which air may be

admitted more freely during the flowering season; water may be applied once a-week, and alternately mixed with rich liquid manure. A pure light and dry air appears essential to produce the brilliant orange-scarlet tints of this noble species. 3. Æ. pulcher, with terminal clusters of rich crimson blossoms. 4. Æ. Boschianus, producing numerous axillary flower-tubes, of a rich flame-coloured crimson. 5. Æ. Lobbianus, having terminal close racemes of a crimson hue. 6. Æ. miniatus, with rich vermilion blossoms, formed laterally, upon its branches. The four last-named species being apparently much smaller in growth than those previously described, are therefore suitable for small collections of stove-plants, and of the four, Æ. Boschianus and Æ. miniatus, by their decumbent habit, are specially adapted for being suspended in baskets or fancy vases.

XIX.—*Remarks on Cultivating Tropical Fruits for the Table.* By Mr. A. Scott, C.M.H.S., Gardener to the Right Hon. Sir George Staunton, Bart., M.P., F.H.S.

(Communicated Jan. 12, 1847.)

Now that the cultivation of rare tropical fruits is likely to receive more attention than it has hitherto done, I have ventured to mention the subject, not with the view of giving any new or valuable information, but briefly for the purpose of noticing some of the kinds that are fruited here, whose merits have been compared with the usual dessert fruits; believing that a correct list of the sorts that have fruited in the different gardens of this country, accompanied with a few remarks on their qualities and the best methods of cultivating them, would give a more inviting appearance to this very interesting branch of gardening, seeing that we could then more readily ascertain their various merits, a subject on which opinions will be found to differ; for it is well known to those having extensive knowledge of Indian and other tropical fruits, that many Europeans at first express strong dislike to certain sorts which they afterwards learn to esteem.

Of the kinds that are fruited here, perhaps the *Mango* is the only one entitled to the character of a first-rate fruit; but others are equal, if not superior, to several of our common kinds, independently of their being the produce of species belonging to very distinct tribes of plants, and thus interest and variety is added to the dessert, which ought always to give them a strong claim on our attention, even if it should ultimately be found that but few of the more rare tropical fruits excel those usually cultivated for the table.

Bananas are now common, and, although not high flavoured, they form an important addition to our list of hothouse fruits. Five distinct varieties have been fruited here, but of those perhaps Musa Cavendishii is the most useful. But a magnificent growing variety cultivated here (under the name of Musa maxima merely for distinction, and in the Edinburgh Botanical Gardens known as the St. Helena Banana) is, where it can have room for its noble foliage, superior to any sort yet introduced. The foliage of this variety rises to the height of 30 feet, and the clusters of excellent fruit are from 80 to above 130 lbs. weight, and in quality equal if not superior to that of M. Cavendishii; like that variety it keeps some time, whereas some of the sorts very soon rot when grown in a moist stove. This is often the case with the Dacca Banana. Other kinds produce well-flavoured fruit, but in general the clusters are small and the plants more difficult to grow well.

Granadillas, or fruits of several species of Passion flower, are interesting additions to the dessert; they are easily cultivated stove climbers, and in general their flowers are very beautiful.

Passiflora edulis, a native of the West Indies, grows fruit freely; the fruit is purple and well-flavoured.

P. maliformis has round fruit, green coloured when ripe, and the size of a large plum. The skin or outer part is thick and hard, containing a very well-flavoured pulp that partakes of the flavour of the gooseberry and the orange.

P. laurifolia produces a handsome oval fruit of a fine lemon colour, and hence it is called water-lemon; it is also called Pomme de Liane. It is about the size of a peach or nectarine. The skin is soft, containing a very pleasant acidulated pulp. This is the handsomest fruit, but is inferior in size to the next.

P. quadrangularis produces the true Granadilla: well-grown plants will produce fruit about 3 lbs. weight, yellowish when ripe, and containing a large quantity of pulp, which, if mixed with a little wine and sugar, is generally considered excellent. The three last are also natives of the West Indies, easily cultivated, particularly in a corner of the bark-bed, allowing their roots to run in the decayed bark. The two last-mentioned species have fine flowers, which require to be artificially fertilized.

Guavas, or fruit of Psidium Cattleyanum and P. pyriferum, are admired by some as table-fruit, but they are chiefly valuable as a preserve or jelly. The White Guava, P. pyriferum, is easily cultivated, requiring little more than a greenhouse temperature in winter; but it is liable to harbour insects, and for that reason has received but little attention for some years. The Purple Guava, P. Cattleyanum, is even hardier than the

White Guava, besides being a very handsome shrub; it fruits freely, and is not liable to the same objection as the P. pyriferum.

The *Rose Apple*, or fruit of Eugenia Jambos, is allied to the Guavas. The foliage is fine; the flowers white, large, and showy. The fruit is tolerably good, but its greatest recommendation is its perfume, which strikingly resembles that of the rose. It is whitish in colour, about the size of an apricot, easily cultivated, a minimum temperature of 50° or 55° suiting it in the winter, and the common stove temperature in the growing season.

Blighia sapida fruited here several times, but was given up, being good for nothing as a fruit. The arillus is large, white, and tastes not unlike a chestnut; it is boiled and eaten as a vegetable.

In the gardens here are healthy plants of the *Cherimoyer*, *Bread Fruit*, *Mangosteen*, &c. &c.; they are also in a few other English gardens, where they will be carefully cultivated. It is, therefore, not unreasonable to expect that in due time they may be added to the list of hothouse fruits.

XX.—*Remarks on the Tank System of Heating in the Culture of Pine-Apples.* By Mr. Robert Reid, C.M.H.S., Gardener to Mrs. Clark, Noblethorp, Barnsley.

(Communicated Dec. 10, 1846.)

"I can at this moment see in my mind's eye long ranges of pines planted out on prepared beds over shallow tanks of water, with here and there an old bark bed, the thermometer placed over the centre of the tanks, and the attendant looking on like an engineer, conscious of his full command over the simple machinery, giving a little more heat here and taking off some there, and regulating the whole with precision. *The toils of a long life are nothing to the pleasure of anticipating such a state of things.*"—*D. Beaton, in Gardener's Chronicle, Dec.* 2, 1843.

Such were the prognostications of one of the best gardeners in England only three years ago, at which period we were all completely in the dark respecting the best method of erecting tanks for bottom heat. Now, however, that all difficulties in the matter are overcome, and its great merits fully understood, the time is not far distant when a bark bed or a pine fruited in a pot will be numbered amongst the things that were. Although considerable improvement has taken place within these last ten years in the culture of pines in pots, at the same time it will doubtless be acknowledged by the generality of pine-growers, that there is yet room for very great improvement, both in the

number and size of the fruit and in the time required to bring it to maturity. Wherever gardeners are obliged to depend upon the bark bed and pot culture—whatever their skill and industry may be—their success must always be uncertain and variable. It is quite impossible to judge, with any degree of certainty, when a pine-plant in a pot, and plunged in a bark bed, requires a greater or less quantity of water, or to prevent the bark from attaining extremes of heat or cold; and I am doubtful whether, under these circumstances, the improvement of pine-culture, if continued in this way, will ever advance much further than it has already done, as the great uncertainty attending all the operations will ever present obstacles beyond the control of the gardener. Happily the introduction of the tank system of bottom heating will, it is hoped, entirely banish bark beds and pots: it opens up at the same time an entirely new field for experiment, and certain success in improving the growth and size of the fruit, besides considerably shortening the time required for bringing the plant to maturity.

The great advantages of the tank system for the growth of the pine-apple, or any other fruit or vegetable for which bottom heat is necessary, are so apparent, and the apparatus so simple, economical, and effective, that it is well deserving the special attention of every proprietor of gardens. The difference betwixt this and the old system may not inaptly be compared to the (now) old plan of travelling by stage-coach and the modern one by railway. The first cost of materials will in a very short time be repaid, both by the saving of labour and the increase of produce, besides relieving the gardener of endless care and anxiety, more especially from the trammels of repeated shiftings, plunging of pots, turning back, and all other attendant troubles and expenses of the old method. When a bed is properly prepared on tank heat, and planted with the requisite number of plants, all labour and trouble with them may be said, comparatively speaking, to be at an end, the only requirement being to attend to the fire and to give air. With respect to water, I find that very little is required, with the exception of syringing or sprinkling with the rose of a watering-pot. The soil is not apt to become dry at the bottom, as has been apprehended by some; I find bark that has been lying on the tanks for six months, in which pots were plunged, to be quite moist down to the rubble, after lying that time without being watered.

Where a regular succession of fruit is required through the whole year, Mr. Hamilton's system answers the purpose perfectly. The Montserrat will be found to be the most useful sort for this purpose, as the fruit attains a good size and flavour in winter,

which many other sorts will not do. I have six lights of them planted on Mr. Hamilton's method, from which I have cut fine fruit, and will continue to do so all through the winter. The fruit swells much better than I ever could cause them to do in pots. I have several just now (December) with two fine fruit on one plant, of larger size than the first single fruit cut from the same plant. With respect to treatment, I manage them just the same in every point as if they had been in pots, keeping the atmosphere much dryer in winter, giving no water whatever from November till February, with very little air, and we find the fruit nearly, if not quite, equal in flavour to summer fruit, the produce being double what we should have obtained from plants grown in pots, as the fruit is much quicker in its growth and the suckers are often ready to show fruit by the time others on the plant are ripe.

I have seen tanks erected at several places on different and, what I consider, unnecessarily expensive plans; but from the experience I have had of the tanks erected here, I cannot see that they can be improved upon, either in durability, economy, or in most effectually answering the end in view. They are gutters of cast-iron, eight inches wide and four inches deep; the pits are nine feet wide, and the gutters are carried along the front and return by the back wall, at eighteen inches distance from the wall all round, resting on bricks about ten inches from the ground; the floor is of flag-stone, about two inches in thickness, and laid an inch clear above the tanks; it is also supported on brick piers, which are built as the floor is laid, without any regular order, but just where wanted, to suit the joints and the size of the flags. When the floor is laid the joints are carefully filled with Roman cement. At certain distances, close to the front wall, holes are chiseled through the floor two or three inches square, on which pipe-tiles are fixed with cement: these serve for chimneys, to admit the steam at pleasure amongst the plants; but when steam is not wanted a piece of slate is laid over the top of the pipe, which effectually stops its escape. When the floor is finished I lay on about six inches of broken bricks, the largest pieces being laid on the bottom, a second size over these, and over all are sifted the smallest-sized pieces, which are not larger than hazel-nuts. These effectually prevent the fine soil or dust from penetrating through the rubble, which, besides acting as a drain for the soil above, serves as the grand medium whereby the heat is equally distributed the whole length and breadth of the pit, betwixt the floor and the soil. Over the floor and rubble I next put a foot or more of fresh leaves, well trodden down, which makes not only an excellent bed whereon

to place the soil for the plants, but also prevents any extremes of heat or cold, moisture or dryness.

A tank-bed made as above will only require, for keeping up a sufficient bottom heat, a brisk fire for a few hours two or three times a week; but in the growing season I find it answers much better to light a fire every afternoon for an hour or so, just to get the water in the tanks pretty hot, and then, on shutting up for the night, I take off all the slate covers, and admit the steam amongst the plants, replacing the covers in the morning. I am now having a second pit heated with tanks, and hope in a few months hence to have both our pine-houses heated in the same way; and when these are done I shall *do entirely away with bark for pine-growing*, and I am perfectly convinced that I shall be able to grow double the weight of fruit, *and at less than one-half the expense to my employer*, than I have hitherto been able to accomplish with bark beds and with pot culture. The soil I have used is a mixture of sandy peat and loam, exactly the same as I use for greenhouse or hothouse plants. I am of opinion that pines will grow to the highest perfection in any open porous soil that will not become bound, hard, and dry, such as leaf mould and loam mixed, or loam and peat, or good sandy loam, or peat alone. I should not be afraid to grow first-rate fruit in any of the above soils, provided the houses were good. Liquid manure I have never used, and I have never been able to perceive its good effects when used by others. The minor details of pine-culture on the tank system are so few and simple that they do not require much notice, and may safely be left to the discretion of the cultivator; and all books that have been written on the subject are but of little, if any, use whatever.

The use of tanks, or gutters, for bottom heat, may be extended to a great variety of purposes, with great and certain success for early crops both of fruit and vegetables. For vine borders I have no doubt they would answer well, and, at the same time, would not be expensive, as a very gentle heat only would be required. Pits of five or six feet in width, with a single gutter through the centre, would be found to answer admirably for all kinds of vegetable forcing, or even for show pines, where large fruit is wanted, although for the latter purpose there can be no doubt that the use of fermented stable manure is preferable to any other material.

XXI.—*The Propagation of Fruit-trees and other Trees from Branches and Cuttings.* By Mr. James Barnes, C.M.H.S., Gardener to the Baroness Rolle, F.H.S., Bicton, near Honiton.

(Communicated November 23, 1846.)

From observation I am inclined to imagine that many kinds of fruit-trees, deciduous ornamental trees, shrubs, and roses, may be propagated from branches and cuttings, a plan which appears to me to be of some importance; for almost every orchard, plantation, shrubbery, and rosary bears witness to some extent that unsuitable stocks for budding and grafting have been selected.

A circumstance that occurred in the spring of 1845 served to confirm my opinion, that many trees and plants could be successfully cultivated from branches and cuttings. During the winter of 1844, a considerable quantity of refuse prunings from the shrubberies, parings of grass edgings, sweepings of walks, and refuse from borders, were accumulated for the purpose of being converted into useful manure by charring. The beginning of February, 1845, was chosen for packing it together for that purpose; there were from 20 to 25 loads of it, and the greater proportion of it was in a green, moist state, intermixed with a considerable quantity of earth, and therefore it took a considerable time to char. The weather the whole time was severe frost, with a cutting north-east wind; nevertheless, the charring went on satisfactorily, and when accomplished, on taking the heap to pieces for the purpose of sifting and storing away the contents in a dry situation, I was delighted to observe at the base of one side of the kiln that a quantity of moss-provins and other rose prunings, together with Jasminum fruticans and branches of other plants, had put forth abundance of beautiful healthy roots. They had been cast upon the kiln at the finish of packing, and had become intermixed with the sweepings and rakings of half-decayed leaves, gritty sand, and other earthy refuse; others within a few inches of those that had put forth healthy roots were completely charred. The hint thus given I imagined might be turned to a useful account, and it struck me were tanks or gutters erected on a good principle in the open air, so as to afford bottom heat at the desired season, choosing healthy, suitable soil, and placing it on good drainage over those tanks or gutters, that cuttings prepared at a proper season, and inserted methodically in the soil, would strike with success.

Not having a convenience of this description myself, however, I resolved, when the pruning season of 1845 came round, to select cuttings of various fruit-trees, such as apples, pears, plums, cherries, medlars, peaches, nectarines, apricots, some deciduous

forest-trees, shrubs, and roses, and to prepare them, some by cutting close to an eye of the young wood, and others by baring at the base an inch or two of the previous year's wood. They were laid in by the heels until the beginning of February, 1846, and taking the hint from observing the condition of the refuse prunings at the char-kiln, which had been lying about for some time previous to the materials being collected and packed for charring, I had a kindly hot bed made with well-wrought tree-leaves to the height of about 30 inches, then about 3 inches of healthy loam with some charred saw-dust were mixed with it. On these I placed an old wooden frame, not so much for the sake of shelter as for seclusion to carry out my experiment. The cuttings were then placed in the soil at various depths in rotation, a kindly lining of the same material as that of which the bed was formed was placed all round; and the outside to the top of the frame all round was then thatched with furze faggots; this kept cold winds from the lining, giving the whole the appearance of a little furze stack. The result turned out to my satisfaction. I found that almost any deciduous tree or plant might be made to put forth abundance of roots, and formed into healthy plants, if all matters appertaining thereto were carried out on good and systematic principles.

Some fruit-trees, however, are greatly improved by being budded or grafted on proper stocks, and the same holds good to some extent with other trees, shrubs, and roses, &c.; but I have observed that the properties of others have been very much deteriorated through their having been worked on unsuitable stocks. On the other hand, I have also seen many trees entirely fail, after good preparation had been made for them at a considerable expense, and at the very time when it was reasonable to suppose they should have made some return in the way of fruit; and others, again, have changed their naturally good properties; and therefore, that some of the first attempts to produce healthy, thrifty plants by this process may fail it is not unreasonable to suppose, still I have seen quite enough to convince me that the thing may be accomplished to a considerable extent. I have often observed, on turning leaves, rubbish heaps, &c., that, besides branches of trees and shrubs having pushed forth healthy roots, green stakes, thrust into hot-beds for the purpose of ascertaining the degree of bottom heat, have under peculiar circumstances put forth roots. Others, again, have put forth strong shoots, only however to a certain extent, without roots; but I had never, previous to the spring of 1845, given such matters any particular consideration, with a view to discover why such things should happen, and the following facts may possibly throw a little light on the matter.

The last gentle forcing asparagus bed I had made that year (1845) for producing asparagus, until it came in naturally, was a kindly made bed of half-decayed leaves, &c., from other hot-bed linings. The necessary soil and roots were placed on it, and a slight protection formed with stakes placed on the sides, with some temporary wood battens across and tied to the stakes on each side, for the purpose of holding up clear from the surface of the bed some evergreen boughs for keeping off the morning frosts, a plan which I find to answer very well for the last gathering of forced asparagus. Some rubbish faggots, made of refuse prunings, had been placed close by for sheltering other hot-bed linings; I pulled out of those faggots three branches, lopped off the side branches roughly, pointed one end, and thrust them into the asparagus bed for heat stakes. Time passed on, and the asparagus over; in the first week in May I proposed pricking a quantity of young celery plants on the bed, but looking about I observed strong shoots had burst forth from all the three stakes, and on pulling them up each was well-rooted from the earth's surface to the depth of about 6 inches, and the size of the stakes thus far considerably increased, while the part below the roots remained unincreased. Two of the stakes were Fraxinus excelsior; both happened to be placed the bare end downwards into the bed, while the other, a common laurel, was by chance thrust in top downwards, and was beautifully rooted; its buds (of course pointing towards the bed) had pushed several strong shoots from 4 to 10 inches in length, and had turned up horizontally from the stake which had been thrust in slantingly.

From this and other facts of a similar nature, it has appeared to me that abundance of healthy plants may be produced from branches and cuttings if properly selected, and at the right season methodically placed on bottom heat, the latter being maintained only a sufficient time at the proper season; and, at the same time, the whole of the branches or cuttings left above the surface of the soil should be fully exposed to the open air.

XXII.—*Memoranda respecting the Saa-gaa-ban, or Apios tuberosa, a supposed equivalent for the Potato.* By the Vice-Secretary.

Public attention having been drawn to this plant by persons who anticipate the possibility of its becoming a substitute for the Potato, it is supposed that a few memoranda respecting its history and qualities may be found useful.

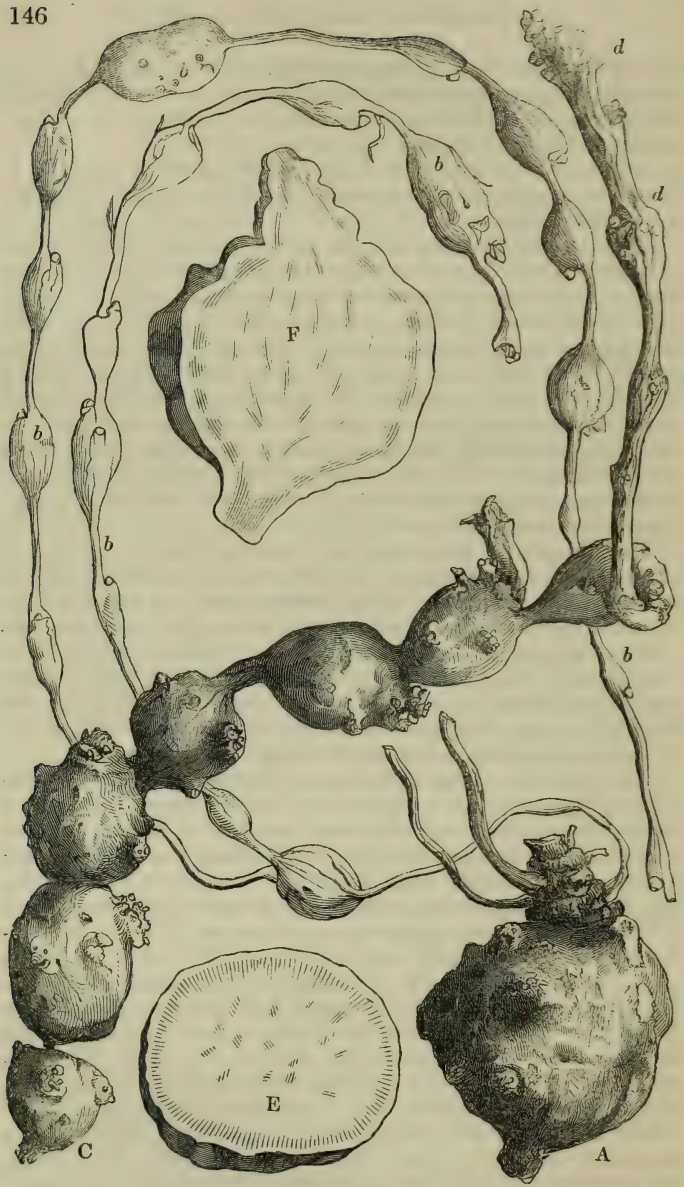
This plant, called *Glycine Apios* by Linnæus, *Apios tuberosa* by modern botanists, and *Saa-gaa-ban* by some of the North

American Indians, is a small trailing, tuberous perennial, with pinnated leaves, narrow lanceolate leaflets, and small brownish purple flowers, rather sweet-scented, and growing in axillary racemes, which are shorter than the leaves.

It is described by North American botanists as growing in damp, rich soils, along the margins of swamps in Carolina (*Elliott, Fl. Carol.*, ii. 232), and in moist shady places from Canada to Florida, west to Missouri (*Torrey and Gray, Flora of North America*, i. 282); but Pursh asserts that it inhabits *hedges* and mountain meadows from Pennsylvania to Carolina (*Fl. Amer. Sept.* ii. 473). Its roots, that is to say, its tubers, are described by Elliott as *small*, and as having formed an article of food to the aborigines; Nuttall calls them "oblong cylindrical tubers, edible and farinaceous, much like those of *Lathyrus tuberosus*, sold in some of the German markets, and rarely larger, though very numerous" (*Genera of North American Plants*, ii. 113); Pursh is the only author that I can find who speaks of them differently; he says that the roots "sometimes grow to an enormous size."

The plant itself is no stranger to our gardens. It is figured in the Botanical Magazine, t. 1198, and in other works. A rude woodcut, indeed, is to be found as early as 1640 in Parkinson's Theatrum, fol. 1062, at which time the plant was cultivated in England under the name of "*Terræ glandes Americanæ sive Virginianæ* — Virginia Earthnuts." The latter appellation seems to indicate in what estimation the plant was then held; it was regarded as a mere curiosity, with a "tuberous browne roote, which multiplies itself into sundry others."

As it is the tubers which some suppose likely to take the place of the potato, the annexed cut has been prepared to show what they are, and how they are formed. A full-grown old tuber (A) is as large as a Golden Pippin Apple, or a Nonpareil; it has a firm, rather hard, fleshy texture, is roundish in form, and bears irregularly a number of tubercles on its surface. These tubercles are eyes or buds; some of them remain dormant; others, especially those near the upper end of the tuber, push into slender underground runners, which, after advancing a short distance, swell, then contract and lengthen again, then swell, and so proceed during the season of growth, until a string not very unlike a rude necklace is formed, as at *b*, *b*. Towards the end of the season these swellings diminish, or even disappear, and then a slender, cord-like, underground woody stem is all that is formed. The swellings, *b*, *b*, are young oval tubers, each furnished with an eye or two at the upper end. In a second season these strings of tubers enlarge considerably, form more eyes at their sides, become rounder, and assume such an appear-



Tubers of Apios tuberosa. A. An old tuber with a double string of young ones, *b b*. c. A string of tubers two years old. *d, d*. The upper and woody part of the string from which the stems arise. E. A cross section of an old tuber. F. A longitudinal section of the same.

ance as is seen at C, *d*; the upper part, *d*, acquiring a more woody texture, and throwing up stems and leaves, or emitting other underground shoots. At what rate this swelling process advances, or how many years the largest tubers which have come under examination may have been in acquiring their size, I do not know; certainly two years, at C, or more, and probably several in such cases as A.

When examined microscopically, the tubers are found to consist principally of a mass of large oval, very thick-sided cells, filled with starch, among which are scattered irregularly in the centre several woody bundles, composed of strangulated porous vessels of considerable size, very irregular and unequal laticiferous vessels, also much strangulated, and a few spiral vessels. Near the circumference, just within the bark, these bundles are arranged in distant narrow plates, forming short rays, and offering indistinct traces of concentric zones (E). A considerable quantity of truncated prismatical raphides is found among the cellular tissue; and around the central bundles of woody tissue are series of prosenchymatous cells, which seem chiefly to contain gum.

In a raw state the tubers taste like earthnuts, or perhaps between an earthnut and an acorn. When boiled they are firm, sweetish, of a dirty yellow colour, and in texture and flavour may be compared to a mixture of sweet chesnuts and parsnip.

The possibility of cultivating this plant requires no proof. It has been for more than two centuries in Europe; fine specimens were exhibited at a meeting of this Society in January last, by Mr. E. A. Hamp, gardener to James Thorne, Esq. of South Lambeth; and those from which the accompanying drawing was taken have been growing in the Society's Garden for twenty years.

The points for cultivators to ascertain obviously are—

1. Whether a sufficient weight of the tubers can be obtained to render the plant profitable.

2. Whether that weight can be obtained quickly enough.

3. Whether the quality is such as will render it acceptable as human food.

Upon these points, which can best be determined by experience, I can only offer conjectures, and they are not favourable. The land which the plant requires must be so good, that any crop which is taken from it must rank among the best and most profitable. The best, the Saa-gaa-ban cannot be considered under any circumstances; the profit is doubtful. I am not at present aware that tubers of any size can be obtained before the second year; but it is quite possible that skilful cultivation may render this more easy of attainment than is supposed. It seems obvious, however, that if two seasons should prove ne-

cessary to procure a crop, it can form no part of profitable agriculture. The quality of it is but inferior at the best; and it may even be questioned whether it is perfectly wholesome, for it is nearly related to the kidney beans, whose tubers are poisonous; and its employment by savage people, who eat it as we eat pignuts, is not an entirely satisfactory proof of its salubrity.

XXIII.—*West Indian Fruits and Esculents that may be advantageously introduced into Cultivation in England.* By Sir Robert H. Schomburgk.

(Communicated March 10, 1847.)

The following catalogue, in which the countries wherein each fruit can be best obtained are separately enumerated, will, it is hoped, be the means of introducing many valuable tropical productions to the tables of Europeans.

BARBADOS.

The Guava. (*Psidium pyriferum*, L.; *β. P. pomiferum.*)
The French Guava, a variety which has been improved by cultivation, is particularly good at Haynes Hill, the property of Sir Bowcher Clarke.

The Java Plum Tree. (*Spondias Spec? β. S. mangifera*, Pers.)
It is superior in taste to any other fruit of that kind. I have seen trees at the Sugar Estates, Halton, and at Quentyn's. It is a large tree.

The Golden Apple. (*Spondias dulcis*, Forst.)
A large tree, with fruits of the size of an apple; it is very generally cultivated in the orchards in Barbados.

Jamaica Plum Tree. (*Spondias Mombin*, L.)
A tree of a moderate size.

Hog Plum, Gully Plum, Moupee. (*Spondias lutea*, L.)
A very large tree, with fruits of an agreeable vinous acid.

Custard Apple. (*Anona reticulata*, Linn.)
A moderate-sized tree. The fruit is much esteemed, and the pulp is of a sweetish agreeable taste.

Sugar Apple—Sweet Sop. (*Anona squamosa*, L.)
The fruit of this species is generally preferred to the preceding. They surpass in Barbados those of any other island. The tree is of a moderate size.

SOUR SOP. (*Anona muricata*, L.)

A tree, or arborescent shrub. The pulp of this fruit is more acid. When mixed with milk and sugar it is refreshing; nevertheless it requires an acquired taste to like it.

STAR APPLE. (*Chrysophyllum cainito*, L.)

A large tree. There are two varieties; one with purple, the other with green fruits. They are pleasant when fully ripe, and are admitted on the dessert-table. In the garden of Mr. J. Bailey, at Passage, in Bridgetown, is a remarkable tree, which produces purple and green fruits on the same tree. It is the only instance of that kind which I know of.

STAR, or DAMASCEN PLUM. (*Chrysophyllum monopyrenum*, Sw.; *C. oliviforme*, Lam.)

Indigenous in Barbados. It reaches a large size when cultivated, and the fruit is considered superior in delicacy to the former.

DAMASCEN, or GALLIMATO TREE. SMOOTH STAR APPLE. (*Chrysophyllum glabrum*, Jacq.)

It is indigenous in Barbados, and the plum-shaped fruit resembles in taste the preceding.

BULLY TREE, or BALATA. BULLY BERRY. (*Bumelia nigra*, Sw.)

A large tree, indigenous in Barbados. The fruits are clammy, but of an agreeable taste. Several kinds of fruit go under that name in Guiana; some more delicate than the real Bully Berry, which belongs to the genus Mimusops.

THE MAMMEE SAPOTA. (*Achras mammosa*, L.; *Lucuma mammosum*, Gaertn. fil.)

A large tree. The fruit is oval, containing a thick pulp of an agreeable taste. It is sometimes called Natural Marmalade.

SAPPODILLA, or NEESE BERRY. (*Achras sapota. α. A. zapota; A. fructu elliptico scabro majore*, Browne. *β. A. zapotilla; A. bracchiatus diffusus fructu subrotundo.*)

The fruit is more delicate than the former; but, as Jacquin observes, "Fructus edulis solummodo est quando jam putrescens cœpit." It is a large tree, bears likewise when merely of an arborescent form. It is perhaps an acquired taste, but I have been very partial to the Sappodilla.

ROSE APPLE, or POMME ROSE. (*Jambosa vulgaris*, De C.)

A tree of moderate size.

MALACCA APPLE. MALACCA SHARNBU. (*Jambosa alba*, Wight and Arn.)

The fruit of this species is larger than the former. The taste is agreeable, and the flesh of the fruit smells slightly like a rose.

THE MANGO. (*Mangifera indica*, L.)

The Peach Mango among the different varieties is by far the best. Mr. Cox, at the Estate Buttal's, has a large number of varieties of that fruit.

MAMMEE TREE. (*Mammea Americana*, L.)

A large tree: its growth is exceedingly slow. The fruit is large, and if it be from a good tree, it is very nice in taste, not unlike an apricot.

AVOCADO, AVIGATO, ALLIGATOR PEAR, VEGETABLE MARROW. (*Persea gratissima*, Gaertn. fil.)

A tree of large size. The fruit is of the shape of a pear. Europeans become generally very partial to it, although in the commencement it is not much liked. There are two varieties, one of a purple colour, the other green.

THE CASHEW, or ACAJOU TREE. (*Anacardium occidentale*, L.)

The fruits of some trees are much superior to others, and prove refreshing. The kernel of the nut when roasted is very delicate.

In the garden at Buttal's is a tree of a species which I recognise as the Oubondi of Guiana. They form large forest trees; and this and another specimen at Edgecombe have been brought most likely from Guiana.

THE SEASIDE GRAPE, or BAY GRAPE TREE. (*Coccoloba uvifera*, L.)

The fruit is liked by the inhabitants of the island, although it is not admitted on the dessert-table. A pleasant fermented liquor is prepared from the fruit and seeds, which are pounded, and infused in boiling water.

CHIGERY GRAPE, or CHEQUERED GRAPE. (*Coccoloba nivea*, Jacq.)

The taste of these fruits is rather pleasant. They are acidulous, and resemble in some degree the white garden currant.

THE COCCOPLUM; FAT PORK TREE. (*Chrysobalanus Icaco*, L.)

The fruit is chiefly used as a preserve.

RED CHERRY TREE; SMOOTH-LEAVED BARBADOS CHERRY. (*Malpighia glabra*, L.)

The fruit of this and the succeeding species is much used for preserves and in tarts.

CHEREEZE, or BARBADOS CHERRY. (*Malpighia punicifolia*, L.)
The fruits resemble the former. They are much inferior in taste to the European Cherry, which they resemble more in appearance. There is something in the taste which reminds rather of the raspberry than the cherry.

THE JACK-FRUIT, or JACCA. (*Artocarpus integrifolia*, Linn. fil.)
There are only a few specimens of that interesting tree in the island; and it is seldom to be met with in the other islands. The taste of the fruit has been compared to the pine-apple and melon combined. The smell, however, is anything but inviting.

There is a tree of it in the Parish of St. Thomas (at Farmer's, if I am not mistaken).

THE BREAD-NUT (*Artocarpus incisa*, Linn. fil.), and its variety, the Bread-fruit, are much more common.

GRANADILLA VINE. (*Passiflora quadrangularis*, Linn.)
The arillus which surrounds the numerous seeds is of a sweet vinous flavour. They are prepared with sugar and Madeira wine, and considered a great delicacy. The size of the fruit is that of a small melon.

THE WATER ONION, or BELLE APPLE. (*Passiflora laurifolia*, L.)
The fruit of this species is of the size of a lemon. It is much sweeter, and more delicious. It is, like the former, cultivated in arbours, by which means the fruit is much improved.

CONCH APPLE; CONCH NUT. (*Passiflora maliformis*, L.)
The pulp resembles that of the water-lemon; but it is inferior in flavour.

WILD WATER-LEMON, or LOVE IN A MIST. (*Passiflora fœtida*, Cav.)
The fruit is of the size of a small cherry, and surrounded by the involucre. The pulp is very delicate, but the smell of the leaves unpleasant.

THE GOOSEBERRY SHRUB; BARBADOS GOOSEBERRY. (*Pereskia aculeata.*)
The large bunches of white flowers are very ornamental, and the fruits are used for preserves and tarts.

I have not alluded to the Plantains and Bananas; however, Sir Bowcher Clarke, the Chief Justice of Barbados, possesses a variety, which is of a very small size, and of an exquisite flavour. I am not acquainted with its specific name. It is, perhaps, the Fig-Plantain of Surinam. I would recommend

to procure some young shoots, or "suckers," as they are called in the island, from Sir Bowcher.

Choco-Vine, or Christophine. (*Sechium edule*, De C.; *Sicyos edulis*, Jacq.)

The fruits of this cucurbitaceous plant are very delicate, and surpass the vegetable marrow. I have little doubt it might be cultivated in our hotbeds.

Sorrel. (*Hibiscus sabdariffa. α. H. caule rufescente; β. H. caule virescente.*)

This plant is perfectly acclimatized. There are two varieties with purple and green stems. It is much cultivated for the sake of the calyxes and capsules, which are used for tarts; but they are much more employed for preparing a very nice drink, which being sweetened is allowed to ferment, and furnishes a refreshing and wholesome beverage.

Ochro, or Ockra. (*Hibiscus esculentus*, L.)

The pods when green are much used for domestic purposes in soups, and as a vegetable. They are considered very wholesome; they are likewise pickled. I have little doubt that this plant might be acclimatized.

Pigeon, or Angola Pear. (*Cajanus indicus*, Sp.; *C. flavus*, De C.; *Cytisus Cajan*, L.)

The more delicate varieties of this pulse (e. g. the Santa Cruz, Pigeon-Pea) are held in great esteem, even by the higher classes of inhabitants in the West Indies. Their quick growth and large produce in indifferent soil renders them the more recommendable. It is a very hardy plant, and I doubt not that it might be acclimatized.

Taniers, Nut Eddoes, Chou du Bresil. (*Caladium sagittifolium*, Vent.)

It is cultivated in the West India Islands chiefly for the sake of its leaves, which are boiled and eaten as a vegetable. The roots are likewise used for boiling in soups. A correspondent in one of the local papers in Barbados recommended them for acclimatization in England as a substitute for potatos.

Roasting Eddoes. (*Arum macrorhizum*, Linn.)

The roots resemble much in taste the former; but if the roots are getting large they are less delicate.

Scratching Eddoes, Scratch Cocco. (*Caladium esculentum.*)

The roots of this plant are used like Taniers. I have read recently that the disease peculiar to the potatos in Europe had shown itself among the Cocco in Jamaica.

INDIAN KALE. (*Caladium nymphæifolium*, Vent.)
The leaves of this plant when boiled make a wholesome and agreeable vegetable.

SMALLER INDIAN KALE. (*Arum divaricatum*, Linn.)
It is used for the same purpose as the preceding.

TOULEMA, corrupted from Tous les mois, which name it bears in the French Islands. (*Canna Achiras*, Gillies.)
This species of Canna has been introduced from Martinique. The root is eatable, and is very productive. It contains, like other Marants, a large quantity of starch.

CHILLIS, OR CAYENNE PEPPER.

BELL-PEPPER. (*Capsicum annuum*, Linn.)

BIRD-PEPPER. (*C. baccatum*, L.)

BONNY, or BONNET-PEPPER. (*C. tetragonum*, Mill.; *C. annuum*, Martin.)

NEGRO-PEPPER. (*C. conoideum*, Mill.)

SPUR-PEPPER. (*C. frutescens*, L.)

TURBILO-PEPPER. (*C. grossum*, L.)

LADY'S-FINGER, or LONG-FRUITED-PEPPER. (*C. longum*, De C.)

"The Englishman in Jamaica sees with regret the disappearance of his appetite, previously a resource of frequently recurring enjoyment, but he succeeds by the use of Cayenne-Pepper, and the most powerful stimulants, in enabling himself to take as much food as he was accustomed at home."—*Liebig's Animal Chemistry.*

The different species of Cayenne Peppers, or Chillis, may be considered as an indispensable condiment under the tropics, which Nature herself appears to have pointed out. The native tribes in Guiana use the fruits of these plants in an abundance which would not be credited by an European except he were to see it with his own eyes. The most aromatic species (or pungent) are C. baccatum, C. grossum, frutescens, &c. It is not generally known that the leaves give a nice vegetable resembling spinach.

THE WILD CUCUMBER VINE. (*Cucumis Anguria*, L.)
The small fruit, of a deep yellow when ripe, is used in its green state as a delicate vegetable. It is likewise used in vegetable soups, and generally considered wholesome. It has an acidulous taste when ripe which it does not possess in its green state.

GUIANA.

I am obliged to restrict myself to such fruit-trees as are within reach of the colonists. A number of others peculiar to the interior could only be procured by sending a qualified person for such a purpose into the equatorial forests.

THE MISSEL, or MEDLAR OF GUIANA. (*Blakea quinquenervia*, Aubl.)

A tree of moderate size. The fruit is of a white colour and globular, but as the calyx is persistent, it resembles the hip of a wild rose. The fruit is very delicate, and has been compared to raspberry cream; but it will not keep beyond a couple of days. It is very abundant in the forests of the interior, and is much cultivated by the settlers along the Essequibo, chiefly at Post Ampa. The flowers are highly ornamental.

THE MARMALADE BOX. (*Genipa Merianæ*, Rich.; *Cacao sylvestris*, Aubl.)

The fruit is of a globular form, and where the soil suits the tree, it reaches the size of a small orange. It is of a brownish colour, and covered with hair. The outer skin encloses a brownish pulp of a delicious taste, equal to the best marmalade. It is cultivated at the gardens of the colonists; e. g. at the late Mr. Bach's estate, in Canal No. 1. I have found it frequently in the interior.

The *Alibertia edulis* (Genipa edulis), which is found on the savannahs of the Rupununi, would be highly recommendable for cultivation if it could be procured from thence.

A Guttiferous plant, apparently a Garcinia, abounds in the forests of the interior, chiefly near the Carawaimi mountains (lat. 2° north), which vies in delicacy with the Mangosteen. Another species is cultivated on the estate of Mr. Lambert (Providence), near New Amsterdam, in Berbice, from whence it might be easily procured.

I have already alluded to different species of Mimusops, which go under the name of Burruwè, or Bully trees. These grow within reach of the colonists, and could be procured if the Governor of Guiana applied to a wood-cutter.

TORTOLA.

There are two species which I would advise should be procured from Tortola; namely, "The Guava-berry," which, when ripe, forms an excellent fruit for the dessert-table, and is likewise used for preparing an excellent preserve, and a favourite cordial. The plants grow abundantly on Sage Mountain, in Tortola. There is a variety with red fruits like a cherry, and another with

yellow fruits. I have not seen it in flower, but I consider it to be Eugenia lineata.

There are whole forests of the Melicocca bijuga, or Genepp tree, on the savannahs of the Takutu, in Guiana; nevertheless I know only of a single tree cultivated in Demerara. It is equally scarce in Barbados; but abounds in Tortola and St. John. The fruit has a vinous flavour, and if it be from a good tree it is aromatic. Aiton calls it the Honey-berry.

Branches for grafting Shaddocks should be procured from St. Christopher or St. Kitts; Oranges from Trinidad or Grenada; Forbidden Fruit from the Golden Grove Estate in Barbados.

XXIV.—*A Note upon Saxifraga mutata.* By the Hon. and Rev. W. Herbert, F.H.S.

(Communicated July, 1846.)

At p. 49 in the 1st No. of the Journal of the Horticultural Society I have an account of the finding of the Saxifraga mutata on a low mountain near Thun, and its subsequent treatment. I was obliged to my kind friend, Mons. C. Fischer, for pointing out that rare plant to me. The two plants of which I had tied up the roots in a ball of moss, placed in the mouth of a pot filled with moss, and set in a pan of water out of doors, in June, 1845, had remained untouched in that situation till both plants began to flower at the commencement of this month, July, 1846. The strongest is seventeen inches high, having a branching spike of flowers with twenty-five branches, each of which has from nine to four flowers, or under. It can thus be cultivated without any difficulty in moss, placed so that it can at all times suck up water. Saxifraga Cotyledon, the beautiful pyramidal Saxifrage, which is not however pyramidal unless tied up, but beautifully waving and almost pendulous, grows on calcareous rocks, where water oozes through their seams, and a little powdered stone has lodged on some little prominence, or has gathered round the plant itself, and generally in a northern aspect, unless the supply of water to the surface of the rock is constant. I find many plants thrive in a ball of moss with a little native soil in the centre of it.

This plant was figured exactly fifty years ago in the Botanical Magazine from a weak, faded specimen, all the flowers being coloured of the effete dark hue. It is there said that it must be protected from wet and frost. Mine has stood twelve months, and is in fine flower. The strongest plant has about twenty-five or twenty-six compound branchlets of flowers, bearing from nine

flowers to about four each. The colour of the fresh flowers is yellow ; of the old ones orange, *not bright.* I imagine that it has not been in England the last forty or fifty years. I was told

in Switzerland that I had no chance of cultivating it unless I could plant it instantly. Where it grew in Switzerland the water was gushing out from the hill side.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

4. Spiræa pubescens. *Bunge, in "Turczaninow's Decades Plantarum Chinensium*, 11."

Received from Mr. Fortune, in 1843, as a "dwarf shrub from Chusan."

This is a small grey shrub, with little hemispherical umbels of pure white small flowers, having a slight fragrance. In habit it may be compared to a weak Spiræa opulifolia. Its leaves, when full grown, are about an inch and a half long, much wrinkled, wedge-shaped, and entire at the base, unequally serrated towards the point, and covered beneath with wool, which becomes cinnamon coloured as it grows old. The uppermost leaves beneath the umbels are oval or oblong, and less unequally serrated.

It appears to be nearly hardy, grows about 2 feet high, and flowers freely in any good garden soil. We may expect this to prove an ornamental shrub for planting in sheltered situations and warm districts.

March 4, 1847.

5. Forsythia viridissima. *Supra*, vol. i. p. 226.

This species, which has already been described in the place above quoted, has now flowered, and proves to be a plant of extraordinary beauty. Its branches are loaded with deep golden-yellow blossoms, and although they appear before the leaves are fully grown, they are by no means rendered unattractive by that circumstance.

The specimen now referred to has been kept in the greenhouse, but the plant is quite hardy. It grows freely in any good common garden soil, and is easily increased by cuttings of the half-ripened shoots put in sand with a little heat. It flowers freely, grows from 3 to 4 feet high, and will probably remain nearly a month in bloom.

March 13, 1847.

6. CERASUS JAPONICA, with double white flowers.

Received from Mr. Fortune, from the North of China, in 1846.

This differs in no respect from the well-known double dwarf Chinese Cherry (or Plum), except in having perfectly white and very double flowers.

Like that plant it is a hardy shrub, growing freely in any good sandy loam, and increased by budding on a plum stock. It is a very nice plant.

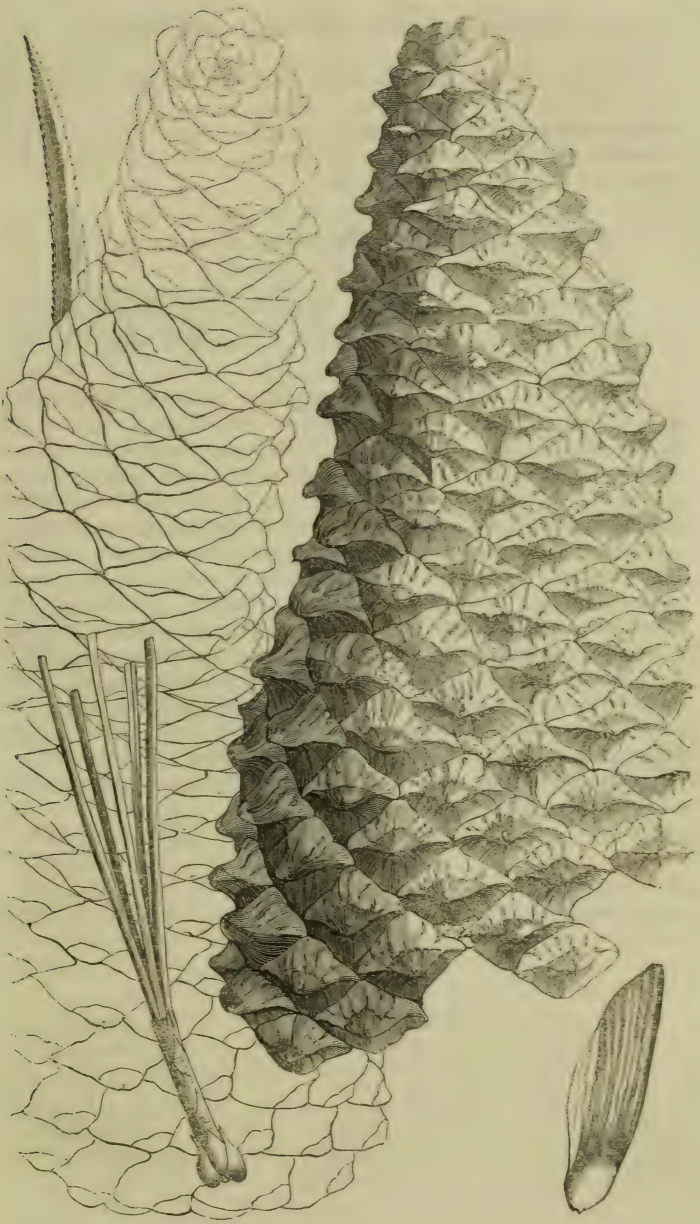
March 12, 1847.

7. PINUS WINCESTERIANA.*

Seeds of this very distinct Pine was first received by the Society from the Marquis of Winchester, along with a part of one of its long cones in June, 1846; more recently complete specimens, with perfect cones, were obtained from Mr. Hartweg, who found it growing on the most elevated parts of the Cerro de San Juan, or Saddle Mountain, near Tepic, in Mexico, attaining a height of from 60 to 80 feet.

Leaves in fives, from 12 to 14 inches in length (on the wild specimens), rather stout, triquetrous, thickly set on the branches; glaucus green, and much resembling those of Pinus filifolia, but broader and shorter than in that species; sheaths persistent, about 1 inch in length, smooth and entire, or nearly so; seed-leaves on the young plants mostly eight in number, and rather short; branches few, spreading irregular, and rather stout; buds imbricated, non-resinous, and large; cones pendulous; sessile on very short footstalks, two or three together, but sometimes single, always much incurved, and tapering pretty regularly from the base to the point, from 8 to 10 inches in length, and $3\frac{1}{2}$ broad at the base, with from 26 to 30 rows of scales; scales five-eighths of an inch broad, much elevated, particularly those upon the middle of the cone on the upper side, where they become conical, and from three-eighths to a quarter of an inch high, while those on the under side and towards the extremities are much smaller, less elevated, and nearly all of a size; from amongst these exude large quantities of clear resin, particularly on the upper side near the base; seeds rather small, a quarter of

* *P. Wincesteriana;* folis quinis longissimis filiformi-triquetris serrulatis, vaginâ tereti glabrâ, strobilis subsessilibus pendulis (2-3) arcuatis elongatis versus apicem squamosum attenuatis, squamis transversis pyramidatis costatis, alâ oblongâ dimidiatâ semine multo longiore.—G. GORDON.



an inch in length and angular, with rather broad wings one inch in length.

This pine, so very distinct from any other hitherto described, particularly in its long incurved resinous cones, I have ventured to name after the Marquis of Winchester, who first presented the seeds of this noble pine to the Society, and to whom its first introduction into England is due.

8. Akebia quinata. *Decaisne, Mémoire sur les Lardizabalées*, p. 195.

Received in 1845 from Mr. Fortune, as a "climbing shrub, from the hedges of Chusan, with very sweet scented flowers."

A slender twining evergreen, with deep green digitate leaves, and obovate or emarginate leaflets. Its flowers are of the colour of the pink Clematis Viticella, and appear in racemes from the centre of scaly buds; each has 3 ovate sepals, and no petals. They are of two kinds; the females are much the larger, grow singly, and are placed on longer stalks, and contain 6 linear spreading carpels, whose interior is covered with ovules; the remainder of each raceme consists of males, containing 6 sessile anthers. The flowers have no bracts, and scarcely deserve the name of sweet-scented; they have, however, an agreeable odour, although it partakes a little of the Berberry smell.

A climber which grows very freely in a mixture of sandy loam and peat, and increased by cuttings in the usual way. At present it is kept in the greenhouse, but if it should prove hardy, like so many of the Chusan plants, although it cannot be called very ornamental, it will form a useful shrub, ranking in point of appearance with Periploca græca.

March 4, 1847.

REPORT FROM THE COUNCIL

TO THE

ANNIVERSARY MEETING, MAY 1, 1847.

At the last Anniversary the Council had to regret that the debt of the Society had unavoidably increased during the previous year to the extent of 448*l.* 12*s.* 6*d.*

The Report of the Auditors for the year just ended (which Report was presented at the Meeting on April 20, in compliance with the wish expressed at the last Anniversary) enables the Council now to state, that the debt has been decreased by the sum of 587*l.* 19*s.* 2*d.*; and they trust that the measures which are either in progress or contemplation, for the improvement of the financial condition of the Society, will, in the course of the ensuing year, enable them to announce a more considerable diminution of the Society's liabilities. The reduction now announced would, indeed, have been more considerable had not the Council been obliged to oppose in Parliament the progress of a railway which would have ruined the Garden had it passed, and also to advance to Mr. Hartweg the amount of two years' allowances, in consequence of the impossibility of procuring for him a money credit in California. These two heads of expense amount to 270*l.*; but the cost of Mr. Hartweg's mission will, of course, be inconsiderable for the coming year.

The Council, however, feel that the diminution of the Society's debts, important as it undoubtedly is, does not justify them in neglecting the great purposes for which the Society was incorporated, and for the promotion of which the funds at their disposal are intrusted to them.

In other respects, as well as in the diminution of debt, the affairs of the Society are more satisfactory than they were at the last Anniversary. All the great heads of income have advanced:—

	1845–6. £.	*s.*	*d.*	1846–7. £.	*s.*	*d.*
Admission fees . . .	277	4	0	296	2	0
Compositions	210	0	0	294	0	0
Annual contributions .	3,003	0	0	3,102	15	0
Transactions sold . . .	74	6	0	85	5	7
Exhibitions	2,135	0	1	2,481	18	3
	£5,699	10	1	6,260	0	10

The number of Fellows elected has been larger than in any year since 1843; and the occasional use of the meeting-room has been granted to another Society, the Pathological, at a rental of 30*l.*

Arrears.

The want of punctuality in the payment of subscriptions continues to be felt inconveniently, and to be a source of expense to the Society, the unpaid arrears being in reality provided for, in a great measure, by the Society's bonded debt, which bears interest. The Council are therefore anxious once more to draw the attention of gentlemen who are in arrear to the extreme importance to the Society of greater exactness in this matter, and to represent that the efficiency as well as prosperity of the Society greatly depend upon the regular discharge of the pecuniary engagements of those who form its members.

Auditors.

With a view to the more efficient examination of the Society's accounts, the Council, in the absence of any by-law on the subject, have appointed during the past year three Fellows of the Society, not members of the Council, to audit the accounts quarterly, and they propose that in future the Auditors for the year shall be nominated at each Annual General Meeting. The Council have, moreover, determined that, considering the extensive nature of the Society's accounts, the Auditors should be remunerated for their trouble, and they have therefore authorized the payment of one guinea each, to each Auditor, for every quarterly attendance, upon the delivery of their Report.

Transactions.

The 'Journal' has continued to appear with regularity on the 1st of January, April, July, and October; and the Council trust that the Fellows of the Society recognize the advantage which it possesses over the old quarto 'Transactions' in enabling the Council to present the public regularly at short intervals with matter of permanent value, relating to Horticulture, at a smaller expense than was formerly incurred by the 'Transactions.'

The Council have to announce under this head that the complete Index to the 10 volumes of the 'Transactions' has been completed, is now in the press, and will appear in the course of the summer It has been compiled with very great care, and will, it is hoped, form a complete reference to every article included in the very important original papers on Horticulture which have proceeded from this Society since its incorporation in 1809.

Exhibitions.

The Exhibitions of Plants and Fruit at the Garden have again proved eminently successful; the number of visitors having been unusually large, and the cultivation of the plants exhibited so excellent, as to have led to the award of medals to the value of 1284*l.*, the largest sum ever so expended by the Society. The Council trust that such an outlay, thus annually renewed, cannot fail in rendering permanent and universal the horticultural skill for which the gardeners of England have become pre-eminent. They learn, with satisfaction, that many persons last year entered into competition who were before unknown at the Garden meetings; and they confidently anticipate a further increase in consequence of the facility of safe transport now offered by the railways. With a view to increase the inducements of gardeners to produce their plants, various changes have been introduced into the details of the Exhibitions, the effect of which is to graduate more exactly the value of the prizes, and to diminish the number of plants which an exhibitor is required to furnish. It is expected that this will have the effect of yet more strongly fixing the attention of gardeners upon the far greater importance of finely cultivated than rare or numerous plants, and will still further throw open the door to competition.

The number of Visitors on these occasions was—

May 9 . . .	4,858
June 13 . . .	13,421
July 11 . . .	6,083
	24,362

which is 1,473 more than ever attended any three previous meetings, and 506 more than in 1844, when there were four meetings.

The total number of tickets issued was 23,913.

On the last of these occasions, His Grace the President again opened the grounds at Chiswick House to the inspection of the visitors to the Garden, a mark of kindness and consideration for which the Society is extremely grateful.

With the exception of medals, there has been upon the whole a reduction in the cost of the Exhibitions, as will be seen by the following comparison of the items of charge in 1845–6 and 1846–7:—

	1845.			1846.		
	£.	s.	d.	£.	s.	d.
Building large room for exhibitors	150	16	2	..		
Materials for orchestra, tables, &c.	89	19	10	45	5	5
Miscellaneous timber	5	19	9	..		
New tents	196	8	1	..		
Hire of tent, &c., for His Highness Ibrahim Pacha and suite	..			10	10	0
Repairs of tents	3	10	0	8	18	6
Repairs of ladies' cloak-room and other rooms	4	12	3	7	3	2
Oil, paint, &c.	17	14	0	18	8	1
New pump, &c.	4	0	10	..		
Miscellaneous ironwork	41	8	10	24	15	11
Turf, gravel, &c., and road repairs	18	15	6	85	14	0
Handbarrows, water-pots, &c.	5	16	9	5	13	6
Hats given to men belonging to the Garden	4	19	6	..		
Carpenters, painters, tent-pitchers, &c.	208	0	10	152	16	5
Miscellaneous labour beyond what is required for the ordinary service of the Garden	234	19	11	308	3	3
Hire of crockery	13	14	2	12	13	0
Miscellaneous printing	74	1	6	85	0	6
Admission tickets	41	4	6	44	0	0
Advertisements	101	11	6	97	19	6
Sundry petty payments	35	4	1	3	1	0
Carriage, postage, &c.	28	14	0	32	15	6
Stationery	10	15	11	11	1	11
Cloak-room expenses	6	13	0	6	1	0
Judges	48	6	0	56	8	0
Extra clerks and hire of temporary rooms	33	2	6	39	5	6
Police	118	2	0	123	2	0
Bands and all musical expenses	342	2	6	349	15	0
Provisions for exhibitors, police, &c.	54	11	9	63	4	9
Watering roads	20	5	0	30	5	6
Medals	1,182	5	0	1,284	0	0
Miscellaneous	2	6	4	..		
Refreshments for His Highness Ibrahim Pacha and suite	..			33	4	3
	£3,100	2	6	£2,939	5	8

The influx of visitors to the Garden on the day before the Exhibitions has now become so large, and proves so serious an inconvenience to the persons employed in the preparations, that the Council have found it necessary to limit future admissions on those days to Fellows of the Society, and visitors personally introduced by them.

The Meetings in Regent-street have been as well attended as usual; the beauty and interest of the specimens exhibited remaining unimpaired. The value of the medals awarded on these occasions is exactly what it was last year, namely, 78*l.* 5*s.*

Collectors.

Upon the subject of Collectors the Council have to report that Mr. Fortune returned to England from China in May last, bringing with him the most important part of his collections. The particulars of his visit to that empire have been already published in the Journal of the Society, vol. i. p. 208. The cost of his expedition amounted to the sum of 1818*l.* 17*s.* 7*d.*, spread over about three years and a half of time. The Council trust that this large expenditure will be justified by the result. Some of the plants which have flowered, such as Weigela rosea, Daphne Fortuni, Forsythia viridissima, Dielytra spectabilis, Anemone japonica, the double Spiræa prunifolia, the double white Chinese Almond, a double white Peach, and Gardenia Fortuniana, are objects of great interest and beauty; others, such as some Azaleas, Jasminum nudiflorum, Akebia quinata, Campanula nobilis, Rhynchospermum jasminoides, Berberis Fortuni, Buddlea Lindleyana, are very useful additions to our collections; and many others, including the new varieties of Moutan, from which so much is expected, are still to blossom. It is satisfactory to the Council to be able to announce that all the species from the north of Chusan, and some from that island itself, appear to be quite hardy, not having been affected injuriously by the late unusually severe winter.

With respect to Mr. Hartweg's mission to California, the Council regret to have little to add to what has been already announced. From Tepic, where he was at the date of the last Report, he proceeded to Mazatlan, in order to procure a passage to California; but the blockade of the Mexican ports by the United States' squadron had then put an end to all private transport, and therefore Mr. Hartweg gladly availed himself of the permission kindly granted him by Rear-Admiral Sir George Seymour to proceed to Monterey in H.M.S. Juno. He reached that place on the 7th of June, and on the 28th of July sent home a continuation of his Journal, with a letter. Since that period the Council have received no intelligence from him or from his agents.

In anticipation of the danger and difficulties inseparable from military operations, the Council took an early opportunity, through H. E. Louis M'Lane, then the United States' Minister in this country, of soliciting from the Cabinet of Washington protection and assistance for Mr. Hartweg. The following correspondence which passed on the occasion will show with what readiness the Government of the United States acquiesced in the request of the Council:—

21, Regent Street, June 17, 1846.

SIR,—I take advantage of the permission given me by your Excellency to lay before you the following communication :—

It is the custom of this Society to apply a portion of its funds to the acquisition of plants and seeds from foreign countries. For this purpose a collector, Mr. Theodor Hartweg, a German, was despatched last November to California, *viâ* Mexico. His last letters are dated from Mazatlan, to which place he had proceeded in the hope of finding an opportunity of reaching Monterey, or some other Californian port. In the meanwhile, hostilities having commenced between the United States and Mexico, and the former power having, as we are informed, decided upon blockading the Mexican ports, the Horticultural Society is apprehensive that Mr. Hartweg may be cut off from his communication with Europe, if he shall have reached California, or that he may be detained on the west coast of Mexico, either of which events would render useless the expense incurred by the Society in this mission, or perhaps endanger Mr. Hartweg's personal safety.

It is under these circumstances that the Horticultural Society ventures to solicit your Excellency's good offices with your Government, which can have no desire that the objects of science should be frustrated any further than is inevitable in a state of war. The Society trusts that the United States officers may be instructed to protect and assist Mr. Hartweg in the event of his seeking their aid, and that it will not be found impossible to give him some assistance in the conveyance of his collections to Europe. Should he succeed in communicating with the American cruizers, and they would take his small parcels on board, the latter might be transferred to any English man-of-war on the station, or what would be better, conveyed to Panama with despatches, when they would be taken charge of by the English Consul there ; or, if possession of any Californian port were taken by the United States forces, it would be a great advantage to us if the American officers were instructed to give Mr. Hartweg such aid as in that case might be effectual.

I have ventured to point out these as possible means by which Mr. Hartweg's operations might be facilitated, in doing which I believe I have complied with your Excellency's wishes. But it is impossible for us to foresee in what way American aid may be most valuable to him. I would venture to express a hope that, if the United States Government should be able to grant the Society assistance in this matter, the orders which may be sent to the officers in command will be so framed as to enable them to extend their assistance in any way not now expressly contemplated.

The Society relies with confidence upon your Excellency's enlightened views of the importance of scientific investigation no less than upon the good will which you have been so good as to express, for such a recommendation of this application to the favourable consideration of your Government as will secure the objects prayed for as far as they may be practicable.

I have the honor, &c.

(Signed) JOHN LINDLEY,
Vice-Secretary.

His Excellency Louis M'Lane,
&c. &c. &c.

38, Harley Street, June 18, 1846.

SIR,—I have had great pleasure in forwarding your letter of yesterday to the Department of State at Washington, and in recommending that one of the modes you have suggested for the accommodation of the Horticultural Society may be adopted by the President.

I do not doubt his compliance with your request, and that I shall soon have the pleasure of acquainting you with the fact.

I am, Sir, your obedient servant,
LOUIS M'LANE.

John Lindley, F.R.S.,
Vice-Secretary of the Horticultural Society.

38, Harley Street, August 3, 1846.

SIR,—I have the pleasure to transmit to you a copy of a despatch received from the Secretary of State of the United States by the last steamer, together with the papers accompanying it, from which you will perceive that your wishes in regard to the exportation from Mexico, notwithstanding the blockade, of the seeds and plants collected by Mr. Hartweg for the Royal Horticultural Society have been promptly complied with.

I remain, Sir, your obedient servant,
LOUIS M'LANE.

To John Lindley, F.R.S.,
&c. &c. &c.

(Copy.)—No. 39.

Department of State, Washington, 14th July, 1846.

SIR,—I have duly received your despatch, No. 56, conveying the request of the Vice-Secretary of "The Horticultural Society of London," that some arrangement may be consented to by this Government for allowing to pass, notwithstanding the existing blockade of the ports of Mexico, certain collections of foreign plants and seeds made for the Society by Mr. Theodor Hartweg. I have lost no time in submitting Mr. Lindley's application to the President for his consideration. The copies of papers herewith transmitted will acquaint you with the favourable manner in which it has been entertained, and the measures which have been adopted to effect the object proposed.

I am, Sir, respectfully, your obedient servant,
(Signed) JAMES BUCHANAN.

Louis M'Lane, Esq.,
&c. &c. &c.

(Copy.) Navy Department, July 13, 1846.

SIR,—I have the honour to enclose herewith a copy of a circular addressed to Commanders of United States squadrons, directing them to facilitate the operations of Mr. Theodor Hartweg, agent of the British Horticultural Society, so far as may conduce to his security and speedy return to Europe with his collections for said Society.

The original letter from Mr. M'Lane, our Minister at London, of the 18th of June, to the State Department, upon the subject, is herewith returned.

Very respectfully your obedient servant,
(Signed) GEORGE BANCROFT.

Hon. James Buchanan,
Secretary of State.

(Copy.) *Circular.*

ALL officers of the Navy of the United States who may meet with Mr. Theodor Hartweg, the agent of the British Horticultural Society, believed to be now in California, on peaceful business for that Society, are required, notwithstanding the blockade of the Mexican ports, to give him protection,

and to afford such assistance in the furtherance of his object as may conduce to his security and to his speedy return to Europe with his collections for the said Society.

(Signed) GEORGE BANCROFT.

Navy Department, July 10, 1846.

Copies of these letters were immediately despatched to Messrs. Barron, Forbes, & Co., at St. Blas, with a request that they would forward them to Mr. Hartweg; and the Council fully believe that the officers of the American squadron would not hesitate to act up to the spirit of their instructions. Under these circumstances, and considering that he was also under the protection of the English Admiral on the Californian station, the Council trust that the cessation of all intelligence from Mr. Hartweg for so long a period has only arisen from some of those accidents to which communications at so great a distance are always liable in unsettled countries, and in time of war.*

Garden.

With the assistance and by the advice of the Garden Committee, the Council have continued to take means for the improvement of the Society's Garden, which, although they have not involved any considerable outlay of money, will nevertheless, it is hoped, add materially to the efficiency of the establishment.

In addition to maintaining the buildings in a state of thorough repair, and of providing whatever was needed for the due cultivation of the ground, the addition of new buildings has not been neglected. The anxiety of the Council to improve the Society's financial affairs has however confined the expenditure upon new buildings to the construction of some new brick-pits for the protection of half-hardy plants; of about 80 feet of small glazed span-roof buildings, for the reception of new shrubs brought home by Mr. Fortune and others; and to the completion of a ridge and furrow conservatory presented to the Garden by Messrs. Hartley & Co. of Sunderland. This house was intended by the donors for a specimen of a greenhouse which could be contracted for at a fixed price per square foot of the area which it covers, and promised to be useful as a shelter for greenhouse plants, or as a winter garden, or for any of the other purposes for which glazed buildings are required. Owing, however, to the inexperience of Mr. Hartley's workmen, and to defects in its construction, it was found to demand considerable alteration, the

* Since this Report was read, letters have been received from Mr. Hartweg, dated Monterey, Jan. 12, 1847, together with a continuation of his Journal, which is printed in a subsequent part of this volume.

cost of which was agreed to be shared between the Society and Mr. Hartley. These delays prevented its being finished till very lately, and the Garden Committee have not yet thought it advisable to recommend its being heated.

A portion of the wall which cuts off the hothouses from the view of visitors proceeding into the Garden along the main walk has been removed, so that the latter now leads by a slight bend directly to the front of the hothouses; and thus in some degree is cured one of the great defects in the original design of the Garden. A further outlay, in extending the hothouses eastward, has been suggested by this change; but the subject has not at present been brought distinctly under consideration.

A collection of the finest new Roses, not previously in the Garden, has been purchased; and the renewal of the soil of the great Peach-border, commenced in 1845, has been completed.

Shortly after Mr. Fortune's return to his duties, the Curatorship of the Apothecaries' Garden at Chelsea became vacant; and he having been appointed to it, with the approbation of the Garden Committee, a vacancy was thus caused among the Superintendents in the Society's Garden. The Garden Committee thought it desirable to take advantage of this opportunity to consolidate the Hothouse and Hardy Department by appointing Mr. Gordon to the charge of both; and the experience which has since been gained as to the practical working of this measure has satisfied the Committee of its being highly advantageous, not only as effecting considerable diminution in the cost of the Garden, but as rendering the machinery of the establishment more perfect. That Mr. Gordon understands the cultivation of stove and greenhouse as well as of hardy plants, is abundantly shown by the admirable condition of the whole of the great collection now under his charge.

The Fruit Department has always been regarded by the public as one of the most valuable portions of the Garden. With a view to increase its efficiency, the Garden Committee thought it advisable to send Mr. Thompson, its Superintendent, to Paris, to inspect the best examples of French winter pruning, and to collect such information as the very important but generally unattractive season of early spring would furnish. Mr. Thompson reached Rouen on the 1st of March, and remained at Paris for nearly three weeks, in which time he was able to examine all the principal horticultural establishments as far as Fontainebleau. In this service he was greatly aided by the assistance of Mr. Francis Rauch, a German gentleman residing in Paris, and familiar with all that relates to its gardens; and the Council desire to take this opportunity of publicly expressing their thanks to Mr. Rauch for the invaluable aid he gratuitously rendered the

Society's agent on this occasion. Mr. Thompson was directed to keep very full notes of all that he found worthy of notice, and it hereafter will be laid before the Fellows in the 'Journal.'

Another and, as the Council believe, a very important subject has this year engaged the attention of the Garden Committee. From an early period of the establishment, the education of the young men employed in the Garden as workmen has been promoted by the Council; a small library has been gradually formed for their use; and, for their encouragement, a private examination of their qualifications in certain branches of knowledge has been held by the Vice-Secretary, who was authorised to grant official certificates of proficiency, upon the gaining of which the men became eligible to be recommended to places. It is due to the young men who have from time to time been recommended from the Garden, to say that they have in general fully justified the good opinion formed of them; and if this has not happened in all instances, the exceptions have only been such as inevitably occur in human affairs.

The following return, which shows the exact result of the first twenty-five years' management of the men, also furnishes materials for judging of the relative fitness of different nations for the peculiar duties connected with the business of a Gardener:—

A Return of the manner in which the Labourers in the Garden have been disposed of, who have left the Garden between May 20, 1822, and December 6, 1846.

	English.	Scotch.	Irish.	Welsh.	German and others.
Recommended to places (including permanent garden appointments).	58	43	3	5	2
Left for improvement, without returning	12	3	3	1	2
Left at their own request . . .	32	18	7	1	4
Left from illness, or died . . .	8	4	1	..	..
Discharged on account of reduction in establishment	2	..	1	..	..
Resigned	1	1	..	1	..
Deserted	9	3	1	..	..
Discharged for drunkenness . .	3	..	..	..	..
" incapacity . . .	7	2	2	..	..
" stealing flowers or seeds	1 }24	.. }6	2 }8	..	..
" for other causes .	13	4	4	..	..
Total	146	78	24	8	8

From this it appears that the total number of workmen permanently employed by the Society in the course of the first twenty-five years of the establishment of the Garden has been 264. Of these 41 have been discharged for various reasons, 13 have deserted, generally shortly after their arrival, from finding the discipline of the Garden distasteful to them; 3 have been allowed to resign, and 13 have died or left in bad health: in the whole, 70 are from these causes to be struck off the list of the men who have steadily applied themselves to improvement in the Garden. Of the 194 forming the remainder, 111 have been recommended to places; but the 62 who are returned as having left at their own request, are in almost all cases men who have procured places for themselves, without the aid of the Society; so that if these two numbers are united, we learn, that out of 194 steady men, 173 have been placed in situations upon leaving the Garden; of these 90 were English, 61 Scotch, 10 Irish, 6 Welsh, and 6 foreigners.

But although this return affords no ground for dissatisfaction with the kind of instruction attainable in the Garden, it has been long felt that the advancing intelligence of all the educated classes of society in this country rendered it desirable that better means of acquiring information should be provided. With this view the Garden Committee in the autumn of last year recommended the establishment of a reading-room in the Garden, for the use of the workmen. At that time the state of the funds of the Society did not authorize the Council to incur the expense of erecting a building for this purpose; but they recommended that some temporary arrangement should be made, in order to see how the plan would work. An empty room was therefore appropriated to the purpose, and by means of old materials fitted up so as to be habitable. Some duplicate and other books were selected from the Society's library; various persons interested in the promotion of the object presented others; a few were purchased at the expense of the Society; rules were drawn up under the direction of the Garden Committee, and on the 23rd of November the room was opened for study, with a lecture from the Vice-Secretary. Since that time ten lectures have been delivered on points of physiological and practical importance bearing on Gardening, two on the elements of Geometry, and one on Physical Geography. An examination in the Elements of Geometry has been also held, and another has been appointed, at which a friend of the Garden has offered as a prize a copy of Dr. Badham's work on British Funguses, a book of much value to gardeners, but too dear for many of them to purchase.

Notwithstanding the unfitness of the present room for its pur-

pose, and especially for lectures, for which there is no accommodation whatever, the Garden Committee report that the measure has proved of great value to the men, that they attend regularly and diligently, and that not a single instance of misconduct has been reported. The Council, therefore, propose to furnish better accommodation as soon as the funds of the Society will permit them.

The regulations which have been adopted for the management of the reading-room are the following:—

RULES for the MANAGEMENT of the READING ROOM, passed by the Garden Committees of Dec. 7, 1846, and Jan. 4, 1847.

Of the Reading Room.

The Reading Room is to be accessible, at the hours mentioned below, to the persons employed as garden-labourers upon the recommendation of Fellows, and to the superior officers of the Garden, including Mr. Sibthorpe, or to persons recommended by them.

It is to be cleaned, the fire in the winter to be lighted, the candles or lamps cleaned, and otherwise kept in order by the stoker; he is to look to it every morning before breakfast, and light the fire one hour before the room is opened during that part of the season when fires are required.

It is to be open every evening, except Sunday, till ten o'clock; from dark in winter, and from half-past six in summer.

Of the Books, &c.

The Books, &c., are to remain as now, under the care of the Garden-clerk, who is responsible for their safe custody and good condition.

He is—

1. To receive all books when they first come to the Garden.
2. To cut them.
3. To enter them in the catalogues, and place them on the shelves.
4. To see that they are kept in proper order, as to binding, &c.
5. To report if any accident or injury happens to them.

No books are to be removed from the Reading Room except by the written order of the Vice-Secretary.

No printed book or newspaper is to be admitted, unless by the permission of the Garden Committee or Vice-Secretary, application having been first made in the recommendation book, and signed by the person making the proposal.

Of the Evening Meetings.

A person, to be called the reading-room clerk, shall have charge of the room. His business will be to light the candles, deliver out books and replace them, see that all the rules below mentioned in this chapter are observed, and report in writing immediately any infraction of them. He is also to be the first and last man in the room, putting out the candles, leaving all right, locking the door, and taking the key with him.

The frequenters of the Reading Room are to act in succession as the reading-room clerk, each one week at a time; the Garden-clerk taking the first turn and being succeeded by the oldest man in the Garden, and so on according to seniority.

All persons using the Reading Room, except Mr. Sibthorpe and the officers of the Garden, will upon entrance sign their names neatly in a book provided for the purpose.

No one can be permitted to frequent the room unless his hands and face are washed clean.

No conversation is allowed, except on lecture evenings after the lecture is concluded.

When a book is wanted, its name is to be written on a slip of paper and handed to the reading-room clerk, who will furnish the book if not previously engaged.

The Society furnishes all articles of stationery in moderate quantity, except pens and cedar-pencils.

Of Supervision.

It is expected that the gardener and superintendents will look to the due observance of these Rules, and to the general management of the Reading Room, each taking one week at a time, Mr. Munro commencing, to be followed by the superintendents according to their seniority. It is not, however, meant that they should stay in the room; it is only wished that they should consider the room under their charge, each for his week, and give it occasional supervision.

The Council are strongly impressed with the value of the exertions made by the Vice-Secretary to promote this highly important object, as evinced by the very interesting lectures delivered by him at the Garden, and by his valuable donations to the Garden Library, and they have much satisfaction in stating that this undertaking has been promoted by presents from several other parties.

These consist of—

MRS. LOUDON :—

Köllar's Treatise on Insects injurious to Gardeners.
Waterton's Essays on Natural History. 1st and 2nd Series.
Loudon's Illustrations of Landscape Gardening. Parts 1 and 2.
———— Gardener's Magazine. Vols. XI. to XIX.
———— Suburban Gardener and Villa Companion.
———— Architectural Magazine (complete).

W. H. PEPYS, ESQ., F.H.S. :—

Don's General History of the Dichlamydeous Plants (complete). 4 vols., 4to.
Aiton's Hortus Kewensis (complete). 5 vols., 8vo.
Rapin's History of England (complete). 21 vols., 8vo.
Gleditsch—Dutch, German, and English Dictionary.
Hortus Siccus Gramineus; or, a Collection of Dried Specimens of British Grasses, with Latin and English Names. The whole classed according to the Third Edition of Practical Observations on Grasses. By Mr. Wm. Curtis. Vols. I. and II., folio. 1802.

THOMAS CLARKE, ESQ., F.H.S. :—

Harrison's Floricultural Cabinet. Vols. I. to X., 8vo. 1833 to 1842.
Burnett's Outlines of Botany. 2 vols. 8vo. 1835.

THOMAS EDGAR, ESQ., F.H.S. :—
A Map of the Outlines of the Physical and Political Divisions of South America. Delineated by Arrowsmith before the year 1806, and corrected to 1810. Published in 1811. Size, 7 feet by 8 feet 3 inches.

W. W. SALMON, ESQ., F.H.S. :—
Black's General Atlas: comprising Sixty-one Maps. Folio. 1846.

THE REV. F. E. THOMPSON :—
Thompson's Solutions of the more difficult Equations contained in the Fourth Edition of Dr. Bland's Algebraical Problems. 8vo. 1827.

MR. R. GLENDINNING, F.H.S. : —
Glendinning's Practical Hints on the Culture of the Pine Apple. 12mo. 1839. In cloth.

MR. JOSEPH SIBTHORPE :—
Four Cedar Triangle Rules.

MR. ABRAHAM BOOTH :—
Booth's Sanatory Tracts. Six copies of No. I.

From the VICE-SECRETARY 53 volumes, including—
Backhouse's Narratives. 2 vols. 8vo.
Knight's Physiological Papers.
Solly's Rural Chemistry.
Johnson on Fertilizers.
Downing's Cottage Residences.
Loudon's Encyclopædia of Trees and Shrubs.
Newman's History of British Ferns.
Loudon on Cemeteries and Church-yards.
Kirby and Spence's Entomology.
Johnson's Kitchen Garden.
The Tree Rose.
Lindley's Vegetable Kingdom.
——— School Botany.
Gardner's Travels in Brazil.
A 20-inch Terrestrial Globe and leather case.
Five Plans of Foreign Gardens.

From MR. MUNRO :—
21 volumes, including a complete set of the Gardeners' Chronicle.

There has been also placed at the disposal of the Vice-Secretary, to be applied as he may think fit, the sum of one guinea each, by R. Horsman Solly, Esq., and W. W. Salmon, Esq.

The establishment of such a reading-room appeared to offer the workmen opportunities of gaining knowledge so much greater than they before possessed, that the Garden Committee felt justified in revising the regulations for the admission of young men into the Garden, and of raising the standard of their qualification. After much consideration the following rules were drawn up, and having received the sanction of the Council, have now been in operation since March 1.

1. The management of the Garden of the Horticultural Society is with the Garden Committee, who meet once a month at least, and report their proceedings to the Council for confirmation. During the intervals of their meetings it is intrusted to the Vice-Secretary.

2. Under this direction the immediate superintendence is vested in the head gardener and two superintendents.

3. For this purpose the Garden is divided into two departments, each under the separate charge of one of the superintendents; who are held responsible for the good cultivation of the plants under their care, and have power to determine what modes of cultivation are most proper.

4. These departments are as follow:—

(1) The Orchard and Kitchen Garden Department, including the houses for forcing fruit and vegetables, and the ground adjoining.

(2) The Hot-house and Hardy Department, including all the remainder of the Garden.

5. The packing and distributing seeds, plants, &c., to the Fellows of the Society, is independent of the above departments, and under the immediate and personal superintendence of the head gardener.

6. The men permanently employed in the Garden are received on the recommendation of Fellows of the Society. But no Fellow of the Society can be allowed to have more than one person employed in the Garden, upon his recommendation, at the same time.

7. The names and addresses of the candidates for admission are registered in a book, in the order in which their recommendations are received.

8. Immediately after registration, a written notice is transmitted to the candidate, requiring him to give satisfactory evidence in his own handwriting upon the following points:—

(1) That he has been employed for at least one year in some *good private* garden.

(2) That he can write and spell *well*.

He will also be required to forward a legal certificate of his birth.

If this information is satisfactory, the application of the candidate will be confirmed.

9. In case of a vacancy in any department, that vacancy is filled up by the first on the list of candidates for admission, *provided it shall appear that he has reached the full age of twenty years*, and can give satisfactory evidence as to the following points:—

(1) That he has been employed for at least three years in some *good private* garden.

(2) That he is *well* acquainted with common arithmetic, including the rule of three.

(3) That he is able to measure land and make ground-plans.

(4) That he is sober, honest, and industrious.

The certificate of the Fellow of the Society recommending him will be required as to these points.

10. Temporary vacancies are filled up by extra men, engaged by the superintendents in whose departments the vacancies occur.

11. The number of foreigners employed in the Garden shall not at any time exceed two.

12. The men are successively employed in each department, the transfer from one department to the other taking place twice a year, on the 1st of February and 1st of August. On these occasions each superintendent will have it in his power to retain two or three of his men, with their consent,

provided that no man shall be allowed to remain more than eighteen months in the same department without the special permission of the Council.

13. The superintendents will certify to the Garden Committee at their monthly meetings the conduct of each man under their charge. These certificates will be filed for future reference.

14. With a view to the improvement of the education of the men, a library and reading room are provided, and lectures are given on subjects connected with the art and science of gardening, to which each man is entitled to have access under certain regulations, framed by order of the Garden Committee.

15. For the encouragement of the men in the pursuit of knowledge, an annual examination will be held by the Vice-Secretary, or other officer appointed in his room. This examination will be held in the reading room in the second week in the month of August. It will be conducted by means of printed or written papers, to which written answers must be returned; and will include,—

(1) Arithmetic.
(2) The Definitions and first twenty Propositions in the first book of Euclid.
(3) Physical Geography.
(4) Systematical and Structural Botany.
(5) Vegetable Physiology, in its relation to Horticulture.
(6) The Art of Horticulture.

16. On these occasions two book-prizes will be offered; the highest of the value of £3, and the second of £2. Besides which, certificates of merit may be awarded, with or without such prizes.

17. No man who has not been two years, or thereabouts, employed in the Garden, can present himself at these examinations.

18. No person can be permitted to obtain a certificate of merit whose answers shall not be equal in amount to half the value assigned to the questions by the examiner, previous to the examination.

19. No man is required to submit to this examination; but, on the other hand, no man will be entitled to be recommended to a situation unless he shall have done so, and gained a certificate of merit.

20. No man can present himself for examination more than twice.

The Garden continues to be enriched with additions of new and valuable plants, presented by its friends and correspondents. Among those received during the past year, the Council desire more especially to acknowledge many Orchideous and other plants from G. U. Skinner, Esq., some new Coniferous plants from the Marquess of Winchester, continued supplies of seeds, &c., from the Hon. Court of Directors of the East India Company, including Potato seed from Mussooree, Native Mexican Potatoes from G. H. Uhde, Esq., a barrel of Golden Peruvian Potatoes from Messrs. Gibbs and Co., some Orchideous plants from Bahia, from — Hood, Esq., lately H. M. Envoy to the Argentine Republic, and numerous fruit-trees, ornamental plants and seeds from the nurserymen in communication with the Society, especially from Mr. Glendinning, Messrs. Loddiges, Messrs. Veitch, and Messrs. Prince and Co. of New York.

The number of Visitors to the Garden, exclusive of days of Exhibition, has been 8,494.

The distributions from it have been as follows:—

1846–47.	Plants.	Seeds.	Cuttings.
To Members	6,958	49,450	2,450
To Foreign Countries, Correspondents, &c.	406	319	132
To Her Majesty's Colonies	6	59	..
Total	7,370	49,828	2,582

Various experimental inquiries have been in progress during the past season, two of which, viz., on Seed-steeping, and on the Potato disease, have been already published in the Journal. In the latter experiment, which is the most extensive yet undertaken, involving as it did a comparison between 176 varieties, it was necessary to hire a piece of ground on the farm of Mr. Jessop, of Chiswick. Other experiments on Wheat, and Potatoes, and the action of Manures, were under the charge of Professor Solly, whose report has not yet been received.

The Council believe that they have thus brought successively under the notice of the Society all the occurrences of the past year which are of importance enough to demand special report, and they trust that the statement now laid before the Meeting will be found to contain a satisfactory assurance that their most anxious desire has been to administer its affairs in the manner most conducive to the true interests of Horticulture, as far as the means at their disposal, and the necessity of making economy an element in all their proceedings, have permitted.

XXV. — Dielytra spectabilis, *a new Plant introduced from China.* By Mr. Fortune (*with a coloured Plate*).

(Communicated May 20, 1847.)

A short notice of this plant has already appeared in the Journal (vol. i. p. 233), where it is stated that the species was first known to European botanists by a specimen sent by the Russo-Siberian De Karamyschew, who, studying at Upsal, communicated it to Linnæus. Since this notice, the species has flowered for the first time in England in the garden of the Horticultural Society at Chiswick, where the accompanying drawing was made.

It is one of those plants of which the Chinese mandarins in the north of China are so fond, and which they cultivate with so much pride in their little fairy gardens. I found it first in the "Grotto Garden," on the island of Chusan, growing amongst artificial rocks near the beautiful Weigela rosea already figured in this Journal. Its Chinese name is *Hong-pak-Moutan Wha*, or the "Red and White Moutan Flower." The Chinese botanists do not take the characters of their genera from the flowers as we do, but from the general habits and appearances of the plants. In this instance the leaves are not unlike those of the Moutan Pæony; the flowers are red and white, and hence the Chinese call it the "Red and White Moutan Flower."

In China it grows from a foot to two feet in height, and forms fine racemes of rose-coloured flowers, which have been well represented by Miss Drake in the accompanying plate. It is certainly the most handsome of all the known species of Fumeworts, to which family it belongs.

The plant is yet too rare to trust in the open ground, and, therefore, its capability of living unprotected during our English winters has not been proved; but I think there can be no doubt of its being as hardy as any of its race. I never met with it in the southern parts of China, and, from the authority above named, it seems to be found even on the borders of Siberia. As a pot-plant for rooms it is extremely graceful, and remains for a long time in flower. I have had it for three weeks on my table in Chusan after being dug up out of the garden, and it remained in great beauty all the time.

Its habits are the same as the well-known D. formosa, a plant common in all gardens where showy herbaceous plants are grown. The stems die down in autumn, and the roots remain in a dormant state until the following spring, when the plant again appears above ground, and flowers in the months of May and June. The Chinese increase it readily by dividing the roots in spring when it begins to grow. In this country it

Dielytra spectabilis.

will be easily multiplied in the same manner, as well as by cuttings of the young stems, during the summer months, when the plant is growing. It will grow in any common garden soil, and is best adapted for situations which are sheltered from high winds.

XXVI.—*Observations and Experiments made in the Garden of the Society in* 1846 *relative to the Potato Disease.* By Mr. Robert Thompson, Superintendent of the Orchard and Kitchen Garden.

The continuation of the disease having been indicated in the previous winter by some potatoes growing in a frame, the crops in the open ground were closely watched; and it was found that even in the end of June, although the tops were then growing vigorously, and had a fresh green appearance, the disease had commenced in the same way as in 1845, exhibiting itself first on the portion of stem below ground, where, in consequence, sufficient roots had not been formed to support the top for any length of time, especially under the evaporating effect of very hot weather. Immediately above the surface of the ground the stem appeared thicker than usual, from the returning sap having no farther any sound channels to enable it to pass freely to the roots and tubers.

As an experiment to ascertain whether a set of fresh roots might not possibly be formed, the stems of those in a quarter in the kitchen garden in which the disease was most apparent, were additionally earthed up, June 26, with the view of encouraging fresh roots from the stem above where the disease had previously spoiled it. This proceeding had the effect of producing some fresh roots, tending to keep the tops green throughout the hot weather, but insufficient to maintain them in a perfectly healthy condition, or to enable them to withstand the vicissitude of a change from very hot to wet weather. The tubers grew tolerably well, although their quality was very different from that which the varieties possessed in former years. Nor was this to be wondered at, the stem whence the runners proceeded being unsound, whilst the runners themselves in most cases afforded only a disorganized communication. Potatoes not fully grown had the flavour of very old ones; and frequently their skins had nearly the same appearance as that of the old set, with which, indeed, the entire substance of the tubers seemed too much assimilated.

In the beginning of July a stem was taken up with the tubers attached. Disease was perceptible on the portion of stem below ground, but the tubers were then sound. The *stem and attached tubers* were replaced in the ground; but being an early

sort, and too near its natural period of decay, the plant could not strike fresh roots, and of course the stem died. Three weeks after it was first removed and replanted, the whole was again taken up; and the tubers were found thoroughly diseased in consequence of remaining in contact with the decaying stem. The brown colour pervaded their whole substance.

From the above result, it was deemed expedient to try the experiment of pulling up the stems of a portion of the plantations of potatoes as soon as diseased blotches began to appear upon them. Others were then cut over close by the ground; and some were left to die untouched.

Where the potato stems were pulled up as soon as diseased blotches began to appear upon them, the tubers were generally free from blotches; but where the haulm was allowed to remain, many of the tubers in connection with it appeared to have absorbed putrescent sap, and exhibited blotches, as well as deeply diseased substance.

The potatoes cultivated in the garden were mostly samples of rather early varieties. The sets were planted in good time, to the depth of not less than six inches; and the plants were well earthed up. Before the blotching and decay of the stems and foliage became manifest, a considerable weight of tubers had been formed, notwithstanding the diseased action observed to have been going on for a long time previous, and by which the successive formation of tubers had been early arrested. Early sorts, such, for example, as the Hâtive de Juin, distinguished under ordinary circumstances by its regularly-formed, roundish, and not large tubers, to the number of six or more to the stem, had in many instances only two or three; but they were large, carbuncled, and, in short, quite out of character, more like a coarse potato for cattle than an early table variety. This irregularity of growth is of course attributable to the disease having prevented any additional formation of tubers beyond the few that were first formed. Instead of the substance elaborated by the tops being embodied in many successively formed tubers, it could only be conducted to a few, and these were consequently urged into an unnatural development. In many cases unusual protuberances only were formed; but in others, a runner proceeded from the extremity of the previously formed tuber, and a second tuber was produced. In such cases it was found that the last formation contained starch; but scarcely any could be detected in the first, and they boiled crisp.

It must be observed with reference to the cutting off or pulling up the stems when they exhibit symptoms of disease, that although the operation was somewhat beneficial where the tubers had previously acquired so much development as that above

described, yet it was found to have a diminishing effect on the amount of produce where the crop was not so far advanced.

Experiment with Potatoes as regards the effects of Lime.—Potato sets from good sized tubers, of Jersey blues, were planted when cut, March 9, 1846, from six to eight inches deep. Lime was profusely scattered in the trenches in which the sets were placed; and after they were covered in, more lime was put on the surface, which was then chopped with a hoe.

Another portion was planted similarly to the preceding in every respect, but without lime. The number of sets and extent of ground were in both cases equal.

The produce, sound and unsound, was as follows:—

		lbs.	oz.		lbs.	oz.
Limed portion	sound	200	7.	Unsound	19	15
Not limed	„	192	6	„	22	13
In favour of limed portion .		8	1		2	14

It appears from the above, that the sound produce from the limed portion was about four per cent. greater than that from the portion not limed; whilst the relative proportion of unsound was fifteen per cent. in favour of the liming.

The ground not having been previously affected by the application of lime, it was rendered more tender for the potato runners than where it was not applied in the above experiment. Lime, with reference to the disease, appears to have produced some degree of modification; but it is not a decidedly specific remedy, for the premature decay of the stems was alike in the limed and unlimed portions.

Experiment with Diseased and Sound Potato sets.—All other circumstances being the same, the produce from

		lbs.	oz.		lbs.	oz.
Diseased sets was	sound	197	8.	Unsound	20	10
Sound sets	„	195	5	„	22	4
		2	3		1	10

In selecting the tubers to be cut in sets for the above experiment, none were employed as sound that were in the least discoloured either externally or internally; and, on the contrary, the most deeply diseased were employed, provided the eyes were not destroyed, in the portions cut out for sets for the part of the experiment contrasting with that in which only sound tubers were used. Contrary to what might have been anticipated, the resulting produce was rather in favour of the unsound sets. The total produce differed little; but the quantity diseased was nearly eight per cent. less from diseased sets than from sound.

Observations respecting the Depth of Planting.—The mass of

evidence adduced respecting remedies for this mysterious, and it may be said hitherto unsubdued, disease in the potato, is so conflicting that none of the many applications propounded can be relied on. The effects of different depths of planting have, however, proved such in the Society's garden as to deserve particular attention. No depth, it must be premised, has been preventive of the disease; for under all circumstances the haulm gave way before its natural period of decay. The condition of the tubers was, however, remarkably affected according to the depth of the sets, and subsequent earthing up of the stems.

In the preceding experiments, as has been previously stated, the sets were placed from six to eight inches deep. The average sound produce was no less than fifteen tons per acre, the limed portion yielding fifteen tons six hundred-weight; diseased sets, fifteen tons one hundred-weight; and the others a few hundred-weights less than fifteen tons per acre.

In similar ground adjoining that in which the above large produce was obtained, some potatoes were planted shallow, having been previously prepared for an experiment by Mr. Bickes, of Mayence, of which an account is given part i., vol. ii., pp. 35–38, of this Journal. These prepared tubers were placed in drills drawn by a hoe, and covered not more than three inches deep. In the counter part of the experiment, where similar tubers, but unprepared, were employed, the same shallow mode of planting had of course to be observed. The consequence was, that in both cases the produce was equally and thoroughly diseased, most of the tubers approaching the putrescent state.

On the appearance of the disease in 1845, it was conjectured that, as it manifested itself early on the underground portion of the stem, the latter would be strengthened by being mostly greened, from exposure to light, by shallow planting; but from the above results, it appears evident that shallow planting ought to be avoided.

In light soils the sets may be placed at the depth of eight inches; in others the depth ought not to be less than six inches. Great attention should also be paid to well earthing up; and in order that a proper ridge may be formed, the rows, except in the case of very early sorts, should be as much as two and a half feet apart.

XXVII.—*Propagation and Culture of Late Vines in Pots.* By Mr. Toy, Gardener to Col. Challoner, F.H.S., at Portnall Park.

(Communicated, with bunches of Black Hamburgh and West's St. Peter's Grapes, January 19, 1847.)

From the latest grape-house I take shoots of the West's St. Peter's vine, cut them into lengths of about 6 inches, and with the knife carefully remove all the eyes except one at the base of each shoot. I then pack them in dry sand and place them in a cool shed till the end of May, when they are put into 6-inch pots filled with light sandy soil and plunged in a bottom-heat of about 80°.

If intended for pot culture, I take particular care that they receive no check while growing, or till the wood is ripe, which is about the end of November, when I allow the soil in the pots to dry; I afterwards place them in a cool shed till the approach of spring, and then turn them out with care, shaking the soil from the roots and re-potting them. I now replace them in a cool situation till the buds begin to swell, when I remove the plants to a house or pit, plunge them in a bottom heat of about 80°, and give them a good watering, either tilting or throwing the lights wide open night and day in order that the temperature may be as cool as the season will admit of.

For the successful culture of late Grapes a span-roofed house is preferred; the border should be inside, for this will allow of its becoming dry when the growth of the vine is to be retarded. In preparing the border I take out the good soil, if any, and throw in in its stead about a foot of brick-bats for drainage, which I render perfect by a layer of coarse heath. As compost, I mix equal parts of turfy loam, decayed leaves, night-soil, old mortar, brick-bats, and bones, which upon being thrown into a mound I allow to lie for about six months.

In the middle of June I prepare dung and leaves to make a hot-bed 2 feet high and 3 feet wide, besides a layer of the compost 1 foot thick, and I finish making the border by adding 2 feet more of the compost in such a manner that when the dung and leaves are quite decayed, the surface shall be level. If the house be span-roofed, the bed should be in the centre, running its whole length.

The border will be ready to receive the young vines by the beginning of July; I then turn them out of the pots, keeping the balls entire, and I put a little fine earth round the roots and over the surface.

Respecting the routine work of tying in the young shoots as

they advance and giving air I need say little; but as to sprinkling it is proper to remark, that I never allow the border to become dry till the wood begins to ripen, after which time I gradually discontinue the use of water.

The wood will be ripe about the end of November, up to which time I am careful that the vines are not checked in growth. The fire-heat is now daily lessened, and the lights thrown open whenever the external air is above the freezing point. The border in a short time becomes dry, in which state I permit it to remain till the buds begin to swell, when I immediately put on a layer of rotten dung, surfacing with the compost, and watering every day till it is quite soaked. At this period I keep the lights open night and day, and often sprinkle the surface, with a view to cool the temperature.

As soon as the berries are set I commence thinning, leaving them half an inch apart, so that when ripe they just meet. I persevere in sprinkling till a change of colour is perceptible, when I leave off by degrees till the border is dry, as I mentioned before. From this time I never allow the temperature to fall below 65° till the fruit is ripe, after which fires are only made to exclude frost and expel damp.

The grapes sent for exhibition were grown in a common lean-to house, with the border outside: fires being made merely to exclude frost and expel damp.

My experience convinces me that by retarding the growth of the vine, I can produce plump and good flavoured grapes from the beginning of the year up to the end of March, and at about one fourth the expense required to force a house so as to pick by the beginning of April.

XXVIII.—*Directions for Cucumber growing for the Market, as practised* by James Cuthill, Camberwell.

(Read at a Meeting April 6, 1847.)

My seed pit is built of solid 4-inch brick-work laid in cement; it holds 200 4-inch pots, and has two lights; but of course the size should be in proportion to the demand. The laps of the glass are all puttied, and painted with anti-corrosive paint, which is cheaper and lasts much longer than any other paint; no putty is employed, except in the bedding of the squares, they are merely painted, and no drip ever enters the pit. The pit is bottomed with a few rough boards, and over these about 3 inches in depth of mould is put, on which to set the pots level. The dung is applied fresh from the stable-yard, making a very substantial lining about 2½ feet in width at the bottom.

As soon as the pit has become sufficiently heated, the seed is put into a pan of water, in which it is allowed to steep for 24 hours; after which it is sown in pans of two inches deep, in dark coloured mould of a light nature, fresh from a pasture which has been under grass for many years. As soon as the plants are up and the seed leaves separated, they are potted off into 4-inch pots, using the same mould as before with a bit of turf for drainage. Two plants are put into each pot, placing the plants in the pit east and west, and no water is given for three or four days, in order to prevent the tender stems from damping off. Air is given day and night both back and front, and the heat is kept up at night to 65° and by day to 70°. The plants are shifted right round every three or four days, and they are watered when required with soft tepid water.

As the plants only remain in the nursery bed for about three weeks, the large pits should be prepared for their reception by the expiration of that time. This is effected by lime washing their insides, hunting out all woodlice, and by covering the pipes which traverse the middle of each pit at the bottom for bottom heat with a layer of oak faggots; putting some rough dung or straw over the sticks to keep the mould from mixing with the faggots. The mould, rough from the fields, is put in, so as to form a ridge in the centre of the pit to the depth of at least 16 inches, leaving the top of the mould about 2 feet from the trellis. The fire is lighted at least six days before the plants are put out; there being four dozen lights to one fire, and consequently much cold water and mould to heat. As soon as the mould is heated through, the plants are planted out immediately under the centre of each light, inserting them in the mould up to the seed leaf, and placing a stick to each plant reaching the trellis. The latter is formed by a strong stick under each rafter, and by hazel rods about 4 feet long, placed 5 or 6 inches apart. As soon as the plants reach the trellis their heads are nipped off. Saddles on the pipes made of zinc are kept full of water, and the plants are frequently watered with diluted dung-water in a tepid state. Plenty of air is given, and the heat is kept up by day to 70°, and by night to 65°. The shoot is pinched off at the fruit, and not at the joint above the fruit, as is the practice with many, and by this mode the frame does not get so full of useless vines. Keep the male blossoms cleared off at all times, and after the plants come into hard bearing every encouragement must be given them, administering manure water freely. We have 100 lights, which require a great deal of tepid water up to the middle of June.

Our plants are generally in September just as healthy as ever, even after cutting three times a week all the summer, and then

ripening the seed. We have cut on the 15th of April out of 48 lights 70 Cucumbers at one cutting, averaging in length from 12 to 16 inches; and in April this year I cut 320 altogether. The quantity of water used during bright sunshine with the plants in full bearing, is about four gallons a-week to each light, and this is always applied by sprinkling every day over head, at half-past 3, or about that time, and then of course the lights are shut down close. The water used is diluted manure water, obtained in the following manner:—Water is thrown upon the fresh dung from the stables, and a tank being at hand, the water drains off and carries in solution the strength of the dung. I mix one gallon of this with three of water that has been exposed to the sun. I never in the height of summer water with cold water, for I am persuaded that half the diseases in Cucumbers arise from watering with cold water from tanks not sufficiently open to the sun and air.

The admission of air is also a matter of paramount importance. I never give air at the front of the pits for this reason, that the moment you admit air in front and back a dry hot current is produced, which in Cucumber growing above all things should be avoided; but if air is given at the back only, a circulation of heated air something after that under the Polmaise system will be maintained. And be it remembered, the older your plants the stronger heat they require. Shading is of course necessary in the first instance, until the plants gather sufficient strength, but it is only half-starved, diseased, and badly rooted plants that require shading all the summer. To preserve them from woodlice, keep four or five toads in each pit, and after the plants have reached the trellises; the young woodlice among the leaves may be caught by placing small pots full of hay on a ledge under each light. These I examine every day, and by this means find that the woodlice are very much reduced in number. I have paid six shillings a dozen for toads, which shows the value I place upon these commonly despised but really useful animals.

I have bought all the new Cucumbers advertised, but I may, without fear of contradiction, say that I have never found one so early and so productive as my Black Spine. I have now had it in my possession upwards of fifteen years; it took prizes at Ipswich in 1831, where it obtained first and second prizes at the same show. In 1834 it took the first prize at Chiswick, and in 1836 the first at Barnet. And since then for seven years past it has been the best at the first shows of the Royal South London Floricultural Society.

In conclusion, to grow Cucumbers fine and handsome they must be grown upon trellises; the plants will bear better, con-

tinue to produce for a much greater length of time, and they will also in this way grow more robust and healthy, a circumstance no doubt due to the great circulation of air which plays constantly around them.

XXIX. — *Journal of a Mission to California in search of Plants.* By Mr. Theodor Hartweg, in the service of the Horticultural Society. Part III. Continued from Vol. II., p. 121.

(Received May 10, 1847.)

On July the 2nd I returned to Monterey, on board of an American bark, after a passage of four hours, and found that Commodore Sloat had arrived in the 'Savannah,' accompanied by two sloops of war. In consequence of a rupture between the United States' forces and the Mexicans, near Matamoros, wherein the latter were defeated, the American Commodore, on the 7th, landed a party of marines and seamen, and hoisted the American flag without opposition.

The few days of absence produced a great change even in the vegetation; the fields and woods, which before were covered with flowers, are now gradually drying up from the total absence of rain during the summer months; even the bulbous plants had, during that time, shed their flowers and ripened their seeds.

As yet I have not succeeded in procuring horses, Castro having taken all the available horses away, in order to mount the militia, with which he intended to have marched against the Americans. Under these circumstances I cannot venture far away from Monterey, nor is it advisable that I should do so, as I might fall in with a party of country people, who could not be persuaded that a person would come all the way from London to look after weeds, which in their opinion are not worth picking up, but might suppose that I have some political object in view; I, therefore, confine my excursions within a few miles of the town.

Crossing the wooded heights near Monterey I arrived at Carmel Bay, after an easy walk of two hours; here I found Diervilla, No. 47; Cupressus macrocarpa, No. 143, attaining the height of 60 feet, and a stem of 9 feet in circumference, with far-spreading branches, flat at the top like a full-grown cedar of Lebanon, which it closely resembles at a distance; Eschscholtzia crocea, E. californica, Platystemon californicum, a scarlet Castilleja, a Mesembryanthemum, resembling M. rubrocinctum; Cheiranthus, No. 94; Stenactis speciosa, an Echeveria,

Abronia rosea, and A. mellifera. These two species, the former with pink and the latter with orange flowers, are spreading on the sands near the seashore, and delightfully scent the air with their perfume towards evening.

Another excursion, which I made to the Rancho de Tularcitos, led over the mission of Carmel. This, like all other missions in California since their breaking up in 1836, is in a sad state of neglect; the buildings are fast falling to ruin, and the lands nearly in the same wilderness as the first settlers found them. The Indians, who were employed by the friars as labourers, and held in a state of slavery, were then thrown upon their own means for subsistence. The greater part went to the Tietar valley, from whence they commit their depredations upon the property of the white settlers, chiefly carrying off herds of horses, which form their principal food.

Following up the narrow valley of the Carmel river I entered a beautiful wood of alders, willows, and plane-trees, some of the latter attaining the height of 80 feet, and 12 in circumference. Of herbaceous plants I observed two species of Solidago, Nos. 118 and 119; Mimulus cardinalis; Labiata, No. 122; Asclepias, Nos. 127, 117; an annual, No. 120, with an extremely powerful smell, which, if inhaled in excess, produces bleeding at the nose. Of shrubs, a half-climbing Caprifolium, with small dingy flowers; Clematis, No. 121; Cercocarpus sp.; and on rocky ground, a patch of Berberis aquifolium. The sides of the mountains, which attain no great elevation, are thinly covered with oaks.

The higher parts, near the Rancho de Tularcitos, are occupied by Pinus macrocarpa, which rise to the height of 80 to 100 feet, with a stem of 6 to 8 feet in circumference. The larger trees had not yet ripened their cones, but the smaller ones, of twenty to thirty years' growth, ripen theirs at different periods, and furnished me with a few cones. On my return thence, over El Toro, a high mountain destitute of trees or shrubs, but thickly covered with wild oats (Avenæ species), I found, on the north side, in a ravine, a few small trees of Pinus Sabiniana, the highest of them not exceeding 30 feet. In this situation they appear to produce their cones when yet very young. Some trees, measuring from 8 to 10 feet in height, and of as many years' growth, had cones on them, which, like the foregoing species, seem to ripen about November.

On August the 23rd I embarked on board the bark 'Joven Guipuzcoana,' whose owner, Don José Antonio Aguirre, invited me to take a trip with him up to the Bay of San Francisco. I gladly accepted this invitation; the more so, as I intended to visit the valley of the Sacramento river, where I possibly might

procure horses, and return thence by land to Monterey. On the following day we anchored off Santa Cruz, where the ship was to remain a day or two. I took advantage of this delay, and made an excursion to the mountains, in a different direction from that visited before. Passing through a copse wood, composed chiefly of Pavia californica, Quercus californica, Ceanothus thyrsiflorus, Corylus No. 85, Rhus viride, called 'Yedra,' and justly dreaded by the inhabitants for its poisonous properties, I entered a beautiful pine-wood. The leaves of this species of pine stand in threes; are longer than the cones, usually 11 inches in length; cones 5 inches long by 2½ at the broadest part, of a reddish brown, the centre of the scales terminating in a small sharp point, bent downwards. The trees rise to the height of 100 feet, with a stem 3 to 4 feet in diameter, producing the cones in clusters of three or four, which ripen towards September, or in about eight months from the time of flowering. This handsome species of pine, which appears to be new, I have named, in compliment to the late Secretary of the Society, George Bentham, Esq., Pinus Benthamiana.

Another kind of pine that I found within a few hundred yards of the foregoing species, is, probably, the doubtful and little known Pinus californica: the trees seem to be of slow growth, and do not attain any great height, seldom more than 25 feet by 8 inches in diameter. The leaves are in bundles of three, 4½ inches long; cones, 5 to 5½ inches long by 2 broad, the outer surface curved, the inner straight, scales on the outer surface more developed, enclosing two small, flat, winged seeds. The cones are only produced on the main stem; when ripe, they are of a light-brown colour, and stand off at nearly a right angle; when old, of a silvery grey, pressing firmly upon the stem, and remain on the trees for a series of years without opening or shedding their seeds.

On August the 28th, the bark got under weigh for Yerba Buena. On the afternoon of the same day we encountered a strong north-west gale, which tore some sails and obliged us to put back to repair damages. On the 30th we sailed again, and having to contend against headwinds and a strong current, kept close in shore. The whole of the coast is destitute of trees or shrubs, with the exception of Point Año Nuevo, where some pines or cypresses seem to grow.

On September the 2nd, we were opposite the narrow but safe entrance to the bay of San Francisco; a large inland sea, divided into several branches, forming not only the principal port in California, but the largest and safest on the whole western coast of America. About noon we anchored off Yerba Buena, a small town, rising rapidly in importance.

Two Wardian cases, which were furnished by the Society for preserving such plants and seeds as will not carry otherwise, gave me some trouble in clearing them at the Customhouse. They were shipped in London for the Sandwich Islands, and thence to Yerba Buena, where they arrived under the Mexican government, without it being exactly known what they contained, nor who the owner was. Some miscreant, thinking he might profit by the occasion, denounced them as containing contraband goods; they were accordingly taken to the customhouse, where, upon examination, instead of silk stockings and printed calicos, they found "two small greenhouses," some kitchen-garden seeds, nails, &c. Soon after, by the change of government, they fell into the hands of the Americans, and having no papers to show that I was the owner, I had to send in a petition to the captain of the port, prove the property before the magistrate, and after a good deal of running to and fro, I finally received them from the commander of the place, in whose charge they were.

The vegetation about Yerba Buena is poor; the sand-hills that surround the town, and which extend for several miles into the interior, are but thinly covered with brushwood of oak (Quercus californica, Ceanothus thyrsiflorus, Rhus, "Toyon," Prunus No. 102, and Baccharis No. 123).

On September the 10th I went across the bay to Sausalito, in company with Don Antonio O—— and Captain C——, who were proceeding to their farms on the north side of the bay. Early the following morning we were joined at the mission of San Rafael by General Vallejo.

After enjoying the hospitable board of General Vallejo for three days, I left my companions and proceeded with F——, an Englishman, to his farm at San Miguel, distant thirty miles, where he is established with two of his countrymen in raising grain and rearing horses and cattle. My new friend had formerly been in the navy, and had seen some service; he held the rank of a boatswain of an English 74-gun ship. Now, though he is above sixty years of age, he is as vigorous and healthy as a man of forty: being an expert horseman, he occupies his time chiefly in breaking in horses.

The face of the country about Sonoma and San Miguel is perfectly level towards the bay, and capable of great agricultural improvements. Several species of oak (Quercus, Nos. 139, 140, and 141) thrive well in the fine black vegetable mould, and are disposed into large irregular clumps, giving the country the appearance of an immense park, enlivened by numerous herds of elks and antelopes.

A ridge of mountains which rises at a short distance from San Miguel is thinly scattered over with oaks, and a few Abies

Douglasii interspersed. No other kinds of pine occur here. In the shaded dells I found a Viburnum, Euonymus, and a large-leaved Calycanthus in seed.

From San Miguel I went to Bodega, where the Russians a few years back had an establishment granted them by the Mexican Government, in order to supply their possessions in the north with wheat, &c. When their term expired, it was purchased by Captain S——, an American, who erected a steam saw-mill there, for which the redwood trees that cover the mountains supply him amply with material. This is the most northern limit of this magnificent tree, growing at intervals from the latitude of 32° N. up to the river Ross in 38° 15′.

From Bodega I returned by way of San Rafael to Sausalito, passing over a beautifully undulated prairie, destitute of water or trees. Numerous bands of Coyotes, a kind of wild dog, I saw here; they are of the size and colour of a fox; when observed, they scamper off beyond the range of a rifle ball, and then commence barking as if in defiance.

On October the 7th I returned to Monterey in the bark 'Joven Guipuzcoana,' and made preparations for a trip to San Diego, her next destination, from whence I expected to return by land before the rains set in. The day previous to the bark's sailing I reluctantly saw that this plan also I was obliged to give up [in consequence of the political state of the country].

With the beginning of November the periodical rains have set in; they are unaccompanied by thunder, but continue for several days without intermission, and terminate by the end of March. The heaviest fall of rain occurs in January and February. Judging from the quantity that fell up to the middle of December, it would seem that the rains will be more abundant than for some years past. "El Toro," which lies due east of Monterey, has already been twice covered with snow, but it soon disappeared again. The rainy days are succeeded by frosty mornings, but the cold is seldom so intense as to freeze water.

The thermometer, which ranges in Monterey during the summer months from 62° to 65° of Fahr., is now from 50° to 55° during the day.

XXX.—*On the beneficial Effects of an Annual Root-cutting with certain Fruit-bearing Plants.*—By Mr. R. Errington, C.M.H.S., Gardener to Sir Philip de Malpas Grey Egerton, Bart., M.P., F.H.S.

(Communicated February, 1847.)

It certainly appears at first sight a bold recommendation, to advise cutting away those valuable organs destined by Nature to

acquire sustenance for the vegetable structure. When, however, the reasons are carefully examined, it will, I think, be perceived, that such a practice under certain circumstances must be productive of decided benefit; more especially with regard to flavour in the fruit. Some distinction should be here drawn, in order to throw light on the matter, between those fruit-bearing shrubs or trees which produce their fruit chiefly on the young shoots of the preceding year, and those which produce principally from what the gardener terms "spurs." In casting a glance over fruit-bearing trees or plants in general, it will be obvious that with few and trifling exceptions, Nature has in this respect marked out two classes in broad and well-defined characters.

In order to convey a ready idea of these two classes to those who are not practically engaged in gardening, I would adduce the following, viz.:—

Fruits bearing chiefly on the spur:
- The apricot;
- The red and white currant;
- The plum; and

Fruits bearing chiefly on the young wood:
- The gooseberry;
- The vine;
- The black currant;
- The raspberry.

These will suffice to throw light on the matter in hand.

The first thing I would observe is, that from the circumstance of the spurs being for the most part situated on or near to the main stems, any undue extension of the young shoots above and around must of necessity produce such an amount of shade in the neighbourhood of the spurs as cannot do otherwise than end in barrenness. The chances of light, in fact, to the home spurs of a gross red currant bush are about as great as to those of a tuft of fern in a dense wood. Who can wonder, then, at such bushes becoming gradually denuded of spurs, or at their bearing badly coloured and worse-flavoured fruit?

As to the other class, the blossoms being formed on the annual shoots, are in precisely the situation most congenial as to light, and will also bear high cultivation much better than the former.

With regard to annual root-cutting, I must here observe, that the necessity for it will not arise on poor and unmanured soils; it is chiefly in our kitchen gardens, where, from a long course of tillage, accompanied by very frequent manurings, the soil has become what is commonly termed effete; by which we understand, that the mechanical texture is altered, partly through the

decomposition of vegetable fibre, and partly, I believe, through the loss of inorganic constituents.

To give an instance; let us examine the common red currant. This it is well known has a greater tendency to produce what is termed "watery wood" than the white. Now on rich soils it will sometimes produce shoots of two feet in length during the first three weeks in June: the rapidity, in fact, with which such growth is made, might not inaptly be termed propulsion.

Now what is the consequence? The fruit, with the various tufts of leaves by which it is accompanied, is thrown into the most intense shade; and in proportion to the extreme grossness of the bush will the berries be found of a diminutive size and destitute of flavour. Nor does the evil end here, for the blossom spurs, intended to produce succeeding crops, and which need the fertilising agencies of light more than the fruit, are hereby rendered barren, or totally destroyed. And hence it is no uncommon thing in gardens to see huge currant bushes, showing signs of great age and vigour, destitute of fruit, with the exception of a mere tuft at the extremity.

Again, with regard to the strawberry; how frequently do we meet with exceedingly gross beds or plantations bearing little fruit, yet possessing enormous leaves! If much manure is dug into the soil at planting time, and the plants are placed too thick, this is sure to happen. It may not the first season, but will assuredly take place as soon as the plants crowd each other.

We find the cultivation of this valuable fruit very much improved within the last twenty years; and why? because prior to that, the importance of light was so much underrated. Few persons think of planting them thickly in beds at this period; and we shall find that the farther they are planted apart the finer will the produce be. The finest Keen's seedlings I ever saw were four feet apart between the rows, and three feet between each plant. Each plant formed a huge isolated mound; and the quantity and size of the fruit were indeed most extraordinary. I have also seen the prolific hautboy thus treated, with a similar amount of success. This I confess astonished me more at that period than the Keen's; for in my younger days we were taught in the neighbourhood of London, that the hautboy would only succeed in beds. Nor is this grossness, with thick planting, inimical to their bearing properties alone: deterioration of flavour is a sure consequence. The ripening period of the strawberry—the month of July—is very often a cloudy and wet period; and I have frequently known in crowded and luxuriant plantations of strawberries from fifty to seventy per cent. of the fruit actually rot on the ground. In such periods what an advantage thin planting possesses! If bright skies intervene the latter readily

become dry, whilst the former will scarcely receive benefit. If strawberries are planted on good loamy soils, well trenched, with little or no manure, they will be found very different in character to those on light and highly-manured soils; the whole plant will be more compact, the leaves smaller in circumference, yet thicker, and the plant will moreover endure periods of drought much better.

Having now pointed out the evil effects of grossness, as tending to barrenness and loss of flavour, I come to the point from which I set out, viz., to recommend what I have practised for years under such circumstances, and I think I may say always succeeded with, or at least it has always produced the result I anticipated. Let it not, however, be supposed for a moment that I advocate so foolish and prodigal a system as first to over-excite fruit-bearing trees by manures, and then to cut away their roots: by no means; I merely suggest a mode of treatment for pampered subjects which it is not deemed expedient to destroy off hand.

The root-cutting I recommend for the currant is practised at the extremities of the fibres, and is a matter of great simplicity. A line is stretched parallel with the row, at about thirty inches from the stems (if strong bushes), and the line "chopped out." The line being removed, a trench is opened at one end, and a deep spit dug out, nearly to the bottom of the roots, and placed aside, similar to the manner of making a celery trench. All roots on the farther side of the line, from the tree, are cut entirely away, and the trench merely filled again with the ordinary soil of the garden, which lies close at hand, and for which the excavated soil is substituted. This operation should be performed as soon as the leaves are fallen, in order that the bush may commence a series of fresh roots, to meet the demands of the coming spring. Now although I advocate cutting the extremities, I never dig over the surface-roots of my bushes; these remain untouched, and even receive a slight top-dressing, when necessary, of half-decayed tree leaves, more in order to coax the roots to the surface than for the sake of manuring.

In cutting the strawberries, my practice is to trim away all superfluous runners in the end of August; by which means the principal leaves of the mother plant dislodge themselves and separate, and thereby expose a much greater amount of surface to the light to ripen the bud for the ensuing crop. About the middle of October, a slight dressing of half rotten manure, chiefly leaf soil, is scattered over the surface of the ground; and the centre, between each two rows, merely one spit in width, is deeply dug; cutting of course all roots that lie within such boundary. I have always found this course to produce precisely the effects

that might reasonably be anticipated, viz., a temporary reduction of grossness in the foliage whilst the new leaves are forming in the ensuing spring; with an acquisition of fresh young fibres by the time the greatest demand is made on the energies of the plant, viz., the swelling period of the fruit. Indeed, such good results have I ever found to follow this practice, that I am of opinion that a plot of strawberries may be kept in tolerable prosperity for many years by thus annually digging and manuring.

XXXI.—*Report on the Fruit and Kitchen Gardens near Paris, from observations made during a Visit in the Spring of* 1847. By Mr. Robert Thompson, Superintendent of the Orchard and Kitchen Garden.

The Garden Committee having considered it desirable that I should proceed to France for the purpose of reporting to the Council what I might observe most worthy of notice in the fruit and kitchen gardens there, it was deemed expedient that I should proceed thither early in the spring, on account of seeing the operations of pruning and training, as well as to embrace the opportunity of availing myself of the important assistance of Mr. Francis Rauch, which might have been lost by delay: the period of his stay at Paris being then uncertain. Having resided four years in and near Paris for the purpose of accurately observing everything connected with horticulture, he was eminently qualified for the task he kindly undertook of conducting me to places most important to be seen in regard to the object of my mission, and likewise for obtaining the best possible information, on all essential points, from the various horticulturists whose establishments we visited.

I accordingly went from London to Southampton by railway, February 27th, and sailed the same evening for Havre, where I arrived next morning. Here there was little to be seen interesting in a horticultural point of view. I observed, in passing through the market, some good specimens of the Easter Beurré Pear, exposed for sale under the names of Bergamotte de la Pentecôte and Doyenné d'Hiver. This, with some Old Colmars, St. Germains, and Catillacs, were the only kinds of Pears worthy of notice. Of Apples they had some good Reinettes du Canada, which they call Reinette du Canada, or Reinette de Bretagne; some Nonpareils, Reinette Grise, Pigeonet, Reinette Franche, Reinette de Caux, or Belle Reinette de Caux, a very handsome variety, and, from being generally exposed, its cultivation must be rather extensive in this part of Normandy.

There were several varieties of Apples named Reinette Franche; the one so called at Havre is the same as the Reinette Franche Grauwe of the Dutch, and is an excellent late dessert Apple.

Of vegetables, Salsify and Scorzonera were very plentiful; so much so that it may be inferred the demand must be much greater than in London. Cabbages and Savoys were rather indifferent, but Brussels Sprouts were good. The excellence of this green is certainly not sufficiently appreciated in England, where it is apt to degenerate in many situations, but in others there is proof of its seeds having been saved for years as genuine as any imported from the neighbourhood of Brussels; the plants producing abundantly *jets*, or sprouts, as round and compact as they possibly could be.

The weather at Havre was quite as cold as that experienced on the other side of the Channel—clear and frosty, with keen north-east wind. To this the fruit and vegetable market at Havre was much exposed, it being more adapted for coolness in summer than shelter in winter. The women, sitting at their stalls, had small charcoal fires in earthenware pans on their laps. It appeared that, in consequence of the substance of which these open *chaufferettes* were composed being a slow conductor of heat, they could be supported on the clothes without danger of the latter taking fire; but burning charcoal, placed in such a position, the individuals respiring almost directly over it, must have very pernicious effects. The inhaling of carbonic acid under such circumstances cannot be avoided; in fact, its profusion was indicated by the frequency of abrupt stifling coughs, and the bad consequences may be considered as more than a counterbalance to the comfort. But the carbonic acid gas from dry beech wood, burned in leaky stoves in rooms, and evolved so pure as to be unseen—but not the less insidious—is a much more dangerous affair; and the circumstance is of too frequent occurrence in France.

I went from Havre to Rouen by diligence, March 1st. The vast number of apple-trees along the sides of the road, and in single rows between the fields, are, I believe, chiefly cider varieties. Although these trees are at considerable distances from each other, and have consequently plenty of air, yet they are generally covered with moss even to the tips of the branches. The soil does not appear to be wet, and it is cultivated close to the trees. It seems to be in many places a light-coloured clayey loam, but not too stiff; and frequently it is very calcareous. The subsoil in the latter case must be dry enough, but this circumstance does not appear to prevent the trees from being infested with moss. It has been stated by some in this country, that they have cleared their trees of moss by syringing them with

lime-water, which is a cheap and easily applied remedy, the efficacy of which may be readily ascertained.

The extensive lines of fruit trees, and the disposition of the numerous plantations of trees for fuel, give a peculiar aspect to the part of the country between Havre and Rouen. Wherever there is a farm-house, or patch of houses, such are generally enclosed, on three sides at least, by a plantation of trees, for shelter partly, but chiefly for fuel; and these plantations exhibit so much uniformity, that one is led to suppose their formation and maintenance must be regulated by a special law. An embankment is formed near the habitations on the north side, and usually at right angles with this, on the east and west sides. Some recently formed appeared to be about four feet high, and as many in breadth on the top, which is flat; and on this two rows of trees, chiefly beech, are planted. I observed no sweeps formed by the plantations, probably because such would have interfered more with the ploughing of the adjoining fields. It has doubtless been proved for ages, that in thin soil such embankments favour the growth of trees.

Rouen.—The Botanic Garden at this place, or "Jardin des Plantes de Rouen, et à l'École Normale primaire du Département de la Seine-Inférieure," is situated on the south side of the town, and so far distant as to be sufficiently out of the reach of smoke. It is on the site formerly occupied by Calvert's Nursery, and, together with the Arboricultural department, occupies, it is said, upwards of twenty acres. The cultivation of this and the former garden has been for more than forty years under the direction of M. Du Breuil, senior. The Arboricultural, including the Fruit-tree department, is superintended by his son M. A. Du Breuil, Professor of Agriculture and Rural Economy, and of Arboriculture, &c. The arrangement of plants is on a level part of the ground. The plants are disposed in beds five feet wide, and according to a modification of the Jussieuan system. The tallies are supported on iron stems about three feet above the ground.

Lectures are given by Professor Du Breuil on vegetable physiology, the agents of vegetation, soils, &c., budding, grafting, pruning, training, and, in short, everything connected with the management of fruit-trees. There are specimens of trees to illustrate both good and bad practice in these matters. The trees are very neatly pruned and trained, and exhibit almost perfect examples of the various modes of training figured in Professor Du Breuil's *Cours Élémentaire Théorique et Pratique d'Arboriculture.*

There are some specimens of trees against walls, which are

left to their natural growth. The trees illustrating the Montreuil mode of training the Peach are well managed; but here, as elsewhere, the difficulty of repressing over-luxuriance in the centre, whilst the lower horizontally inclined branches become weak, is apparent.

A Peach-tree was trained with a central upright stem, from which the branches are trained horizontally, with bearing shoots inclined forwards on the upper side only of the horizontals. In another tree the branches likewise proceed from a single upright stem, but are wider apart, so as to admit of bearing shoots being laid in from both the upper and under sides of the branches; the main branches having an elevation of about 20°. This mode admits of the wall being covered sooner than by the preceding. At present the trees are doing very well, but they are apparently not above six years old, scarcely covering the wall, which is about ten feet high. In this Society's Garden, where the soil is much richer, trees of Peaches and Nectarines trained on the above principle, namely, with branches proceeding from a single upright stem, did not succeed; the sap flowed with too great force into the vertical stem, and the horizontally inclined branches had, on the other hand, a great tendency to die off.

In other specimens of training, modifications of the fan method were exhibited. In that called *Eventail à la Dumoutier, ou à la Française*, the stem is made to form two ramifications, and each of these is subdivided into two, within a few inches of their bases. After these have grown to nearly their full extent, two more shoots are allowed to push from near their bases; and, by cutting back, these produce others to furnish the centre of the tree; but this leads to the objectionable necessity of having there two vertical and nearly parallel branches; which, although among the last produced, would, in many cases, be apt to become too strong, from being in the direction of the strongest flow of sap.

The great inconvenience attending the Montreuil mode of training will be readily understood by any one who has observed with what force the sap flows into an upright shoot, compared with one in a horizontal position; all other circumstances being the same. Now, if two lines be drawn like a V, each at an elevation of 45°, representing the two main branches (*branches mères*), and if from either side of each of these other lines are drawn, forming angles of 45° with them, it is evident that those on the under side will have a horizontal position, and those on the upper side will be quite perpendicular. These lines give the relative positions of the branches of a tree trained according to the Montreuil system, with the exception that those produced

on the upper sides of the *branches mères* are inclined forward; but then others from them must be perpendicular, or the greater portion of the space included by the two main branches, or half the wall, must remain void.

Professor Du Breuil has commenced the training of some trees, in which two main branches are laid off according to the Montreuil mode, as are likewise the branches from the under side of these; but the branches for filling the centre are reversed till they are brought to an angle of 45°, thus forming right angles with the main branches from which they spring. By this mode there are no upright branches, and consequently no unequal competition between such and those in a depressed position, requiring the frequent application of the knife to maintain the balance of force in the flow of sap. That mode of training must be good in principle which gives a position to the branches that will ensure an equal distribution of sap with the least possible interference by the knife. In the mode under consideration, the branches occupying the centre have an elevation of 45°, whilst those produced on the under side of the main branches have only 20°; but the latter are allowed two years' growth before the former are allowed to spring; besides, the branches from the upper side, although they have a greater elevation, yet in them the sap has to turn at an angle of 90° from its direction in the main branches; but from these main branches the lower diverge at an angle of not more than 35°. The sap will accordingly pass more readily into these than into the others where it has to turn at a right angle. The trees under training according to this mode are not so far advanced as to furnish absolute proof of its merits, but it will doubtless answer. The same principles were adopted many years ago, with trees that had proved unmanageable under the Montreuil system, in a rich border in the Society's Garden at Chiswick.

Amongst various other forms for training the Peach some trees were set off with two stems, like the letter U, from the outsides of which branches are trained horizontally. In one of these the two lowest horizontals are continuations of the two main stems; and from the upper side of these, about 18 inches apart, shoots are trained upright and parallel, from which all the other horizontal branches proceed; also, from both sides of these horizontals, bearing-shoots, about 18 inches apart, are trained with an inclination forwards. By this mode it is sometimes difficult to maintain an equal degree of vigour in both sides of the tree.

Another tree is intended to be trained with a wavy central stem. When in the state of a young shoot, this stem is bent first to the left, then to the right; and where it commences to turn from left to right a shoot is encouraged on the outside of

the bend, and trained straight to the left in a direction a little above the horizontal. Where the stem shoot is again turned from right to left, another branch is extended to the right; and so branches are intended to proceed alternately, on either side, from every outward bend of the stem till the wall is covered.

Trees were trained in the Society's Garden with wavy stems, according to the systems of Hitt and of Hayward; the former having strictly horizontal branches from the bends, with perpendicular bearing shoots; the latter with gently curved branches, with the bearing shoots inclined. But each tree, in both systems, had two straight naked stems, elevated at an angle of 45°, and 4½ feet in length, before they took an upright wavy direction. These naked stems invariably became scorched on the sides exposed to the sun, and the upper portions of the bends were also more or less affected in the same way. Professor Du Breuil's mode is unquestionably far preferable to either of the above, inasmuch as the tree has only a single stem, from which the wall is furnished from bottom to top, instead of being unfurnished to the height of 4 feet, above which the naked stems only begin to branch, according to the systems of Hitt and Hayward. In Professor Du Breuil's tree there are no long naked stems exposed to the scorching influence of the sun's rays, and even the bends can be protected by foliage. On the whole this mode is considered highly deserving of trial in Britain.

Another mode of training the Peach seems to have no claim to such recommendation as has been given to the preceding. Two stems are trained horizontally, and from these branches are trained perpendicular at sufficient distances to admit of the bearing wood being laid in between them. The danger is that these horizontal stems being more liable to accident, such as gumming and scorching, than the other parts of the tree, there is constant risk of losing the whole. It is not natural for the Peach to support a number of perpendicular branches on a horizontal stem. The mode here disapproved of is called *Candélabre à branches droites.*

Some maiden plants of Peaches have been recently planted, in rather poor soil, 2½ feet apart, and trained, without heading back, at an angle of 45°, on an eastern aspect. The inclination of the whole is accordingly equal; and northward. By this mode the wall is speedily covered, and a modification of it might be advantageously adopted in richer soils; on this principle a wall could be completely covered in a very few years—even before a shoot to form a branch could be safely permitted to grow, lest it should form a gourmand, in the centre of a tree laid off in the V form. Can there be any objection against planting Peach-

trees against a south aspect, at 6 or 8 feet apart; and, as they grow, incline their stems and branches westward or eastward, but not both ways?

Peaches trained *en cordon horizontal*, like the vines at Thomery, may succeed for some time; but the plan is not likely to be at all suitable for the climate of England.

The Thomery method of training the Vine is exhibited here, and, I believe, specimens of every mode of training practised in France, may be seen in a more less advanced state at Rouen. The Pyramid Pear-trees have their branches more thinned out than is generally the case about Paris; and more in accordance with what I should consider necessary for admitting sufficient sun and air in the climate of England.

I observed a cheap construction of wall for fruit-trees, which I have no doubt might be advantageously adopted in cases where the erection of brick or stone walls would not be once thought of. The wall to which I allude has a stone foundation carried up a little way above the surface; the rest is composed of a mixture of clay, straw, and a little chalk. It is about 18 inches thick, and 10 feet high, surmounted by a slate coping, projecting several inches. This wall has been built six or seven years, and is in good condition, with a fair surface, against which I have no doubt fruit-trees will find themselves very comfortably situated.

Horticulturists who may have an opportunity of visiting the garden at Rouen will not be disappointed; and under the scientific superintendence of M. Du Breuil, it will doubtless become more and more interesting. I again availed myself of that gentleman's kind invitation to see the Garden on my return from Paris; and my first impressions of the excellence of its arrangements were fully confirmed. I must add, the great attention bestowed by M. Du Breuil in explaining these arrangements deserves my best acknowledgments.

I left Rouen, March 2nd, by the 11 o'clock train for Paris. The frost still continued, and the ground could only be worked where well exposed to the sun's rays. The vineyards seen from the railroad were not dressed, nor even pruned. The stakes pulled up in autumn were lying in parcels on the ground, in general piled horizontally between two uprights; but in some instances they were placed upright with the end uppermost which had been in the ground the preceding summer.

In some of these vineyards, early Peas are sown between the rows of vines in December, and are usually far advanced by the beginning of March; but this season none were to be seen above ground.

Proceeded, March 3rd, to the *Jardin des Plantes*, and saw the arboretum, the plant-houses, École botanique, and nurseries for ornamental plants; and afterwards the Economical and Fruit-tree departments, which are exceedingly well managed under the superintendence of M. L. P. Cappe.

The pyramidal-trained Pear-trees are from 10 to 15 feet high, or more, having a regularly tapering outline from the base to the top, where they terminate in a single shoot. The young plant is stopped according to its strength, and so as to furnish side branches. These are not in stages at uniform distances along the stem; on the contrary, almost every shoot which breaks out from the stem is allowed to grow; but the laterals produced on these are pinched in summer, and even such of the leading shoots as appear likely to become too strong for the others are stopped. All the cultivators from whom I had an opportunity of obtaining their opinion on the subject, admitted the advantages of summer pinching; whilst some regretted that circumstances prevented them from practising it to the extent they could wish. It is, however, well followed up by M. Cappe. He pinches all the young shoots, not required to form branches, when in a very young state; when they have scarcely pushed a finger's length, they are shortened to about an inch, or from that to an inch and a half. The portion left forms the basis of one or more fruit-buds, bearing fruit in the following season, or a spur on which blossom-buds are formed for bearing in the second season.

The advantages consequent on properly managing fruit-trees with regard to summer pinching, are so important that attention to the subject cannot be too strongly urged. On the whole it occasions little or no loss of time; for the confusion which would otherwise accrue is prevented; and this being the case, it is only doing that in summer which, if neglected, would occasion as much loss of time in winter. I am aware that many have more time to attend to trees in winter than in summer; but let the advantages of summer pinching be experienced, and doubtless, in most cases, due provision will be made for its performance. By the operation, the shoots necessary to be retained have the great advantage of more light and air than would be the case if crowded by a multiplicity of laterals, retained till the time of winter pruning, when they must obviously be cut off, either so close as to leave no bud to push, or shortened to within a few eyes of their bases. In the former case the branch is left naked; in the latter, when the tree is sufficiently vigorous, the eyes left generally push other shoots, to be again cut back in winter; and thus crops of shoots are annually produced, instead

of fruit, for many years, or until the tree approaches the state of old age.

The plan which M. Cappe pursues succeeds admirably in the climate of Paris. The fruit on the pyramid Pear-trees under his management is stated on competent authority to have been last year exceedingly abundant, large, and fine. This season the trees are healthy and vigorous, and well furnished with blossom-buds. It may be said that the generally dry, clear air of Paris is very different from the cloudy and moist climate of many parts of Britain; the one being favourable for the formation of fruit-buds, whilst the other favours the growth of wood and leaves; and therefore, circumstances being different, the same practice may not be equally proper for both. There are, moreover, instances of circumstances differing so widely as to require opposite methods of culture. But this does not hold good as regards summer pinching. In England the drawback is a dull atmosphere; the shoots and foliage want more air and light. Summer pinching affords this, inasmuch as it prevents the crowding and shading of wood and leaves necessary to be retained, by that which is superfluous; and therefore it must be considered of still greater utility in dull climates than in bright, more necessary in England than in France. It is generally admitted that "where nature does most, man does least;" but with regard to the management of fruit-trees an exception must rest till summer pruning receives as much attention in England as it does in the Jardin des Plantes, and elsewhere in France.

Supposing the branches of a tree are properly thinned and regulated at the winter pruning, and that so far as they extend, their number is quite sufficient for the space they occupy; presuming, also, that the tree is in good health, a number of laterals are sure to spring. They are, of course, superfluous; and every one of them should be pinched as already mentioned. If the last year's shoot has been shortened at the winter pruning, then, besides the terminal one on the part left, one, two, or three next to it are almost sure to push; and these M. Cappe commences to check by pinching when about three inches in length; but those nearer the base of the shoot he allows to grow till they attain the length of six or eight inches before he shortens them. The terminal bud is of course allowed to go on for the prolongation of the branch. It frequently happens in France, and the liability will be still greater in the climate of England, that after a shoot is pinched back, the newly-formed buds on the part left will push a secondary shoot in the same season. When this is the case with those under the care of M. Cappe, he also pinches these secondary shoots to an inch or an inch and a half from

where they originate. They rarely push again; but if they do, their growths are again reduced as before.

The *winter pruning* of pyramid Pear-trees is almost reduced to a mechanical operation, when the summer management has been properly attended to. Keeping the tapering form in view, it consists in cutting each shoot a little shorter than the one immediately below it, taking care to cut to a bud situated on the side of the shoot towards that direction in which it would be most desirable the prolongation should proceed. Shoots that are too vigorous for the rest are not cut to a bud on the upper side, but to one situated below.

Some trees appeared to be much admired by every one on account of the introduction of another feature of regularity in training, besides that of a merely tapering contour. These had what is called a *tutor*,—that is, a straight perpendicular stake, to which the stem is trained; and from the top of this stake five wires are stretched to as many equidistant points on a hoop near the ground, or in one instance to five short stakes. These wires represent the angles of a five-sided pyramid—a pyramid apparently fifteen feet high on a pentagonal base. Branches are trained directly from the stem to each of the wires. In order to convey some idea of these trees, one may imagine five upright trellises or screens projecting from a central upright, forming the partitions of as many equal recesses, widening outwards. The branches form such partitions with good effect as regards regularity; and when they become ornamented with leaves and fruit the whole must prove an interesting sight. The trees had a fruitful appearance.

Instead of the branches radiating from the stem in five directions, it might be found more convenient to train them out to four points, say east, west, north, and south. It may, however, be observed, that, in the Pear-tree, five buds form a spiral once round the shoot or stem; or, in other words, supposing the leading shoot to be perpendicular, every fifth, tenth, fifteenth, &c., bud will be in the same vertical plane. Therefore, if the number of buds between one branch and that next above it be always a multiple of five, the branches radiating in each of the five directions will originate exactly above each other.

The trees above described had been formerly grown as pyramids in the usual way, with branches extending promiscuously; but M. Cappe is of opinion that by commencing with a young tree, the tutor and wires may be dispensed with. In exposed situations the wires form excellent stays; and where they are employed, a comparatively slender stake will be sufficient.

A curious specimen of trellis-work was standing against the end of one of the sheds adjoining the plant-houses. It had been

formed by crossing and inarching the branches of apple-trees, so as to form rhomboid interstices. The piece had been grown from three stems, and was three or four feet high. The branches were so completely united, that although the bark was partly off, and the wood somewhat fissured by exposure, it was impossible to say with which stem in particular the vegetation of the respective branches had communicated. I am of opinion, that if any one of the stems had been sawed over, the branches it supported would have derived nourishment to keep them alive from the other roots. It appeared to have been removed from the place of its growth many years; but previously it must have formed part of a very strong living espalier.

Several of the hot-houses are very old, and will probably be pulled down as soon as the contemplated additional new ranges are finished. At present there is not half sufficient room for the large collection they contain. The new palm-house is lofty; and in it there are some magnificent specimens.

In some of the hot-houses, heat is derived from large stoves of white stoneware, placed inside. They have apertures at the sides for supplying heated air, somewhat resembling the Polmaise system. They are adapted for burning wood, and appear to have been in use for many years. The state of the weather required them to be hard at work when I had the opportunity of seeing them.

In the École de Botanique, the plants are named on different coloured labels: Red, indicating plants used in medicine; Green, alimentary; Blue, those employed in the arts; Yellow, ornamental; and Black, poisonous plants. I may here mention that M. Neumann, who has the superintendence of the plant-houses, was for some time in the Mauritius. He informed us that the Aërides odoratum is there used as tea, a very few leaves being sufficient for infusion. I thought it might be employed merely for imparting a flavour to the tea; but he said they used the Aërides leaves without employing any other along with them.

Keteleêr's Nursery, Boulevard des Gobelins.—In this there is but little space for fruit-trees; but grafting of Pinuses and other ornamental plants is performed very successfully. M. Keteleêr finds the Abies religiosa does much better grafted upon the Abies canadensis than it does upon the Abies excelsa. He possesses excellent collections of Conifers, Azaleas, Roses, and Camellias, and amongst the latter a fine new variety called Camellia Saccoi nova.

The Nursery of M. Dupuy Jamin, Barrière d'Italie, Route de Fontainebleau, contains extensive assortments of fruit-trees

and Roses. Pyramidal-trained Pear-trees were here plentiful. The demand for these must be great, judging from the quantity observed to have been recently planted, more especially in the numerous small gardens. On observing that the branches were not sufficiently thin for the due exposure of the fruit, the reply was that this was certainly the case, yet the nurserymen found that their customers generally preferred having plenty of wood, and they had to suit them accordingly.

Parallel to a long central walk in this nursery, a small zinc pipe was supported by stakes about two feet above the surface of the ground. Such an aqueduct could be formed at a trifling expense, compared with the saving it might be made the means of effecting in a dry season. It is certainly an object of pecuniary importance to supersede the labour of several men by merely turning a cock, and allowing the water to run quietly along to reservoirs at a distance from the source, instead of wheeling it in tubs, and frequently tearing up the walks in the course of the proceeding. It may be said that the pipe might as well be laid in the ground, as the water would rise to a level; but in that case the pipe would only be available in one fixed direction, instead of being easily moved to where it may be requisite. Such pipes might be made at no great expense, in convenient lengths of about ten feet, with flexible India-rubber connexions. The lengths could be tied together in bundles when not wanted; and when required, they could be readily extended in any direction.

The Establishment of M. de Gontier, Barrière d'Enfer, Route d'Orléans, contains many varieties of Pine Apples, among which are a number raised from seeds recently obtained from Guadaloupe; and a very large assortment of Camellias, exceedingly well grown.

The Pine Apples are cultivated as follows:—The suckers are potted in small pots in October; and in March following they are planted out of the pots into peat soil, 12 plants under each light, the lights being each 4 feet by 4 feet 4 inches. In October the plants are taken up, and repotted, with all their roots, in pots 7 inches wide. In March, the finest plants are taken out of these 7-inch pots, and planted in peat in a fruiting-house, where they mature their fruit in the course of the summer and autumn. Those not planted out remain, and are fruited, in the pots. It thus averages about two years from the time the suckers are first potted, till the plants reared from them mature their fruit.

In a small compartment, with top and bottom heat supplied from the same source as that from which the Pine-house is heated, there were two plants of the Musa Cavendishii, each

bearing a large fruit cluster, one consisting of 300 fruits, the other 250. They had been planted in March, 1846; and in April, 1847, the fruit was expected to be ripe. The stem of one measured 31½ inches in circumference. They were growing in leaf mould, the extent for each plant being 4 feet by 4 feet 6 inches, and about 15 inches deep. When the fruit is ripe, the plants are taken up, and the places prepared for fresh suckers.

The Strawberries here forcing were the Comte de Paris and the Princesse Royale.

At the *Establishment of M. Cels, Chaussée du Maine*, noted for large collections of Camellias and Cacti, and amongst the latter many thousand seedlings, there is a wall of Peach-trees, planted about six years ago by M. Alexis Le Père, of Montreuil, and has been since managed by him according to his system, a modification of that usually practised at Montreuil. The trees extend about 12 feet each way, two main branches diverging at an angle of 45° of elevation; subsidiary branches are trained from the under sides of these; but no branch has been suffered to grow to any extent on the upper sides of the main branches, a number of fruit-bearing shoots only being there encouraged, consequently a large portion of wall still remains uncovered between the two V formed main branches.

Gardens of the Luxembourg.—We proceeded to these gardens, March 5th, to hear the lecture on pruning, by M. Hardy, at 8 A.M., in the open ground. M. Hardy delivers two lectures every week, free to the public, on pruning, grafting, planting, and in short, every thing connected with the management of fruit-trees, finishing the course in the end of April. He has generally from 300 to 400 hearers, among whom are young men employed in the Luxembourg Gardens, the Jardin des Plantes, and other establishments, by permission of the respective directors. In various instances the young men afterwards make up for the time they are thus absent. But the greater number of those who attend are amateurs. M. Hardy also lectures in the afternoon to gentlemen wishing to obtain a knowledge of the management of fruit-trees. The admittance for each person to any one of these is, however, 3 francs. From fifteen to twenty gentlemen usually attend the afternoon lectures.

In his first lecture, I was informed, M. Hardy explained the physiology of the tree, the action of the sap, the names of the different parts of the tree; the stem, branches, and the technical distinctions of the latter, such as *Rameaux à bois, Rameaux à fruit, Brindilles, Lambourdes:* branches for wood; branches

for fruit; fruit-bearing twigs, and spurs. The term *brindille* requires however a little more explanation:—Pear-trees recently raised from seeds are usually armed with thorns, a provision for the defence of the young plants; but naturally, as the trees get older, and more especially when influenced by cultivation, the thorns are produced less abundantly, and by degrees they disappear. The thorns latterly produced lose their original character. Instead of being naked, one, two, or more very small buds may be observed upon them; but still they are pointed, and this being the case, they yet retain the characteristic of a thorn, and cannot elongate in the following season. Some after productions may however be seen to terminate in a small bud, and the substance throughout is much softer, but still harder than the regular shoots on other parts of the tree. These growths may be then looked upon as thorns modified; they become capable of elongation, and are what the French term *brindilles*. They proceed at right angles from the branches producing them; and are not inclined to grow upright. They sometimes bear fruit before the other branches; but when the trees get into full bearing, these brindilles are not required.

M. Hardy concluded by showing how to handle and properly apply the knife.

The second lecture, he took a maiden plant, and explained how it ought to be dealt with according to the modes of training for which it might be intended; then a plant two years old; another three, and so on.

For the third lecture, at which I was present, he had a pear-tree, intended for a pyramid, planted in the centre of a circle, formed by a rope, about 50 feet in diameter, outside of which the people stood to hear the explanations, and see the mode of operation. In the tree selected for illustration, M. Hardy pointed out faults from not pinching the shoots in the previous summer; and some others in consequence of former winter pruning. The reasons for cutting each branch as he did, were successively given, as well as an explanation of the bad effects of cutting otherwise; and ultimately the pruning of the tree was completed in good style. We had an opportunity of closely examining it after the lecture was over.

We then inspected the different quarters planted with pyramid Pear and Apple-trees, and those containing Cherry and Plum-trees. As there is no wall for Peach-trees, these are trained against a trellis, backed with straw mats; and with this assistance the fruit ripens perfectly well.

All the quarters containing fruit-trees are surrounded with borders, planted with Cherry, Plum, and Apricot-trees, as standards; and some with excellent effect are trained in form of

a *Vase*, or *en Gobelet*, dwarf, or with a stem 5 feet or rather more in height. The head is formed hollow, in shape like a goblet, the shoots being annually tied to hoops of wood, adapted to the circumference required to give the desired form. Two hoops are sufficient, the two-year old wood being tied to one; and the equidistant regulation of the one-year old shoots is effected upon the other. As the *vase* or *goblet* widens, of course hoops of greater circuit must be prepared, either of new materials, or by introducing an additional piece. In some instances the hoops were formed of round, apparently $\frac{1}{4}$ inch, iron rods; but wood is preferable to iron, for vegetation in contact with the latter is apt to be injuriously affected by the rapidity with which it heats and cools. Shoots are apt to spring up in the centre of the goblet; but they must be pinched in summer; and so all other irregularities of growth appear likewise to have been. The form is very ornamental; it can be produced at little expense; and the trees were well furnished with fruit buds. Suppose a tree to have 6 shoots, let them be tied at equal distances to a hoop placed horizontally, and then shortened a few inches above it, or so as to leave them a foot or more in length. From each of these, two shoots may be trained to the outside of a somewhat wider hoop in the following season; and thus by annually introducing hoops of a width proportionately corresponding with the respective diameters of the vase intended to be imitated, the desired form will ultimately be produced. The head of the tree will be completely balanced; and the branches will be more nearly equidistant than they could be by any other mode of training as a standard. I should prefer wooden hoops to iron ones. If weak, or if two or more pieces must be employed for the hoop, its circular form may be preserved by two small rods, secured diametrically across it.

Adjoining the Fruit-tree quarters there is a compartment used as the Experimental Garden of the Royal Agricultural Society of Paris. The space, however, is too limited for any extensive experiments being undertaken; and the backwardness of the season had prevented any thing interesting from being commenced.

The Botanic Garden of the École de Médecine lies in a low situation; but this is doubtless an advantage in the hot dry weather. The plants are disposed in straight beds.

In one of the quarters there is a collection of 1800 Vine plants, from all the departments. This was chiefly formed by Chaptal, when Minister of the Interior, in order that their nomenclature might be settled, and their respective merits ascertained. I am not aware that the original intention has been fully carried out; but the vines are still kept in good order.

It may be interesting to mention, that in the Gardens of the Luxembourg, and Jardin des Plantes, the best collection of fruit-trees in France, that of the Chartreux, was preserved; and also that from these gardens the sorts were obtained by the Society when the collection was forming for the Garden at Chiswick. This was the best source whence the identical varieties described by the celebrated Duhamel could be obtained, as appears by a communication from M. Thouin, appended to a list of grafts sent to the Society in 1820, and of which the following is a translation:—

"Various causes having prevented my worthy colleague, M. Bosc, from taking off the grafts requested for the Horticultural Society of London, from the nursery of the Luxembourg, he begged of me to make the collection. This I undertook with the greatest pleasure, as, in obliging my friend, I may also render a useful service to an honourable body to which I am proud to belong.

"The Society may be assured that the names of the grafts precisely correspond with the varieties described by Duhamel (Traité des Arbres Fruitiers, Paris, 1768). The following are the means which were employed, by which we are able to accomplish so important an object.

"In 1793, when the question was agitated of suppressing the monasteries, and placing their property at the disposal of the State, foreseeing the destruction of the garden of the Chartreux at Paris, and anxious to preserve to horticulture the originals on which Duhamel had established his nomenclature, I begged and obtained permission from the minister Roland to remove whatever trees I pleased from the complete collection which that garden contained. They were labelled according to the Catalogue of the Chartreux, and transplanted in the garden of the Museum, where they were arranged in such a way as to form a school for the instruction of nurserymen, gardeners, country gentlemen, and even botanists and physiologists.

"The garden of the Chartreux was soon after destroyed; there remained no vestige of it; and it was not till ten or twelve years after, that it was re-established in the Luxembourg, by rooted plants or grafts taken from our school of the Museum, in the Jardin des Plantes.

"On the formation of that school I invited Christopher Hervy, gardener to the Chartreux, a man well informed on the subject of fruit-trees, and who supplied Duhamel with a great portion of his nomenclature, to make a general examination at the periods of the flowering and fruiting of the trees, to prove the identity of the names of our varieties. This labour was pursued during the first six years of our plantation in the school, in such

a way as to correct errors which might have crept in. There now, therefore, remains no doubt on this head. But this is not the case with many of the varieties obtained from various parts of France, and more particularly from abroad, since the publication of Duhamel's work. The nomenclature of these is vague; in many cases the sorts have proved synonymous with those already known; and it is necessary to wait till the trees have fruited in order that they may be correctly named."

It thus appears that the collection of the Chartreux, made during a period of 150 years, was preserved by the exertions of M. Thouin; and of that collection the Horticultural Society of London received with the above communication, grafts of 48 varieties of Plums, 99 of Apples, and 145 of Pears. Peach and other kinds of fruit-trees were subsequently forwarded from the same source.

M. Laffay's Nursery, Rue du Bel-air, Montée des Capucins, Bellevue.—From the Luxembourg we proceeded to Meudon, but did not find M. Pelvilain at home. We then called on M. Laffay, Bellevue, well known as a rose cultivator, and who possesses thousands of seedlings of the Perpetual Moss Rose. Here, the aspect being northerly, the ground was still frozen (March 5) to the depth of 6 inches, which is very rarely the case in England so late in the season. M. Laffay had the kindness to give cuttings of various kinds of fruit-trees for the Society, among which were the Belle de Hâvre Apple; the Muscat Noir Hâtif Grape, although not the very earliest, yet the earliest, he said, of all *Muscat* Grapes; also cuttings of Malus Sieversianus, originally from the Caucasus, and named after a Russian general. Mr. Knight's seedling, the Elton Strawberry, succeeds well here, producing large fruit in great abundance, and it affords a late succession.

Sèvres.—Here, on our way to Boulogne-sur-Seine, we passed the King's Flower Garden, whence the supply of bouquets for the palaces is principally derived. It is laid out in straight beds. We then traversed the *Park of St. Cloud.* The elevation where the "*Lanterne*" is situated commands a very fine view of Paris.

At *Boulogne-sur-Seine, the seat of Baron James Rothschild*, there is extensive forcing of fruits, flowers, and vegetables, under the direction of M. Bergmann, a native of Holland; and he seems to prefer the usual practice adopted in his country of forcing under low structures. The fruits being forced were Pine-apples, Grapes, Peaches and Nectarines, Apricots, Cherries,

Plums, Melons, Raspberries, and Strawberries. All these had a very promising appearance. The forcing houses are mostly wooden structures, about 11 feet high, and 8 feet wide; they are heated by hot water in copper pipes. The pits for Melons, Cucumbers, French Beans, &c., are heated by hot water, aided by dung linings. The boilers as well as the pipes for this purpose are made of copper. This substance appears to be generally preferred to iron for the hot water mode of heating about Paris, even by market gardeners. On the score of economy, they say, that although it is somewhat dearer than iron in the first instance, yet it is ultimately cheaper, inasmuch as it wastes but little, and it is always saleable. As regards adaptation, they can obtain heat much quicker from it than from iron. This property is more especially an advantage in such a climate as that of Paris, where the general clearness of the air admits of a large amount of sun-heat being suddenly accumulated; and consequently, the quicker the heating apparatus parts with its heat the better. On the other hand, in proportion nearly as the clearness of the air favours a sudden rise of temperature by sun-heat, so does it facilitate the rapid escape of heat by radiation, as soon as the sun's influence is withdrawn; and hence a promptly heating apparatus is again the most eligible.

Parallel to a range of forcing-houses, on the opposite side of the walk in front, there are two rows of vines about 4 or 5 feet apart; outside of these, over half the length of the rows, a moveable frame is placed, with sashes inclined so as to rest below the edges of a board at the top, and high enough to admit of a person walking along between the rows of vines, trained upwards on both sides. When the vines have been grown one year under this structure, it is removed and placed over the other half of the plantation. By this arrangement the vines are grown, one year under glass, and the next in the open air, and so on alternately. Finer grapes are thus obtained than by constantly keeping the vines under glass. This fact deserves further consideration.

Supposing a vine is planted in a rich border, and that it is introduced into a house where it is successively forced with abundance of heat and moisture, but with some deficiency of light and air; the foliage may be ample and the shoots gross, but it does not follow that this luxuriant growth is a substantial one, although, under the circumstances, the best system has been pursued. The growth may have progressed steadily under a gradual increase of temperature, like that of the natural climate of the vine. So far as heat and moisture are concerned, the vine under glass need be no sufferer; but, as regards light, it must suffer to a greater or less extent. That this is unquestionably

the case will appear evident from an inspection of Bouguer's table of rays reflected from glass. According to this, the average amount of rays reflected from glass at various angles of incidence from 1° to 87½°, or, we may say, from morning to night, is upwards of 22 per cent. This calculation is on the supposition that the roof is all good glass. But an additional privation of the rays of light must be taken into account, in consequence of their total obstruction by the rafters, &c.; and sooty laps have no small share in producing obscurity. Altogether we may reckon that, in the course of the day, vines under a glazed roof are deprived of more than 30 per cent. of the rays of light which they would enjoy if growing in the open air. This privation must weaken the constitution of the plants, especially when they are year after year subjected to it.

I do not suppose any one ever saw grapes badly coloured on the open wall, provided they at all approached the state of ripening. When yet sour, they may be seen as black as sloes; and whether the border is rich or poor, or the fruit exposed or partially shaded by the leaves, still the colouring is good, if the climate is only sufficient to bring the fruit to the stage of growth in which the colouring process is effected, and although too cold for perfect ripening. The superiority, as regards colour, of grapes on the open wall, may therefore be fairly ascribed to the free action of light on the foliage.

The influence of light, however, goes much farther than the mere colouring of the fruit. By it the constitution of the whole plant is affected, from the foliage to the very extremities of the roots: the latter, in fact, cannot long continue to be produced unless the leaves effectually elaborate sap, and this they cannot do without free light and air. Even in this country vines growing in the open air maintain their roots in any soil that is not excessively bad; but with all appliances, how generally do they fail in borders when their tops are kept under glass! There the heat may be well regulated, greater perhaps than out of doors, but not greater than where the vine lives for centuries, and a due supply of moisture may be afforded; but the natural constitution of the plant becomes impaired for want of sufficient light; and sometimes to such an extent that, with a little mismanagement in other respects, the vine is scarcely able to bear fruit at all.

From the above remarks it may be inferred that M. Bergmann's plan of alternately forcing and exposing his vines is highly advantageous. Were it not so, he would not likely be at the trouble to move his glazed structure annually. I have endeavoured to explain the principles on which, as it appears to me, the merit of the plan rests; that is, the beneficial influence of

unobstructed light on the foliage. The renovating effects of this for a whole season must undoubtedly enable the vines to produce a superior crop to any that could otherwise be obtained. The principle will hold good in England, or anywhere else, provided the heat of the climate is sufficient to ripen the wood without artificial heat and covering. This indeed must limit the full adoption of the method; but the latter may, notwithstanding, be usefully borne in mind, and the principle may be acted upon wherever circumstances will permit. For example, I believe it will not be denied that better grapes have generally been produced in old vineries with sliding sashes, than in those with fixed roofs, and ventilating holes in the front, and back walls for admitting sufficient draught of air. Sliding sashes not only admit air, but likewise the free light to a considerable quantity of the foliage, during portions of the brightest days; and thus, to some extent, the advantages of M. Bergmann's method are ensured. Fixed roofs, on the contrary, entirely preclude the admission of light except through the medium of the glass, and it may be concluded they are not the best construction for the vine.

A number of men were employed trenching a large extent of lawn. The grass, when laid down after the soil has been trenched and manured, keeps longer green when the heat and drought become excessive, than would otherwise be the case. This process, repeated in the course of several years, is an expensive mode of maintaining verdure; but it is doubtless the best. In kitchen-garden cropping it is well known that they who trench in winter save much time as regards watering in summer, and if plenty of manure can likewise be afforded, most crops will require but little watering, even in very dry seasons. They are also better than where the ground, from not being so prepared, requires daily large supplies of water during a long period of drought, and hence occasioning perhaps much more expense than would have been incurred by previous trenching.

Trees and shrubs appeared to thrive well, but more evergreens might be introduced with good effect, together with additional species of ornamental trees. I observed, as worthy of particular notice, a remarkably fine specimen of the Juniperus virginiana, var. pendula.

Nursery of Messrs. Jamin et Durand, Rue de Buffon.—M. Jamin's nursery here is but small, and may be considered chiefly as a depôt for trees to supply his orders. Along the sides of the walks some fine tall specimens of pyramid Pear-trees were remaining; but the greater part had been just removed to his new nursery-grounds, of considerable extent, at *Bourg la*

Reine, route d' Orléans, about four miles from the Barrière. Here we found them about to be planted in good soil, duly prepared for their reception. Many of them were well formed, to the height of sixteen feet in six years; some were on pear-stocks, others on quince; M. Jamin is rather partial to the former.

The trees were planted deeper than is considered advisable in England; but this was said to be necessary in order that the roots might not suffer during the very hot weather. The holes for the trees were made as they ought to be, not like a basin, or half sphere, but with the sides perpendicular, and the bottom convex, a slight mound of prepared soil being there formed, over which the roots were spread.

M. Jamin does not shorten the shoots of trees worked on the pear stock so much as he does those on the quince; and none of them were so much thinned as he would recommend and practise, were it not for the preference which his customers give to those trees that are furnished with plenty of wood. He generally commences pinching the young side-shoots in the end of April.

In another part of his new ground a number of the hardiest varieties are planted as standards; those that are less hardy he prefers growing as pyramids. On each side of a long central walk he has commenced planting a collection of the different varieties of Pears and Apples, in the order of their ripening. The Society obtained from him, several years ago, a number of varieties reputed the best at the time; and in going round he again supplied grafts for the Society of such as he considered the finest new kinds in his collection, such as the Suzette de Bavay, Baronne de Millot, Fondante Millot, Beurré Starkmann, and Arbre courbé Pears; the latter is so called from its pendulous habit of growth. Altogether, 20 varieties were at this time received from him.

Fruit and Kitchen Gardens of the Palace of Versailles.—We proceeded to Versailles, March 8th, with the intention of confining ourselves to the inspection of the fruit and kitchen gardens only on that day. These, with the buildings appertaining to them, occupy about 30 acres. They were originally laid out, as regarded their internal arrangements, by Jean de la Quintinye, in the time of Louis XIV. They are said to have been much neglected during the revolutionary period, and until the restoration of the monarchy. They are now, however, under good cultivation. The forcing department is under the immediate superintendence of M. Grison; the fruit trees on walls, espaliers, &c., are managed by M. Puteaux.

The forcing of fruits and vegetables in houses, pits, and frames

is extensive; this department occupies nearly two acres. In a long range of houses, 10 feet high at back, and between 6 and 7 feet wide, Peaches are trained horizontally against the back wall, and sometimes the extremity of one branch is inarched to some part of a branch of the adjoining tree, thus forming a continuity. Along the front, Peaches, Nectarines, Plums, and Cherries were being forced in pots. The fruits on these were just set. The varieties of Cherries in forcing were the May Duke, and another said to be a new variety, called the Reine Hortense. The Plums were in 13-inch pots, and their shoots are pinched in summer, so that little winter or autumn pruning is required.

Many of the forcing-houses have evidently been constructed on economical principles, but independently of this, small houses appear to be still preferred; for a new house, on which expense in well fitting up has not been spared, is only 8 feet high at back, 4 in front, and 10 feet wide; the length, 20 lights, about 80 feet. Peaches are planted against the back wall, and trained to horizontal iron wires, 8 inches apart, running through eyed holdfasts. From iron uprights, by the side of the footpath at the back, very neat wire trellises extend across towards the front; against these Peach-trees are trained and kept to their limited space by pinching, the trellises being only about 4 feet high even at the footpath, and the distance from one trellis to the other is only 4 feet; the trees, one at each trellis, are planted almost close to the footpath, and their branches are trained horizontally towards the front.

In an older house, Figs were trained in the same way against trellises similar to those above described. They were planted close to the south side of the footpath at the back, and had all their branches trained horizontally towards the front. They had a very promising appearance for fruit. The young shoots are pinched early.

A number of Fig plants were observed that had been raised by layering from plants in the open ground. They were layered in small pots in May, 1846, and in October last they were removed, shifted into 12-inch pots, and taken into the house for forcing. They were studded with a profusion of young fruit.

In the Peach-house, the horizontal mode of training along the back wall has been generally adopted, the bearing wood being encouraged on the upper side. The Apricot-trees in houses were also trained in this way. In one of the houses a Peach-tree has been budded on the apricot as a stock, and is yet thriving very well.

Some of the fruiting Pine-houses appear not to have been originally constructed for that purpose. They are more than 10 feet high. The back wall is perpendicular to the height of

about 6 feet, and then curves gradually forward over the foot-path. The back was formed to a considerable height of arches, the openings of which are closed in with sheet iron, in order to transmit heat the more readily from dung linings when necessary. But the heating is now generally effected by means of hot water in flat copper conduits, 10 inches deep, and 2 centimètres, scarcely an inch, wide. They consequently occupy but little space in the width of the house, or horizontally. Copper, either as round pipes or in the flat form, is here preferred, chiefly on account of its being a more rapid conductor of heat. In some cases open troughs, for a supply of moisture, are formed on the tops of the copper conduits.

In one pine-house, consisting of Queens, the fruit was nearly ripe, and a fair size. The plants were grown in small pots in sandy peat, and in shifting the plants were not disrooted. In another house the plants were growing, not in pots, but planted in a bed of peat soil, laid on stable litter, well beaten, for bottom heat. They had a vigorous appearance, and will be two years old when they mature their fruit in the ensuing summer. The Cayennes, and other large sorts, were those so planted out. Some were planted out of pots into peat soil in January last, after their fruits were formed; the plants were thriving, and the fruits were swelling exceedingly well. The number of Pine Apples annually fruited in these gardens must be immense. The houses we had already passed through were extensive, when we came to four more fruiting ranges, each 100 feet in length, 6 feet wide, and 7 feet high at the back.

A seedling Pine Apple was shown to us by M. Grison. It was a monstrosity, preserved in spirits, with a cockscombed crown, a line following the wave of which was no less than 6 feet in length; another fruit, diverging from the same stalk, was of the usual form.

In a house heated by a flow and return copper conduit, there was a Musa Cavendishii in fruit. It was not quite a year old, and was planted in leaf mould, resting on a bed of stable litter and leaves.

Vines were being forced in wooden pits, surrounded with dung linings. These pits were certainly of a very cheap construction, merely some posts and boards nailed together, and only 3½ feet wide; but the quantity of grapes produced in that limited width was astonishing. The vines were trained horizontally along the back, which was apparently not more than 3 feet high. A 3-inch earthenware pipe was laid along the front for hot water, supplied by means of a small boiler placed at the end of the range. The variety in forcing was the Chasselas de Fontainebleau, or Royal Muscadine, as it is generally called in England. The

crop was excellent, and would most probably be ripe about the third week in April. M. Grison does not force the same vines successively; he only forces them every other year.

In such pits, similarly heated, Peaches were also growing well, and the fruit was further advanced than any in the houses.

Extensive ranges of pits were occupied with the forcing of vegetables, such as French Beans, Peas, Carrots, and Lettuces; of the latter a variety called the Laitue George was preferred. The Peas in the pits were not in pots. The pits for French Beans were furnished with copper pipes for supplying heat, in addition to that derived from the dung linings. The variety of Melon then forcing was the Cantaloup Petit. Eight ranges of pits were chiefly occupied with the Alpine Strawberry, that being the sort preferred at the royal table. M. Grison found that seedling plants of this sort, when forced, ran much to leaf, but did not fruit so well as plants from runners. He accordingly sows every year, and instead of employing the seedling plants themselves, he pots, in August, the plants from the runners which the seedlings produce.

Vines on the open wall are managed according to the Thomery system; but they make much stronger growths, the soil being richer than at Thomery, and also rather damp below. M. Puteaux informed us he had pruned the vines on those walls for forty years. They were planted 6 feet from the wall, and the shoots laid towards it at the depth of 15 inches. By the Thomery method, each plant has only one stem, branching into two arms, extending horizontally right and left. The shoots from buds along these horizontals are trained upright; they bear the fruit, and in the winter they are cut back to the *lowest eyes*. M. Puteaux cuts them back to one eye if weak, sometimes to two if strong. In pruning he always studies next year's wood and fruit more than the present. He hesitates not to sacrifice a fruitful but misplaced shoot, in order to obtain one more eligibly situated in the following season; acting according to the spirit of a line in *Rapin*:—

"Nor spare the boughs, for sparing spoils the tree."

He spares no shoot, however promising for fruit, if it interferes with the principles of the system he has adopted. So promptly has he uniformly dealt with all such, that it was not an easy matter to find a perverse shoot for exemplifying in such a case his mode of proceeding. The principle is, to cut back all the upright shoots to the lowest eyes that can be observed; and although the lower of two adjoining shoots be the weaker, yet, because the eyes at its base are the nearest to the main branch, they are preferred, whilst the upper shoot, although the most

promising, is entirely cut back. The whole wall was furnished with fine bearing wood, the pruning of which had been but recently commenced.

Fruit-trees in some of the quarters and peach-trees on walls suffer from the dampness of the soil, or more especially the subsoil. The site is low and flat. Probably, the ground had been dug out to raise the terraces of the palace. Peach-trees against the walls do not long continue to thrive; but the mode of training them, somewhat like the Thomery vines, is not conducive to the health of the peach-tree. There are some good pyramid pear-trees in the quarters, and some have their branches curved downwards, like those in the Society's garden. M. Puteaux ties the pears on the branches of these pyramid trees, to prevent them from being prematurely blown down.

The quarters are surrounded by espaliers six feet high. Wooden posts are driven into the ground as supports for the trellising, and the whole has a neat appearance. By the side of the central walk in this part of the gardens the espalier is partly constructed of iron, strong bars forming arches from post to post, surmounted by an iron top-rail. This contrasts strangely with the simple upright and horizontal lines which the adjoining espaliers exhibit.

In some of the quarters inside these six-feet high espaliers there are very dwarf ones, about sixteen feet apart, the spaces between them being cropped with vegetables. These dwarf espaliers are scarcely four feet high; they are formed by posts driven into the ground, and to these four small wooden rails are fixed horizontally. Pear and apple-trees were trained against them. Some of the trees appeared to be fifteen or twenty years old.

What is done at Versailles as regards espalier-training might be very advantageously imitated in other large gardens, and for small gardens no mode is so proper. If the trees be well managed, they will almost support themselves by the time the first, and not expensive, woodwork decays. They occupy comparatively little space; some crops can be grown almost close to them; and their appearance, loaded as they ought to be with fruit, cannot certainly be deemed unsightly.

We observed some pear-trees trained on espaliers, horizontally it may be said, but with an important peculiarity. On remarking them we were informed that their branches were originally trained from the stem at an angle of 45° of elevation; but that they were afterwards brought to a horizontal position, excepting the parts near the stem, which still retained almost the original position. Although lowering the branches was, I believe, an after-thought as regards these trees, yet I believe a

better principle than that of allowing the branches to ascend at the above angle for a little way from the stem, could not be adopted.

The orange-trees are magnificent. Their winter-quarters are below the terrace of the Palace; consequently, they have only light in front, which, of course, is lofty, otherwise trees thirty feet in height could not be admitted. The number of orange-trees is 1500. Some are 300 years old, with stems thirty-nine inches in circumference. One has the inscription "*Semé en* 1421." Its age must, therefore, be 426 years, and it is probably the oldest exotic in existence. The trees are planted in boxes made of oak; and these boxes are said to last from fifteen to twenty years.

Market Garden Establishment of M. Truffaut, Rue des Chantiers, Versailles.—This we visited after leaving the Royal Gardens, March 8th. Forcing, particularly of pine-apples, is here carried on extensively. The pine-suckers in autumn are put in three-inch pots. In the following April they are turned out of these pots into a bed, where they remain till the end of October. They are then taken up, *disrooted*, potted into seven-inch pots, and then placed in the fruiting pit till March or April, when they show for fruit. They are then turned out of the pots into a bed of sandy peat soil, newly prepared for their reception. This bed is heated underneath by hot water in open copper troughs, six inches wide and only two inches deep. The chamber in which these troughs are placed is eighteen inches deep. Over this chamber the soil in which the plants grow is supported by wood and tiles. The boiler is copper.

In two compartments, where bottom heat for the pine-apples is supplied by means of hot water, top heat is obtained from a six-inch cast-iron pipe, serving as a flue from the same fire which heats the water for bottom heat. From the fire at one end it *uniformly ascends* along the front, till it terminates in a brick chimney at the farther end of the compartment. The joints of the cast-iron pipe are merely cemented with clay. There is a fire at each of the opposite ends of the two compartments; and the chimney where the pipes terminate is in the middle, at the front. Hot water was previously employed for top heat; but the tubular cast-iron flue was found to be more effective, with less fuel, than was required for the hot water. This mode certainly deserves to be made the subject of experiment in order to ascertain exactly its advantages, so as to be able to state them in numerical terms. In the first place, it will be necessary to take into consideration the expense of *one* cast-iron pipe of six inches diameter, compared with *two* four-inch pipes, flow and

return, for hot water. The circumference of the six-inch pipe is to the sum of the circumferences of the four-inch pipes as 18·857 to 25·142, or within a fraction of 15 to 20. It therefore appears that about one-fourth less metal is required for the flue than for the pipes; and if it were possible to get the larger casting at the same rate per lb. as the smaller, the cast-iron flue would be, in the first instance, a saving of 25*l.* per cent. This alone is an important object; and when the saving of fuel and more effective heating are stated to be the results, certainly no more arguments need be adduced in favour of the plan. It is necessary, however, to make a few remarks with reference to the position of the cast-iron flue. It was stated above that it uniformly ascends along the front. This being the case, the heated air also ascends naturally towards the farther end, thereby causing a less pressure in that part of the pipe next the fire. This part would become excessively hot if the pipe were level, and would even give out a greater excess of heat next the fire than the old flues, iron being a more rapid conductor than the materials of which they were composed. Probably one foot in twenty would be a sufficient gradient; those observed appeared to rise more than this.

M. Truffaut prefers the Queen Pine-apple, because that variety best suits the market, grown to the weight of 2 lbs. He sells the whole to a fruiterer a little before the fruit is ripe for twelve or fourteen francs each.

He forces vines in wooden pits or frames 4 feet wide, 3 feet 6 inches high at back, and 1 foot 6 inches in front. Heat is obtained from copper pipes and dung linings. The vines in these wooden frames are forced *every second year*. In such frames strawberries are forced; ten ranges, each sixty or seventy feet in length, for vines and strawberries cost about ninepence each range per day for fuel, which is wood. The boilers are copper. The varieties of Strawberries forcing were Keen's Seedling, British Queen, and Elton. The latter, although a late variety, is employed with advantage, because it is a great and certain bearer, and answers well for coming in after the other forced sorts, and before those in the open ground. The ranges for forcing French beans are extensive, the variety being the Nain hâtif de Hollande.

Potatoes, the Marjolin, considered the same as the Ash-leaved kidney, had an exceedingly healthy appearance, growing in frames. Those which M. Truffaut forced last season had no disease; but those he grew in the open ground were much diseased.

M. Truffaut expressed himself as having been much gratified with his visit to England some years ago, when he had an oppor-

tunity of seeing the Society's garden; and he most kindly afforded us every information he possibly could.

We next called at the *Establishment of M. Souchet, Versailles.* It occupies exactly an acre; and this is nearly covered with glass, chiefly for the cultivation of Camellias. In growing these the different kinds are arranged together, and the whole establishment is conducted with great attention to order. About 1000 large bell-glasses are employed for the purpose of propagation.

Royal Gardens at Meudon.—We proceeded, March 9th, to Meudon, chiefly for the purpose of seeing the Pine-apple culture, in which M. Gabriel Pelvilain surpasses all competitors of the present day; and, judging from the vigorous and healthy appearance of the plants, they certainly bid fair to maintain the celebrity which he has already acquired. We saw at various establishments very healthy plants; but none equalled in luxuriance those at Meudon. We obtained the following details respecting the mode of culture:—

The suckers are potted in four-inch pots in August or September, the earliest period after the fruit is cut being preferred, and in these four-inch pots they remain till spring.

In March or April following a bed is prepared, half dung and half leaves, and covered with ten inches of peat soil, and into this the rooted suckers, turned out of the four-inch pots, are all planted for the summer.

In October the plants are carefully taken up with a little soil at their roots, which are not at all cut, and potted into seven-inch pots, in which they remain during the winter.

In the following spring, about March, when the plants show fruit, a number of the strongest are selected for the purpose of being turned out of the seven-inch pots, and finally planted, free, in a bed of peat soil, in houses, where they remain to ripen their fruit in the course of the season.

The remainder, not so planted out, are fruited without being shifted out of the seven-inch pots. Beds of half dung and half leaves are prepared about March, and when the heat has been properly regulated the plants are plunged, and there in the seven-inch pots they are fruited.

It thus appears that the plants are always in pots in winter. The suckers are in small pots the *first winter.* The plants are turned out into peat soil, free, during the *first summer.* All are repotted into seven-inch pots, and so kept during the *second winter.* In the *second summer* the strongest are planted out of the pots into peat soil for fruiting, and the remainder are

fruited in the seven-inch pots, plunged in beds of dung and leaves.

There is certainly no great mystery as regards this simple mode of procedure. But the extraordinary size of the fruits of those planted out in peat soil, as mentioned in the 'Gardeners' Chronicle,' vol. for 1846, and likewise the present luxuriant and remarkably dark green foliage of the plants, do not appear to be sufficiently accounted for by anything very peculiar in the routine, although perhaps a better could not be adopted. The effect must be produced by some powerful agencies which we have not yet traced out. It will, therefore, be necessary to enter minutely into details respecting the position of the plants, and to direct attention to circumstances likely to influence their growth.

The plants, as already stated, are planted out in the fruiting-houses in a bed of peat soil. The depth of the soil is about fourteen inches, placed on a wooden flooring, consisting of boards laid side by side, and supported by iron bars.

The arrangement of the fruiting-houses will be best understood by a plan and sections, which I have the satisfaction of being enabled not only to refer to as published in the 'Gardeners' Chronicle,' 1846, p. 820, but to introduce.

There are four fruiting-houses, which are heated with hot water and stable litter combined; the stable litter for bottom-heat, and the hot water for surface-heat.

No. 1, with 11 lights, each light 4 feet 4 inches wide, is the largest, of which fig. 1 is the ground plan, and figs. 2, 3, and 4 different sections of it.

Nos. 2 and 3, with 15 lights. They are in one line, and the middle light is occupied by the furnace, &c.

No. 4, with 10 lights. The whole are constructed upon the same plan.

Fig. 1.

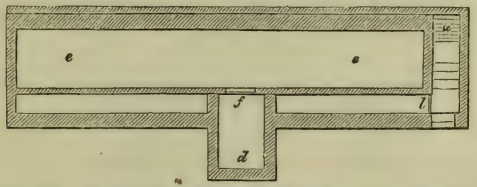


Fig. 1. Ground Plan of fruiting-house, No. 1; figs. 2, 3, and 4, sections of it. In fig. 3 is shown the manner in which access is had to the hot-bed. Fig. 4 shows the entrance and the furnace, with a side view of the house.

a, furnace; *b*, hot-water pipes; *c*, chimney; *d*, concealed pit to get at the hot-bed; *e*, hot-bed; *f*, door, which is shut up after the stable litter has been removed; *g*, air-holes, furnished with a cover to regulate the bottom heat; *h*, bed filled with peat soil, in which the pine-apples are planted; *i*, iron bar covered with boards to hold the peat soil; *k*, foot-path; *l*, door; *m*, water cistern; *n*, shelf for strawberries; *o*, ground line; *p*, iron railings for hanging the straw mattings upon, which serve to cover the houses.

Fig. 2.

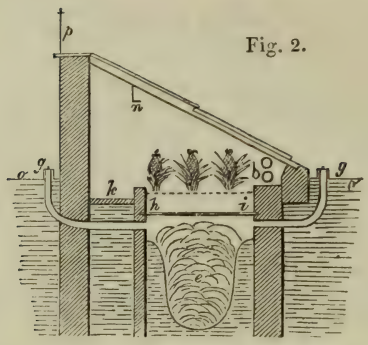


Fig. 3.

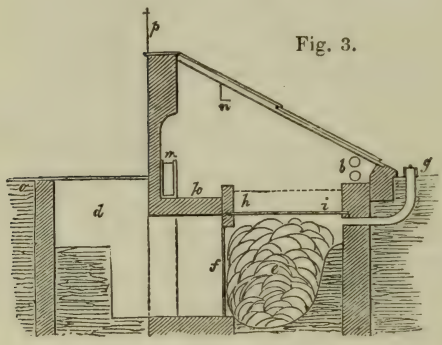
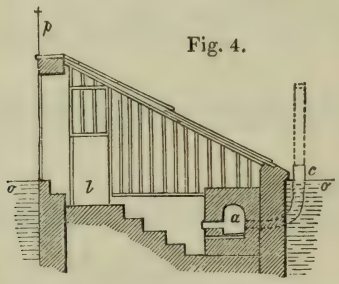


Fig. 4.



Air is given to all the pits when required by lifting up the lights.

The following analysis of the Meudon peat, *Bruyère de Meudon*, is stated to have been made with great care by M. Payen:—

Fine sand	62·
Roots and vegetable remains	20·
Humus	16·
Carbonate of lime	0·8
Matter soluble in cold water	1·2
	100·0

The above can only be called good sandy peat with a mere trace of lime in the form of carbonate. The water employed is spring water. These substances *apparently* constitute the only source whence the plants derive their luxuriance; but in this respect they so far exceed others in similar soil, that it is evident they must have an additional large supply of nourishment to that afforded by peat soil and water nearly pure.

The large stone-built vault below the beds happened to be empty when we were at Meudon, and we had an opportunity of satisfactorily examining it. The boarding over-head was, of course, somewhat decayed, from the action of the gases arising from the dung, and in various places the old roots of the pine-plants were hanging where they had insinuated themselves between the boards. When this vault is filled, or nearly so, with fermenting dung, an immense quantity of ammoniacal and carbonic acid gases must be constantly generated; and they must as constantly find means of escaping, not readily by the stone walls, but very easily by the boarding under the soil. Ammoniacal gas passes through the pores of wood much quicker than common air or other gases do. Liebig states, 'Organic Chemistry,' p. 86, that ammonia, "When in a volatile state, is in a great measure lost before it can be imbibed. When fixed, in the state of salts, its volatility is overcome, and not the smallest portion of the ammonia is lost to the plants, for it is all dissolved by water and imbibed by the roots." From the quantity of carbonic acid gas evolved with ammonia during the continued fermentation of the materials, carbonate of ammonia must be abundantly formed. This smelling salt every person knows is very volatile; but it will be in great measure absorbed by the moisture of the soil as it ascends into the latter. It has been proved that water is capable of absorbing 780 times its bulk of ammoniacal gas.

It was stated that the water employed was spring water, *nearly* pure. Unless distilled, no water is perhaps absolutely pure, since it always dissolves more or less of the substances with which it comes in contact. The water near Paris owes its hardness to the presence of gypsum. This circumstance may be of some importance as regards the Pine-growing at Meudon. "Gypsum (sulphate of lime) and other sulphates convert the carbonate of ammonia into the more fixed sulphate, which re-

mains in the soil till absorbed by the roots" (Turner's 'Chemistry,' p. 1256). It is impossible to say how much water the beds of peat soil may have received in the course of the summer, neither is the proportion of sulphate of lime which it holds in solution accurately known. For an approximate calculation it may, however, be assumed that the quantity supplied would not be less than that of rain which would fall on an equal surface out of doors, say two inches in depth per month, or six inches in three months: this, during the latter period, would give 9350 lbs. for a bed 50 feet by 6 feet. If we, then, estimate the proportion of sulphate in the water to be only one two-thousandth part, we shall have in the above quantity of water upwards of four pounds and a half, which would fix double the quantity of ammonia applied to wheat crops in the garden of the Society, and which produced the remarkably dark green, luxuriant foliage which many will recollect having there seen in successive seasons for some years past. Ammonia, however, in any form, in solution with water, produces luxuriant dark green foliage.

From what has been stated it appears evident that the large Meudon pines feed chiefly on the products of decomposition, supplied by fermenting materials in a capacious vault below the peat soil, in which they are planted.

The Peach-trees at Meudon are trained on the same principle as the Vines at Thomery, the shoots being trained upright from the upper sides only of the horizontal branches. Each tree has two such branches, extending, one right, the other left. The distance of the tiers formed by the horizontal branches of the different trees is about 2½ feet. The young shoots, trained upright in summer, are shortened to less than a foot in length at the winter pruning; and whilst they bear fruit in the following summer, a shoot for succession is trained from the base of each; or, if a shoot spring still closer to the horizontal, it is preferred. The trees are planted 4 feet apart; and are furnished with excellent bearing wood.

From Meudon we went to the Palace of Versailles, having only seen the Fruit and Kitchen Gardens there on the previous day.

The *Nurseries of the Petit Trianon*, under the management of M. Briot, are chiefly occupied by American plants, and other ornamental trees and shrubs. Grafts of an apple called the Reinette de Trianon were obtained for the Society. Some young Apricots were observed which had been budded on the Myrobalan, on which stock, it is said, the Apricot-tree is not apt to gum.

There are here a number of Arbor-vitæ hedges, chiefly the Thuja orientalis. The T. occidentalis can be kept thinner than the other; but its roots are found to extend more into the soil

of the beds. These hedges are about 12 feet apart, and 9 feet high, cut perpendicularly. They afford shade as well as shelter, and American plants thrive very well between them.

The severity of the winter had served to test the hardiness of a number of seedling Rhododendrons, hybrids between the R. arboreum and catawbiense. Some, having taken much of the character of the arboreum, were injured; but many, partaking of the hardiness of the catawbiense, were, under the same circumstances, not affected.

Montreuil.—Snow and sleet rendered the 10th of March unfavourable for horticultural excursions. At night it appears the thermometer in the Society's Garden at Chiswick was 25° Fahrenheit below the freezing point, or within 7° of zero. What the degree was at the same time at Paris, I had not the means of ascertaining; and I believe they have not registering thermometers in the Jardin des Plantes. The windows, however, were richly foliated with frost; and when we went to Montreuil, on March 11, the thermometer there indicated as low as 20° Fahrenheit in the morning. Towards noon, the difference between the extremes of a keen frosty wind experienced on the north side of the walls, and a hot sun beaming through a very clear sky, reflected also from white walls with a southern exposure, was remarkable.

Montreuil is situated about 5 miles east from Paris; but the road to it from the Barrière de Montreuil lies in a north-east direction. Between 1400 and 1500 acres of the Commune are occupied by walled enclosures, chiefly for the growth of Peaches. It appears a walled country, without houses or tall trees to interrupt the view, apart from the village, which lies lower than where the gardens extend. The gardens are generally parallelograms, with cross walls, the latter about 30 feet apart, and from 8 to 10 feet in height. The walls are 40 centimètres, about $15\frac{1}{2}$ inches thick at bottom, and 30 centimètres, or $11\frac{4}{5}$ inches at top. Three mètres, about 9 feet 10 inches, is now considered a suitable height; but in England, particularly in the northern parts, the walls cannot be too high; for the higher the wall, the better the peaches will ripen. The walls at Montreuil are generally plastered on both sides, rather more than an inch thick. Instead of tying the shoots to wooden trellising, the Montreuillois now prefer training to the naked wall, driving the nails into the plaster. The walls covered with this substance afford one peculiar advantage; they can be kept free from insects by frequent whitewashings without being thereby disfigured. They have permanent copings, projecting from 5 to 10 inches, according to the height of the walls, or the fancy of the proprietor. For the

Peach, the south-east aspect is considered at Montreuil the most favourable.

The soil appears a poor yellowish-brown calcareous sandy loam, such as would be unfit for wheat or other corn crops. In the Peach culture it gets occasionally some Paris street-manure.

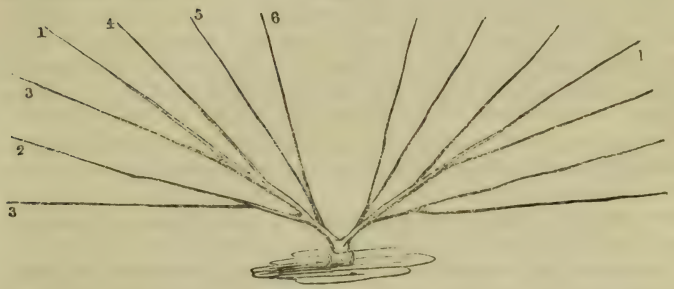
We called on *M. Alexis Lepère, Cultivateur de Pêchers, Rue Cuve-du-Four*, 40, *à Montreuil-sous-bois*, who has published a very good work on the pruning and management of the Peach-tree. We found him at his grounds, where on certain days he gives practical instruction, each person attending paying three francs. To make sure of meeting him, we went on one of those days.

Before describing his mode of training, considered the latest improvement of the Montreuil system, it may be proper briefly to explain what that system was. Its principle originally consisted in checking the perpendicular flow of the sap by diverting it into two channels, right and left. This was effected by means of the two main branches, laid off like a V. But branches taken from the under sides of these invariably became too weak, whilst those allowed to grow at the same time from their upper sides soon exceeded the original main branches in point of vigour. The under branches frequently died, or became useless from weakness, and those above them had to be lowered in their places. This was the case for two centuries at Montreuil.

Butret published a treatise entitled *Taille Raisonnée des Arbres Fruitiers*, which was considered the *vade mecum* of the cultivators. In it the physiological details connected with the management of the Peach-tree are excellent, and led to the mode of allowing the branches on the under side of the main branches to be a year in advance of those on the upper. This was considered the best system of Montreuil training when the Garden of the Society was formed, and accordingly it was there adopted. But it was found not to answer; for although the under branches had the advantage of being started a year before those springing from the upper side, yet in two years the latter not only exceeded those secondary branches, but likewise, in most cases, the main branches themselves. It was therefore found impossible to follow the system with advantage, and consequently its adoption was never recommended by the Society. The Montreuillois now condemn that mode themselves on the same grounds.

In order to remedy the evil as much as possible, instead of starting the under branches one year in advance of the upper, they give them several years' advantage, as will be understood from *Fig.* 1, which represents the number and direction of the principal branches forming the *charpente* or frame-work of a

Fig. 1.



tree trained *à la Montreuil*, as now practised. The figures represent the years in which the respective branches were originated, reckoning from the plantation of the tree. From this it will be seen that no branches are permitted to grow on the upper side of the two main branches (*branches mères*), marked No. 1, till the fourth year; and then the branch No. 4 is allowed to push; in the fifth year No. 5 is originated; and finally, in the sixth year No. 6. It must be observed that Nos. 5 and 6 will still be apt to appropriate more sap than Nos. 2, 3, 3, although these have been three or four years longer established. Aware of this, M. Lepère has acted on the principle of allowing the under branches a still longer period to establish themselves before any are encouraged on the upper side. He has the east aspect of one wall covered with trees managed according to his *Pratique Raisonnée de la Taille du Pêcher en Espalier carré.* The trees were 16 years old: one of them extended 40 feet, others 30 feet, on the wall, which is $8\frac{1}{2}$ feet high.

Fig. 2.

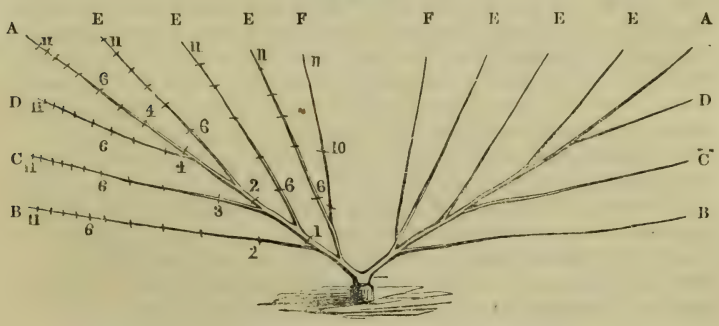


Fig. 2 represents the branches of one of his trees, trained *en Espalier carré*, so named from the branches terminating in points, lines drawn through which would form an oblong square. The marks indicate the places where the leading shoots were shortened, and the figures indicate the years from the plantation of the tree, in which the cuts on the respective branches were made.

Suppose the tree planted and headed back to two eligible buds for producing the two main branches (*branches mères*) A A, then at the end of the

First year, the branch A is cut at 1, at the winter pruning; and the branch B is originated.

Second year—The branches A and B are cut at 2; and the branch C is originated.

Third year—The branches A and B are cut at the marks beyond 2; the branch C is cut for the first time at 3; and the branch D is originated. The tree has now all its lower branches established.

Fourth year—The branches A B C D have their leaders shortened, as indicated; but no more branches are encouraged for this season.

Fifth year—The leaders are shortened, as usual; and the three branches, E E E, on the upper side of the branch A, are allowed to push.

Sixth year—All the branches, with the exception of F, which is not yet in existence, are shortened, as indicated by the marks 6.

Seventh year—Shortened, but no more branches originated.

Eighth year—Same process as in the preceding year; and a fruit-bearing shoot is selected for the commencement of the branch F.

Ninth year—All the branches for constituting the frame-work of the tree have now been originated; and, this being the case, no shoots are afterwards allowed to assume the character of branches. At each winter-pruning shoots of the preceding summer's growth only are left. In the following summer these bear fruit; whilst the lowest shoots which push at their bases are trained for succession.

Fig. 3.

Fig. 3 represents a portion of a branch of one of M. Lepère's trees, not pruned.

Fig. 4.

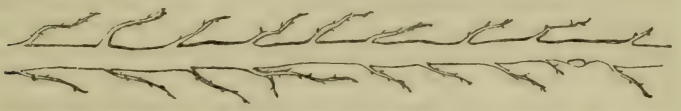


Fig. 4—Another portion, on which the operation of winter-pruning has been performed.

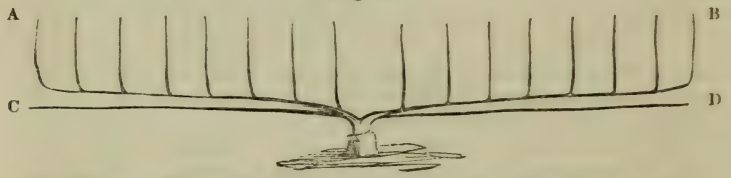
It will be observed that he prunes the bearing-shoots very short; and unless this be done the Peach-tree will not long continue to thrive. In consequence of leaving the fruit-bearing shoots too long, or in some cases not shortening them at all, very many Peach-trees in this country become worn out, even in their youth, and that too in richer soil than is to be found at Montreuil. M. Lepère, it will be seen, has plenty of fruit-bearing shoots: he shortens them to 6 inches; is satisfied with one or two fruits on each; and so from each of his trees he obtains on an average 40 dozen of fine large peaches. This certainly ought to induce people to shorten sufficiently the bearing-shoots, whatever the mode of training may be.

It is necessary to remark that, on the main stems, A A, of Lepère's trees, the spaces between the origin of one secondary branch and that of another are not naked. On the contrary, they are all along furnished with bearing wood, on the upper as well as the under sides. Shoots produced in one season bear fruit the next, and then, at the winter-pruning, they are cut back close to the base of the successional shoot. A large quantity of fruit is thus obtained along these main branches; but there is another advantage, as regards the health and duration of the tree. When branches are naked to any great extent, they are liable to become sunburnt, as was found to be the case with those of a tree trained according to Seymour's mode, in the Society's Garden. The bearing-shoots on this were from 12 to 15 inches apart, and on the upper sides only of the branches. When furnished with shoots at closer intervals, to draw sap, and better shaded by foliage, scorching is not apt to occur.

From what has been stated, and by referring to *Figs.* 1 and 2, it will be perceived that M. Lepère's method differs essentially from the Montreuil, as regards the greater length of time which elapses before any branches are permitted to grow on the upper sides of the two main branches. That the principle is good, there can be no question. A great objection to its adoption in this country would doubtless be, the large space of wall between A A and the centre of the tree remaining so long

uncovered. At the end of six or seven years after planting the tree, there is still a large void ; were it not for this, M. Lepère's system would be perfection. He has a thorough practical knowledge of all the operations connected with the culture of the Peach-tree, and his treatise *Pratique Raisonnée de la Taille du Pêcher*, I consider the best that has ever been published on the subject. He has other modes of training in progress; and it would be well if any were found to equal in principle the above, which he greatly prefers at present, and at the same time afford the means of filling up the centre.

Fig. 5.



On a west aspect wall, a tree is trained as represented by *Fig.* 5. The mode is termed *Chandelier* training—*Taille en Candélabre*. It extends 40 feet along the wall. The two branches, A B, from which the uprights spring, were first laid off like a V, and were annually lowered till, by degrees, they acquired their nearly horizontal position. In the second year after the tree was planted, the two branches, C D, were commenced. At the end of the sixth year, the uprights were all started. Previously to this, however, fruit-bearing shoots were encouraged along the four horizontal portions. The uprights are nearly 3 feet apart, and the bearing-shoots are trained between them at an angle of 45° elevation. The tree was a good example of what may be done with the Peach-tree in regard to maintaining the equilibrium of both sides, when in such hands as M. Lepère's. Those possessing less skill would find some difficulty in managing such a form. I remarked that his admired tree, *en Candélabre*, would probably soon die, some slight symptoms of gumming on the horizontals being discernible. That such would be the case I suspect M. Lepère himself had some forebodings ; however, he declared, if it should die, he would then nail it to the wall.

On the same west aspect, a number of fine Pear-trees had been much cut by a hail-storm in June, 1845. By keeping the wounds covered, fresh bark had closed over many of them ; but some branches were still in bad condition.

In shortening a leading branch, he cuts to a bud situated *next* the wall. The consequence is, that the branch goes on straight, and the section, although exposed, soon heals over, so that it

becomes almost impossible to tell where the shortening was effected. This is contrary to the rule usually laid down and followed in this country, which is to cut behind the bud. A bend is the consequence. But the thickest layers of wood are formed in front of the branch: the wound is in fact longer in healing over where this depends on the convergence of thin layers, than where they are thick; consequently, a wound in front is sooner healed over than one at the back.

For pruning wood under two years of age, the instrument called a *Sécateur* is chiefly employed; and this I saw plied with great dexterity. For summer-pruning, and shortening one-year-old shoots, it is far preferable to the knife, particularly in the case of the Peach-tree, where the part left is, at the next pruning, entirely cut away. In cutting close to the main branch, it is necessary to use the knife. If *sécateurs* could be obtained as well made as those I saw in use, I am certain they would be much more employed in this country.

The borders for the Peach-trees are prepared to the distance of 5 or 6 feet from the wall by trenching 2 feet deep, mixing the soil well with manure. The trees are planted 6 inches from the wall. In many of the enclosures the rest of the ground is occupied with vines. In summer, the labour of watering must be very great. The Almond is much employed as stocks for the trees.

Although the soil is not rich, yet the trees are vigorous enough, with the little manure that is occasionally forked into the borders when the trees come to bear heavy crops. The cultivators attend well in summer to the equal distribution of the sap; and they adopt means to prevent it being wasted by over luxuriant shoots, or *gourmands*. To this, and to the shortening of the bearing-shoots to 6 or 8 inches, is to be attributed the success which attends the cultivation of the Peach at Montreuil. To M. Lepère we were much indebted for the full details which he obligingly furnished of all particulars connected with the different modes of cultivation.

Fontainebleau and Thomery.—We reached Fontainebleau March 12, about noon. The inhabitants say its name is a corruption, by contraction of *Fontaine-belle-eau*—there being fine springs of exceedingly pure water at this place and its vicinity; doubtless from being filtered through fine sand, which is said to be valuable for making flint-glass. Snow commenced falling thickly in broad flakes, so that we only saw the water in a comparatively turbid state, from the influx of the former.

Notwithstanding the unfavourable state of the weather, M. Souchet, of the Royal Gardens at the Palace of Fontainebleau, had the kindness to conduct us to the vine-walls, which

are under the management of M. Brassis, *jardinier en chef du Parc et de la Treille du Roi*, at Fontainebleau. Part of the wall has an eastern aspect, and is about 20 feet high, forming the wall of barracks. More recently built, a long extent, with a south-east aspect, is 12 feet high. The whole length is 1400 mètres, or 1531 yards—nearly 7 furlongs.

Part of the wall, where highest, is occupied with vines planted 2½ feet apart; but this was said to be too close. These were trained with a single upright stem, with the bearing shoots diverging from both sides—*en palmette*, as the mode is termed—or like the leaf of a palm. The leafstalk and leaflets of the Cycas revoluta afford an example of the manner in which the bearing shoots are trained from the upright main stem; or the same may be represented by fish-bones. The bearing shoots were not strong, but firm and well matured; they were about 2 feet in length; and at the winter pruning they are cut close to the lowest eyes. The upright leading shoot is cut to three eyes when the plants are young, but as they get older it is cut to only two.

Where the principle of the Thomery system, *en cordon*, has been adopted, the plants are here 3 feet apart. Each plant, as at Thomery, has only one horizontal branch to the right and another to the left, forming the cordon; but at Fontainebleau each of these extends 6 feet; at Thomery only 4 feet. The cordons formed by the horizontal branches are about 2 feet apart. With regard to the comparative merits of these two modes of training, there was no decided opinion. The first, with the bearing shoots diverging from an upright stem, is the more easily managed; but, in this country, it is questionable whether the eyes on the lower part of the stem would push sufficiently well; for in vineries it is sometimes necessary to bend down the upper part of vines trained upright, in order to ensure the pushing of the lower eyes.

The soil where the vines have an eastern aspect is naturally unfavourable, and rather wet; in fact, it was so bad that it had to be dug out to the depth of 2 or 3 feet, and replaced with better soil, mixed with some leaf-mould. Manure occasionally afforded, consists of a compost, of equal portions of horse-dung and cow-dung, and turf-parings, in alternate layers, turned several times over before being applied. Dung alone has been tried, but the compost was found preferable—the quality of the vines manured with it being much better than where dung only was employed. Along the portion of wall facing the south-east the soil is of a more favourable nature.

The vines are tied to wooden trellis-work. The wall is furnished with coping, projecting about a foot. Both here and at

Thomery, projecting copings are considered of great importance: in England they would doubtless prove equally beneficial. Under glass, projecting like a coping, it has been proved that grapes ripen, colour, and retain their bloom, much better than they otherwise do on the open wall.

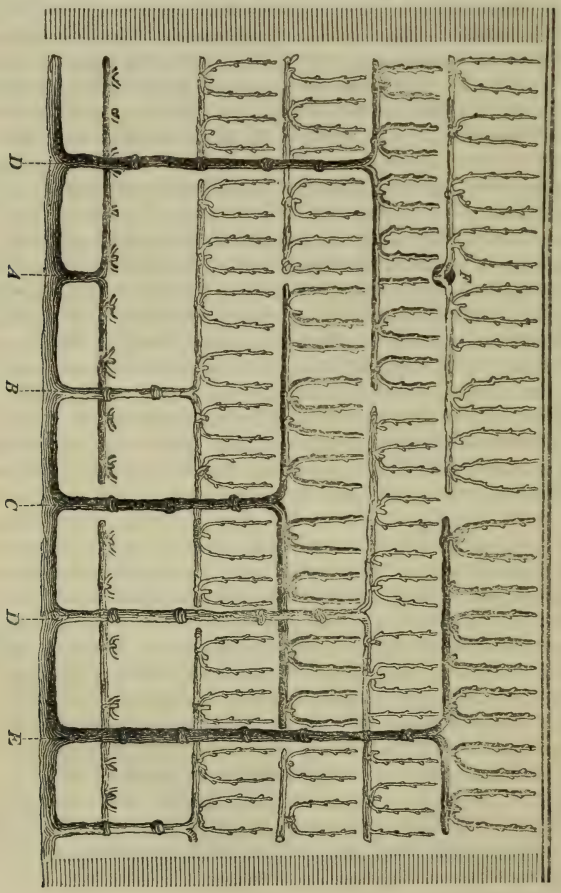
M. Souchet having ascertained that there was an intelligent *propriétaire cultivateur*, M. Larpenteur, from Thomery, in Fontainebleau, he intimated our object to him. M. Larpenteur accordingly undertook, very obligingly, to conduct us by the nearest route through the forest to Thomery.

On reaching the outskirts of the forest we found ourselves considerably elevated above the Seine, and had then a good view of the village of Thomery, stretching along the side of the river and the base of the slope; and of 600 acres of walled enclosures for the cultivation of the vine. Such an assemblage of walls is perhaps nowhere to be seen, if we except Montreuil. It appeared as if the walling-in system was proceeding upwards to the precincts of the forest. Plantations of vines, in the open vineyard mode of culture, were seen verging close upon it, almost in proximity with the common heath, which grows abundantly in the forest.

From this locality Paris is largely supplied with grapes. We were informed by M. Larpenteur that the quantity forwarded to Paris, by barges down the Seine, from Thomery is not less than 30,000 lbs. daily, during the grape season; and the quality of the Thomery grapes is well known to be excellent for the table. This it may be readily supposed is owing to the steep slope on which the vines are planted. "Bacchus amat colles" is a quotation frequently introduced by writers on the vine; and the south sides of hills are recommended. But what is remarkable in the case of the Thomery vines, they are not grown on the south side of the declivity, nor does it face the east or west: the ground actually slopes to the north and north-east. I inquired the reason why the acclivity, equally steep in appearance on the opposite side of the Seine, and facing the south, had not been preferred? The answer was, it was found to be too hot and dry. Probably, the circumstance of the ground sloping as it does first induced the inhabitants to commence building walls, in order to counteract the effects of their northern exposure. At all events, we were informed that the walls were first built with the view of affording the vines an aspect directly south; but this was found too hot. They then tried the south-east, which proved the best point, as regarded the perfection of the fruit. But now, in order to suit the market, or, in other words, their own interest, the cultivators wish to have the walls still farther to the east, or even to face due east. They say there are now so many grapes brought early in the season to Paris from the south

of France that it is more profitable for the cultivators of Thomery to retard theirs till the glut of the others is over.

The different properties form long slips, separated by walls. Interiorly each is subdivided by cross walls, about 30 feet apart. Formerly the walls were composed of clay, plastered over; but they now build them of stone. They are about 8 feet high, furnished with a coping of flat tiles, projecting about 8 inches, and worked up to a ridge-top, in order to throw off the wet. The projecting coping is considered of great importance by the cultivators, on account of its keeping the fruit dry, and preserving the bloom. Wooden trellises are affixed to the wall, and to these the vines are trained in the following manner: —



Formerly the vines were planted 4 feet from the wall, and layered till they reached it. This mode is not now strictly adopted. The plants are 16 inches apart. The plant *A* having reached the first horizontal bar of the trellis, which is 6 inches above the surface of the ground, it is there cut at the winter pruning; and shoots are trained from it to form the cordon, right and left. The distance between the cordons is 18 inches; and when the vine *B* has extended so far above the cordon formed by *A*, it is likewise cut, for the second cordon. In this manner the vines *C*, *D*, *E*, are treated at the winter pruning, after they have attained the respective heights. At *F* is represented the mode of introducing a vine, to form a cordon, from the other side of the wall.

It will be seen that each vine has two arms, extended in opposite directions; and that their utmost extent horizontally is only 8 feet; whilst the bearing shoots are not allowed to pass the next cordon: consequently, each vine is limited to 8 feet by 1½ of trellis, or 12 square feet. We had the opportunity of seeing the vines at Thomery winter-pruned, as in the lower cordon of the above figure; and not pruned as in the four other cordons. At the winter-pruning the upright shoots which have borne the fruit are cut close to the small eyes situated at their bases; and from these eyes, only two shoots are allowed to grow up to bear fruit, to be stopped in summer below the next cordon, cut back, like their predecessors, at the next winter-pruning; and so on for perhaps half a century. We saw some old knotted subjects occupying no more space than that above mentioned, that had been planted by the grandfather of the present proprietor, fifty years ago. Their space indeed seemed ample enough for their apparent vigour. They would certainly form the greatest contrast imaginable with the vines described by travellers in the East, having stems 1½ foot in diameter, with branches, supported to form a canopy 50 feet in length and breadth, covering 2500 square feet. Yet, on such a portion of wall as is represented by the figure, being only 8 feet in length and as much in height, it is calculated that not fewer than 320 bunches would be produced.

The soil is not rich, nor does it get much manure; only a little when the shoots become very weak, once in three or four years. It is a poor light brown sandy soil, such as would not be supposed capable of supporting anything like a crop of grapes. We obtained some of it, which has been analyzed by Professor Solly, and gave the following result.

Analysis of Thomery Soil.

Silica	81·0
Alumina	7·0
Oxide of iron	3·0
Lime	1·5
Magnesia	0·5
Saline matters	0·5
Organic matters	3·5
Water	3·0
	100·0

It may prove interesting to contrast the above with an analysis of the soil in the Society's Garden at Chiswick, by the same eminent chemist, and which was published in the 'Transactions of the Horticultural Society,' Second Series, vol. iii. p. 36:—

Analysis of Soil in the Garden of the Horticultural Society.

Silica	78·730
Alumina	5·182
Oxide of iron	8·250
Lime	0·640
Magnesia	0·107
Potash and soda	0·047
Chlorine	0·004
Sulphuric acid	0·007
Phosphoric acid	0·018
Organic matters	7·000
Loss	0·015
	100·000

It appears from these analyses, that the Thomery soil contains a greater proportion of silica, alumina, lime, and magnesia, than the soil in the Society's Garden; but nearly one-third less oxide of iron, and only one-half the quantity of organic matters. The latter circumstance proves that the soil is not highly manured. The manure preferred consists of equal portions of horse-dung and cow-dung mixed. The dry soil is easily moistened throughout.

Vines are also trained, *en cordon*, against low espaliers in the ground forming the central plot of the respective enclosures. In some seasons the fruit from these is said to be excellent in quality; but wind and rain often render it unsaleable, except as inferior produce. Some of the espalier vines were 60 years old, and were even partially overrun with moss. Against a wall 16 feet high, vines were trained *en palmette*, as at Fontainebleau.

Outside the walled enclosures, in the open ground approaching the forest, vines were observed cultivated according to the vine-

yard system. The shoots are trained to stakes in summer; and at the winter-pruning *all* the shoots are cut down to two eyes. The plant then resembles a stumped willow-stool. The stakes here employed measured 4 feet 3 inches in length.

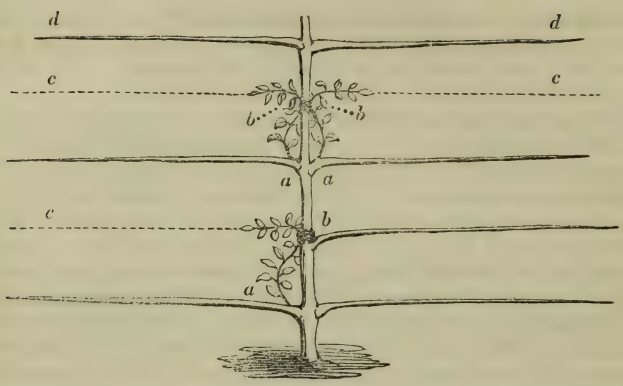
The variety of grape cultivated almost exclusively at Thomery on walls, espaliers, and in the open ground, is the Chasselas de Fontainebleau, which is the same as the Royal Muscadine. The cultivators are particular in propagating only from such vines as are the most healthy, and which produce the finest fruit. They do not say that such are varieties absolutely distinct from the Chasselas de Fontainebleau; but they do maintain that there is decidedly a constitutional difference amongst the plants. M. Larpenteur had the kindness to cut some shoots for the Society from vines recently planted against a wall, and which had been propagated from vines producing the finest fruit growing at Thomery.

We tasted some of last year's crop of grapes, still fresh. They keep them on broad stages, occupying the middle of an upper story, leaving a passage all round between the stage and the walls. A board along the edges gives the stages the form of a shallow box, in the bottom of which is placed a layer of well-dried fern, upon which the bunches are laid. M. Larpenteur was of opinion that very dry straw would answer as well as the fern.

Having seen the mode of training the vine at Thomery, and received, through the kindness of M. Larpenteur, full information respecting its cultivation, we retraced our steps through the forest, and reached Fontainebleau at dusk.

Corbeil.—From Fontainebleau we proceeded by diligence to the rail-road station at Corbeil. Near this some Pear-trees have been managed in a peculiar way by M. Fourké. In order to see these trees, and get back in time for the train, there was not a second to be lost, for the probability was very doubtful. However, we did see them with astonishment, without which, I think, no gardener in England could. They were fine trees, covering a wall, and trained horizontally. But they were not planted when young, and trained progressively in order to produce this regularity. On the contrary, they were planted when large and irregularly grown, having in some places a redundancy, in others a deficiency, of branches. Various means are frequently resorted to with the view of supplying branches where wanting; such as notching, budding, or side-grafting the stem; but here the desiderata were obtained by in-arching the *growing extremities* of adjoining shoots to the parts of the stem whence the horizontals should proceed.

Supposing the branches of a tree are trained horizontally a foot



apart, with the exception of some where the buds intended to produce branches did not break, as is often the case; then a shoot, *a*, is trained up, and, when growing in summer, a small slice is taken off near its extremity, and a corresponding extent of surface immediately below the inner bark of the stem is exposed; the two are joined together, and the point of the shoot *a* is inclined in the direction to form the branch *c*.

The most remarkable feature in the trees at Corbeil was the uniformity of vigour in the respective branches. It appeared as if the supplied branches, *c c c*, had been allowed to grow in connection both with the stem at *b b*, and the branch from which they originated at *a a a*, till their length and thickness corresponded sufficiently with that of the branches above and below them. This is a great advantage which the mode possesses over budding or side-grafting. At the distance of a foot apart for the horizontal branches, it takes as many years to cover the wall as the latter is feet in height; for although the leading shoot may grow three or four feet in length in a season, yet by shortening it to two feet, although the branches *d d* would be produced, the buds at *b b*, to furnish the intermediate stage, most probably would not. In fact, the attempt to form two tiers of horizontals in one season is generally followed by more or less disappointment. The intermediate stage might, however, be readily supplied by the method above detailed; and a wall twelve feet high might be covered as well in six years as it otherwise would be in twelve.

We had not time to ascertain the name of the place where these Pear-trees are growing, nor that of the gentleman who owns the property. He is said to be enterprising, and carries on some manufactory closely adjoining. The place is situated some distance south from Corbeil. Thither, in all haste, we re-

turned, hearing by the way the time-bell of the station, to us a very unmusical sound. However, we got into the train for Ris.

Parc du Fromont, à Ris.—This was laid out by M. Soulange Bodin in the English style; and, although not kept up as formerly, one could scarcely divest himself of the idea that the scenery was not in France. We observed some Cedars of Lebanon which had thicker stems, and were considerably taller, than the Abies excelsa, planted at the same time, upwards of 30 years ago. The soil of the garden is rich. The coping of the walls projects a foot; and vines are trained upon the Thomery system, with the exception of being planted 4½ feet apart. One of the plant-houses sloping considerably from one end to the other was heated by a cast-iron flue, about 8 inches in diameter, the fire being at the lower end of the house.

Market-Garden Forcing Establishment of M. Josseaume, Rue de Reuilly, Faubourg St. Antoine.—The articles in forcing here, March 16, consisted of Asparagus, Lettuces, Carrots, and Cauliflowers. Asparagus was then selling for 15 francs, about 12*s.* per bundle of 80 *sticks* or shoots. We measured some of these shoots 3 inches in circumference, and nearly 18 inches in length. They were grown in beds the soil of which appeared to be chiefly composed of decayed dung. The beds, 3½ feet wide, were covered with frames, the sashes of which were almost flat. The spaces between the beds were 2 feet wide, and 2½ feet deep, filled with fermenting dung. M. Josseaume commenced cutting Asparagus in November. It is forced for ten or twelve years; but the beds forced early one year are later forced the next. Cauliflowers, Cabbage-lettuces, the Laitue noir, and Carrots, were grown also in frames. A number of large bell-glasses were employed. Under these, Cabbage-lettuces were planted next the outside, and one Cos-lettuce in the centre. Between the Lettuce plants in frames, some litter is put on the surface of the beds during severe weather.

Forcing Establishment of M. Dulac, Rue de Picpus, Faubourg St. Antoine.—Melons, Cucumbers, Lettuces, Cauliflowers, Carrots, Radishes, &c., were here forced. The Cantaloup Melon and White Cucumber were the sorts employed. The Laitue Romaine verte is grown under bell-glasses on beds, with trenches between the latter 15 inches wide, filled with dung. The Laitue Crêpe, a small early Cabbage-lettuce, sells, when forced, at about a penny each. The Laitue rouge is planted out for the earliest crop in the open ground. After the forced Cauliflowers, Let-

tuces, Carrots, &c , are over, the beds are stirred up a little, and some soil, chiefly decayed manure, is put on ; and Melons are then planted. They ripen without glass. The soil of the enclosure here appeared to be composed chiefly of decayed dung, in which Melons grow planted out in summer. The soil, open and light in substance, but dark coloured, is readily heated by the sun's rays. Two young men were planting Cos-lettuces in a border in front of a wall with a south-east aspect; and one of them was experiencing the immediate warmth of the soil, without either shoes or sabots. On the preceding day, when we were in the Jardin des Plantes, I remarked that the frost was then but just out of the walk on the north side of the mound.

Establishment of M. Coccomier, fils, Avenue de Bel Air, Faubourg St. Antoine.—The establishment of M. Josseaume is noted for what is termed *Asperges blanches;* but M Coccomier produces on an extensive scale another description, the *Asperges vertes*, the shoots being green. He purchases roots annually to the amount of 20,000 francs—about 800*l.* He prefers plants of 3 years old ; those of four years are generally once cut, and then they do not answer so well for forcing. The plants are packed close on the beds, and the roots covered with light decayed dung, the buds of the crowns being scarcely covered. With a brisk bottom heat, kept up by linings, the shoots are soon fit to cut, green and tender.

Establishment of M. Moreau, Rue de Charonne.—The forcing here consisted chiefly of Lettuces, on dung-beds, as at some of the places already noticed, some being covered with frames, and others with bell-glasses. The number of these glasses was nearly 4000. Each glass covered five Lettuce plants, consisting of four Cabbage-lettuces, and one Cos-lettuce in the centre.

I left Paris, March 18, by railway to Rouen. Proceeded next day, by diligence, through Normandy and Picardy to Boulogne, and arrived in London on the evening of March 20.

In concluding this account, I have to acknowledge the kindness I experienced in France from every one engaged in horticulture to whom we had occasion to apply for information. I found all intelligent and obliging, anxious to avail themselves of improvements in horticulture, and willing to communicate a knowledge of their modes of cultivation to others.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

9. VIBURNUM PLICATUM. *Thunberg in Linn. Trans.* ii. p. 322; *Siebold and Zuccarini, Fl. Japonica*, i. p. 81, f. 38.

A handsome deciduous bush, bearing some resemblance to the N. American Viburnum dentatum. The leaves are broad, coarsely serrate, somewhat plaited, dark green, narrowed to the base, and furnished with an abrupt point (cuspidate). The flowers are white, in round heads, of the size and with the appearance of the "double" Gueldres Rose.

Mr. Fortune says that this plant is a native of the northern parts of the Chinese Empire, and was found cultivated in the gardens of the rich, by whom it was much admired. When full grown it forms a bush eight or ten feet high. It is a most profuse bloomer, forming numerous heads of snow-ball flowers, like the common Gueldres Rose. It will, doubtless, prove perfectly hardy in England; and, on account of its neat habit, will probably become a great favourite in our gardens.

April 10, 1847.

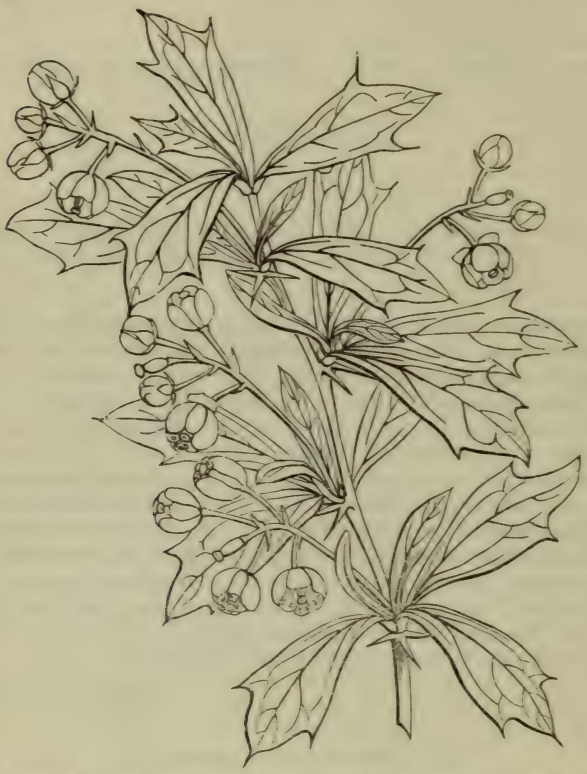
10. BERBERIS PARVIFLORA.*

Presented to the Society when a small plant, about 3 years ago, by Messrs. Lee of Hammersmith, who were not aware from whence it came. Its resemblance to Berberis virgata raises a suspicion that it is some South American species.

A slender evergreen bush. Leaves about $1\frac{1}{2}$ inch long and $\frac{3}{4}$ inch wide, glaucous on the upper side, clear green on the under, with from 3 to 5 spreading spiny teeth near the end. Flowers as deep a yellow as those of B. dulcis, in a few-flowered raceme as

* *B. parviflora;* sempervirens, foliis angustis obovatis versus apicem 3-5-lobis spinosis supra glaucescentibus subtus viridibus, racemis paucifloris foliis paulò longioribus, floribus parvis vitellinis.—J. L.

long as or a little longer than the leaves, unusually small in the genus.



A small hardy evergreen, well suited for planting in situations where neat and choice shrubs are the objects required. It flowers freely in May.

May 29, 1847.

11. VIBURNUM MACROCEPHALUM. *Fortune.**

Received in June, 1844, from Mr. Fortune, from Chusan and Shanghae, as a fine Shrub.

A deciduous bush, covered all over with coarse, starry, scurfy hairs. The leaves are about 3 inches long, very exactly ovate,

* *V. macrocephalum*; ramis petiolis foliis subter pedunculisque stellatim furfuraceo-pubescentibus, foliis ovatis planis obtusis denticulatis scabriusculis, cymis compositis neutris maximis subpyramidatis.—R. F.

very blunt, on short stalks, slightly toothed, quite flat, and not unlike those of an apple. The flowers grow in large compound cymes, which, in the neuter state (that in the Garden), are as much as 8 inches in diameter, not, however, globose, like those of a Gueldres Rose, but rather pyramidal. Each flower is full $1\frac{3}{8}$ inch in diameter, snow white.

Mr. Fortune speaks of it thus:—This noble species was also found in the gardens of the rich in the North of China, and will probably prove perfectly hardy in England. There is a tree of it in a garden on the Island of Chusan at least twenty feet high, which, in the month of May every year, is covered with its snow-white blossoms. When grafted, it blooms on small plants in pots, and is not unlike a white Hydrangea, by which name it is known amongst the Chinese.

It is certainly one of the finest hardy shrubs that have been introduced. Even in the Greenhouse, and in a pot, its beauty is conspicuous. Hitherto it has been grown in a mixture of loam and sandy peat.

June 23, 1846.

12. Amomum vitellinum.*

Believed to have been received from the East India Company. The label having been lost, this is not certain.

A plant about 2 feet high, with oblong leaves, a little wavy, pale green, slightly stalked above a broad thin-edged petiole whose upper free end is rounded. The flowers are deep yellow, strongly veined with red, and grow in a short close spike, sessile among the uppermost leaves. The back petals are short, with sharp teeth; the lip is oblong, coarsely and irregularly toothed, and slightly 3-lobed. The crest of the anther is 3-parted and jagged, the lateral divisions being about half the size of that in the middle. The anther itself is spurless. About 6 ovules are found in each cell of the ovary.

A stove perennial, requiring plenty of moisture and heat during its growth, but afterwards to be kept nearly dry. It flourishes in a mixture of sandy loam and decayed leaf-mould, and is easily increased by dividing the old plants when dormant. It flowers freely in April and May.

It is useful enough as a flowering plant, which will grow in any shady place associated with Ferns, notwithstanding its want of beauty.

May 11, 1847.

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* *A. vitellinum;* caulescens, glabrum, foliis ovalibus, spica oblongâ sessili laxiusculâ, labello oblongo obtuso dentato, antheræ appendice petaloideâ tripartitâ laciniis undulatis laceris intermediâ duplo majore.—J. L.

13. Berberis hypoleuca.*

Raised from seeds received from Dr. Royle, and said to be from the North of India.

A very fine evergreen, with leaves from 2 to 3 inches long and 1½ broad, of a dull green colour above, white beneath, strongly reticulated on both sides, and often bordered with reddish purple. Flowers pale yellow, small, and in racemes not larger than the leaves.

A hardy shrub, only injured by very severe winters. It grows

freely in any good garden soil, and is increased by seeds, which should be sown directly they are ripe.

It forms a fine, handsome, evergreen bush, well suited for planting in sheltered situations on account of its beautiful foliage. It flowers in May. *May* 29, 1847.

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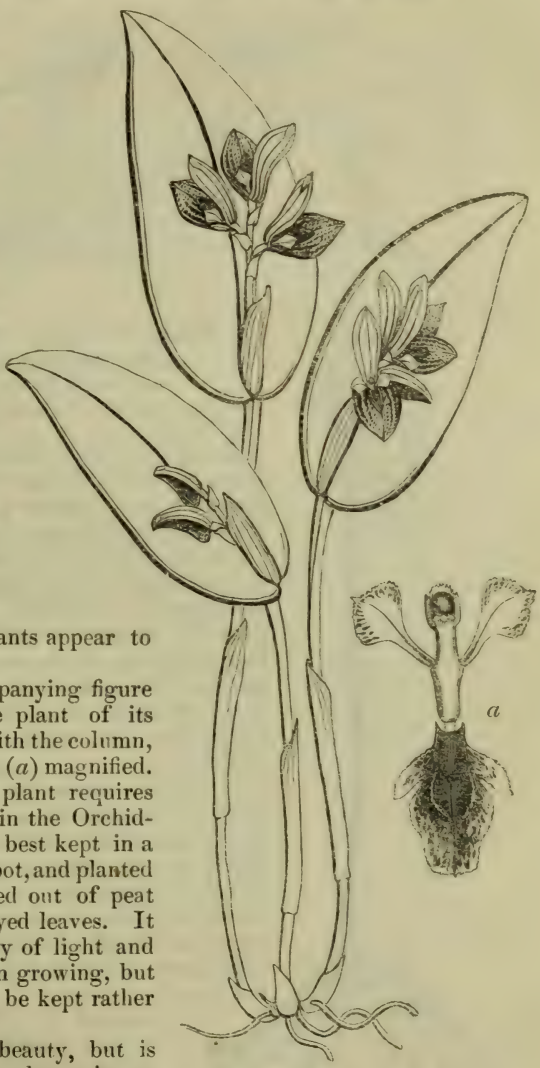
* *B. hypoleuca;* sempervirens, foliis coriaceis latis obovatis distanter spinosis integrisque reticulatis subtus albis, racemis foliis brevioribus.—J. L.

14. Pleurothallis Smithiana, *Lindley in Bot. Register*, 1843, *Misc.* 79.

Received from R. A. Gray, Esq., F.H.S., in 1845.



This plant deserves to be recorded as exhibiting a material departure from the structure originally observed in it. The lip is distinctly 3-lobed, with the two lateral lobes considerably prolonged; while in the original the lip was nearly entire, the lateral lobes being hardly distinguishable. In all other respects the plants appear to be identical.

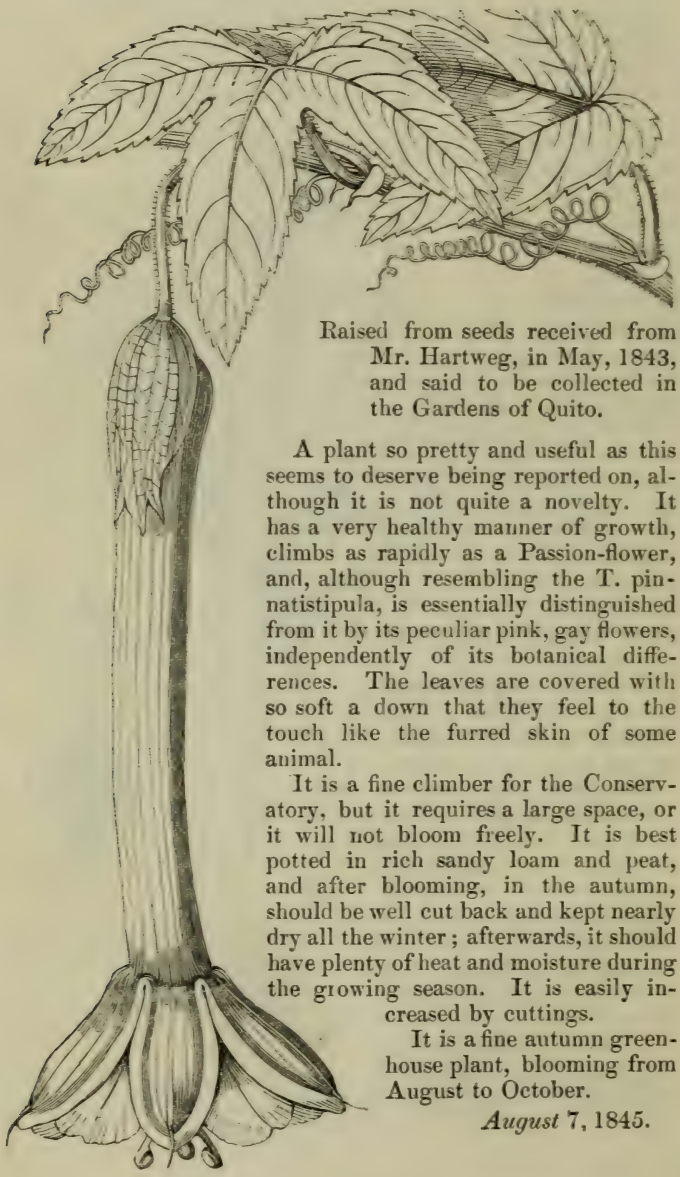
The accompanying figure represents the plant of its natural size, with the column, lip, and petals (*a*) magnified.

This little plant requires to be grown in the Orchid-house, and is best kept in a well-drained pot, and planted in fibre formed out of peat and half-decayed leaves. It requires plenty of light and moisture when growing, but afterwards to be kept rather dry and cool.

It has no beauty, but is very curious and neat in appearance.

June 2, 1847.

15. TACSONIA MOLLISSIMA. *Humboldt, Bonpland, and Kunth, nov. gen. et sp.* ii. 144. *Botanical Register*, 1846, t. 11.



Raised from seeds received from Mr. Hartweg, in May, 1843, and said to be collected in the Gardens of Quito.

A plant so pretty and useful as this seems to deserve being reported on, although it is not quite a novelty. It has a very healthy manner of growth, climbs as rapidly as a Passion-flower, and, although resembling the T. pinnatistipula, is essentially distinguished from it by its peculiar pink, gay flowers, independently of its botanical differences. The leaves are covered with so soft a down that they feel to the touch like the furred skin of some animal.

It is a fine climber for the Conservatory, but it requires a large space, or it will not bloom freely. It is best potted in rich sandy loam and peat, and after blooming, in the autumn, should be well cut back and kept nearly dry all the winter; afterwards, it should have plenty of heat and moisture during the growing season. It is easily increased by cuttings.

It is a fine autumn greenhouse plant, blooming from August to October.

August 7, 1845.

ORIGINAL COMMUNICATIONS.

XXXII.—*A History of the Species of Crocus.* By the Hon. and Very Rev. Wm. Herbert, F.H.S., Dean of Manchester.

[The manuscript of this paper had been prepared for the press by the lamented author, and nearly finished a day or two before his death. Having been placed at the disposal of the Society by Dr. Herbert's executors, it is now published with no other changes than such as were required to adapt it to the pages of this Journal. These changes, chiefly consisting of a translation into English of some Latin paragraphs, and of a few trifling alterations in the sequence of paragraphs, have been made by Professor Lindley, whom Dr. Herbert had advised his family to consult in the event of his death.*]

Five species only of Crocus are generally cultivated in the Dutch gardens and sold at the retail shops in England, viz. the autumn Saffron Crocus, sativus, which is a very shy flowerer; the vernal C. vernus and versicolor, of both which (especially vernus) a great many seminal varieties have been raised; C. lagenæflorus luteus, of which the origin is not known, and sometimes lagenæflorus aureus; and lastly, C. annulatus, var. biflorus, commonly called the Scotch Crocus, of which the native place is also unknown, though it was probably brought into cultivation first in some Scotch garden. The fine autumnal C. Pyrenæus (nudiflorus of Smith) and speciosus, the Spanish C. serotinus, and the vernal C. lagenæflorus lacteus or candidus are found sparingly at a few nursery-gardens near London, such as Osborne's, Pamplin's, and Young's at Epsom. The rest of this beautiful genus, which embellishes spring, autumn, and even the depth of winter, are scarcely known, except through late representations in the Botanical Register and Botanical Magazine; and few of them have yet been brought into cultivation. Having taken great pains, not without some expense, in seeking and collecting them, I have been able to describe above forty natural species, besides a great number of natural local varieties, some of which are even considered by other botanists to be species distinct from their nearest kindred.

* The following are the exact words of the Dean, as inscribed upon the first leaf of his MSS.:—"*Crocorum Synopsis*, nearly prepared for the press, and to be printed, if I die before it is sent to press, with or without plates from my drawings, as may be found expedient. Consult Dr. Lindley."

The whole race appear to have a predilection for calcareous hills, Vernus preferring an elevation of from 5000 feet on the Alps to above 6000 in Calabria; others, like Ionicus, preferring the lower part of stony hills near the sea. Lagenæflorus, however, was found by Sibthorp in sandy soil upon clay in the Eastern Greek islands; and all its numerous varieties certainly prefer such a situation when cultivated, and their bulbs grow naturally and best five inches or more below the surface. A few Italian Croci—that is to say, C. suaveolens and the Italian varieties of C. annulatus—are said to be found on tufa; but I have not sufficient geological knowledge to state whether there is any calcareous matter in that tufa, or whether it is underlaid by calcareous rocks which are certainly in the vicinity. The whole of the genus are hill plants, having no disposition to establish themselves on alluvial plains, and seeming to avoid equally the igneous rocks; both of which I suppose tend to overpower them with a rival vegetation which does not flourish so vigorously on the calcareous hills; for they necessarily require a position either stony and naked, or where the grass, from the ungenial nature of the soil or climate, or the partial shade of trees, is not vigorous in the spring. I saw one weak plant of Crocus Vernus, one of Hepatica, and one still weaker of a Lilium (Martagon, I suppose) near a rill that was dashing down the igneous rocks at Chiavenna, but they did not flower, and were evidently mourning by the waters of Chiavenna, because the seed from which they sprang had been exiled from the calcareous heights of the Splugen. The genus belongs to the Mediterranean formation, beginning westward on the coast of Portugal, where C. Clusianus grows near Lisbon, and Cintra and the hills near Tangiers, where C. Salzmannianus is found in Africa, the southern limits extending by Malta, Crete, and Cyprus, to the mountains near Damascus, the northern limit being the Aquitanian side of the Pyrenees, Cevennes, and the Alps, following the hills on the south side of the Danube to Trajan's bridge. Crossing thence to the Carpathian ridge and South Podolia, it passes to the steppes of Odessa and Caucasus up to the Caspian, but no further, being stopped northwards by the alluvial plains of Poland and the Ukraine, and eastward by the salt barrens and marshes of the Volga. It follows the calcareous heights of Mount Taurus and Bithynian Olympus to Angora, Boli, Tifflis, Elizabethpol, and Lenkeran on the Caspian; but, as far as I can learn, no Crocus enters Suleimania, Kurdistan, Mesopotamia, Persia, Daghistan, or Shirvan, or appears on Mount Elburg or Mount Ararat, being excluded by the igneous rocks, or rather, I conclude, by the rival vegetation of those mountains which can bear the accidents of climate on such a substratum well enough to overpower the

Crocus, but cannot do so in a calcareous region. It does not follow from that circumstance that the Crocus cannot be cultivated to greater advantage in a much richer soil; the magnificent bulbs raised in the Dutch gardens prove that it can. C. vernus is often found in blackish earth on the Alps, and it will grow well in peat in the garden, where indeed Anemone pulsatilla, which grows wild in absolute chalk, thrives better in peat than in any other soil; but most of the Crocuses I have seen appear to inhabit a reddish ferruginous moderately strong earth upon a dry subsoil. The same soil might perhaps not suit them on an ill-drained flat, and a very different compost might lead to a more vigorous development in a garden where the plants would be protected from overgrowth in the early spring.

The germen or future seed-capsule of the Crocus is always under ground, communicating with the limb of the flower by a long tube, and borne upon a scape or stalk, which in some species is very short and scarcely discernible at the time of flowering; in others, raising the germen near to the surface of the ground. In all it becomes lengthened while the seed is advancing, and rises above ground before its maturity. In some species this scape is naked, in others it is enveloped by a membranous sheath or involucre. The genus is therefore separable into two broad divisions, those with the flower-stalk naked, and those with an involucre. No naked Crocus has been yet described west of Italy, supposing C. carpetanus, which I have never seen, to be involucrate. Sir E. Smith, who was ignorant of all the peculiarities of Croci, named the Pyrenean Crocus, nudiflorus, though in fact involucrate and having the least naked flower of all the genus; for, while C. speciosus has the portion of the tube above ground really naked, no involucre, and the spathe concealed within the leaf-sheaths, the tube of C. Pyreneus is conspicuously clothed by a prolonged green spathe. The name nudiflorus must therefore have been rejected, even if Pyreneus had not had the priority. In Italy the annulate Crocus with a hard smooth bulb-coat and separable rings which are the base of other perishable coats, begins to make its appearance with a naked scape amongst those with an involucre; on the other hand, I am not aware that any involucrate Crocus is found in Asia, unless it be perhaps C. Pallasianus, to which I imagine that a dried specimen from the hills near Tifflis, which I at first mistook for a variety of versicolor, must be nearly allied.

I have subdivided the two prime divisions by the texture of the bulb-coats into membranaceous, parallel-fibred, and reticulate; and I have admitted intermediate divisions of subparallel where

the parallel fibres become confluent, and subreticulate where the parallel fibres become decidedly reticulate upwards.

The great mass of Croci have golden anthers; the milk-white anthers of none had been noticed before I described them; but, although that feature is one of the strongest in a genus of which the style yields the high-coloured saffron, the number of white-anthered species is too small to have made it a useful primary division. There is a family of reticulate involucrate autumnal Croci with truncate fragrant stigmas, and the annulate membranaceous naked spring Croci have also truncate fragrant stigmas. There is also an autumnal family with feathery scentless stigmas, but with various bulb-coats, and again a number of Croci with variable and uncertain stigmas more or less cut, so that the feature would not have served for a distinct sectional limitation, even if it had not been too fleeting for use. The species with similar stigmas are, however, brought together in my arrangement; that classification being, observe, subordinate to the different structure of the bulb-coat by which the species may be recognised at all seasons. The eight first species of involucrate reticulate Croci form a kindred family of autumnal species with a truncate fragrant style. Those who like to break down subdivisions may unite them as local varieties of one Crocus fragrans, with again several local subvarieties; but there is diversity even in their style, pendulous or erect, and a similar truncate fragrant style is found in the vernal annulate species. I therefore consider myself right in not confounding them.

The bulb-coats of Croci are the remains of the base of the sheaths that envelop the leaves, and of the leaves themselves. The former I call the vaginaceous coats—from vagina, a sheath; the latter the foliaceous coats. The outer sheath-coats are generally perishable, but often leave a small persistent base; the inner one is generally durable. The outer foliaceous coat is usually a conspicuous one, attached in different species at various parts of the corm or chesnutlike substance of this sort of tuber, which is commonly, but improperly, called a bulb. The root-fibres issue from a particular zone or space between the insertion of two coats; not, however, in all species between the same coats, but always, I believe, below the insertion of the inner vaginaceous coat. By the texture and insertion of the various coats every species of Crocus may be distinguished on examination of the bulb. The shopkeeper readily distinguishes the general aspect of the few sorts which he sells, but it requires very careful and minute investigation to ascertain the certain features by which all the numerous species may be recognised. The difference in the colour, shape, and coating of the seeds of

the several species, is more easily distinguished by the eye than described. The seed should be sown in the autumn ; if kept too long dry, it will not sprout the first season.

It might have been expected that a genus which branches into so many local species and local varieties, with a great uniformity of floral structure and of habit, would readily yield cross-bred intermixtures in cultivation. The reverse is the case. Iridaceous plants in general cross unwillingly, if at all ; but the impediment seems almost insurmountable in Crocus. The pollen is very readily and early cast. It requires therefore some skill and care to take out the anthers with a sharp pair of tweezers before the pollen touches the stigma ; but, when that has been done, and the pollen of a kindred species applied, the usual result is no seed. I have tried many years, and I cannot assert that I have yet succeeded in obtaining a cross, though I have a few seedlings and a few seed-pods which must be cross-bred, if no natural pollen eluded my caution. I have found that although C. vernus ripens its seed and sows itself so as to be a nuisance in my garden, if a plant is taken up and potted while in flower, the flowers which had previously expanded make seed, but those which are produced afterwards never do so. I find C. vernus unwilling to make seed at all or even to flower freely, if kept in a pot, though plunged in sand. On its native mountains the flower often pierces the snow, and the crown of the bulb must be colder than the underground fibres. In a pot the reverse is the case, the bulb being probably warmer and wetter than the fibres. I apprehend that the relative degree of warmth and moisture which the crown of a root and its lower fibres enjoy may be very important in the mystery of cultivation and the fertility of plants.

It is observable that autumnal Croci, which have been kept dry and out of the ground beyond their usual time, are very apt to push the flower immediately after they are planted, although in due course the leaves might have been disposed to push first. That habit may therefore have been perhaps acquired by different species in consequence of the amount of autumnal moisture and the time of its usual occurrence. I should imagine that the habit of flowering in the spring will be prevalent where the vicissitude of heat and drought is least felt ; the autumnal habit, where it is most decisive. In order to flower the later autumnal species, such as C. serotinus, early in our climate and during the sunny days, the bulbs should be taken up as soon as the leaves decay, dried, and replanted in about a month ; and if the month of August is very dry, they may be excited to prepare for early flowering by watering them. The rarer sorts which are intended for the room or conservatory should be potted, perhaps

six or seven in a 4½-inch pot of good yellowish loam, and plunged in a bed of sand. As soon as the leaves decay and the seed ripens they should be protected from rain and dew, admitting the sunshine, and in August the covering should be removed. Those of which it is wished to delay the flowering must be kept dry longer, and be less exposed to the sun. It is to be regretted that the Dutch, whose artificial compost produces Crocuses of such extraordinary bulb and strength, should have so very few sorts in cultivation.

It is singular that the native places of the principal Crocuses that have been long in cultivation are unknown. C. biflorus of Miller, called Scotch Crocus, probably because it was introduced into our gardens through Scotland, cannot be discovered in its present state, though many varieties closely allied to it are to be found; yet it is no garden variety, for it has been increased so long by offsets that it is become absolutely sterile, while the wild varieties, which we know, are very fertile when brought into cultivation. The same is to be said of the great yellow C. luteus so common in cultivation, which is equally sterile, and its locality has not been yet discovered. Crocus sulphureus, and the striped sulphureus, striatus, and stellaris of Haworth, have not been found. The former, however, is probably an old sterile garden variety of C. lagenæflorus; and the two others are perhaps mules between lagenæflorus and reticulatus.

In this history 43 species are described and arranged in the following manner:—

Division I.—INVOLUCRATI; *i. e.* Crocuses having an involucre below the flowers.

Sect. 1. Membranacei. *Bulb-Coats membranous.*

Sp. 1. C. *Vallicola.* Bot. Reg. 1845, Misc. p. 7. Ib. 1847, t. 16, f. 3.

C. cormo e minimis, tunicâ præcipuâ tenuissimè membranaceâ, fibris parallelis superne confluentibus proximâ interiore tenui membranaceâ in vertice cormi sitâ, fl. autumnali, spathâ ebracteatâ circiter sesquiunciam exsertâ perianthio albo 1⅜ unc. acuto maculis binis luteis in laciniæ cujusque regione inferiore, sepalis vix ⅝ unc. latis, petalis parum angustioribus, tubo ultra unciam libero superne ultra ¼ unc. ampliatè producto, filamentis albis ¼ unc. antheris semuncialibus albis stigmata sæpissimè apice bifida fere æquantibus, stylo pallidè subaurantiaco gracili; foliis hysteranthiis, capsula parvâ pallidè badiâ apiculatâ.

Flowers in October, in elevated mountain hollows of the Alps of Trebizond, on the mountain Koulak Dagh, near the village of Stauros.

Corm very small; chief coat membranaceous, with a few parallel

fibres confluent upwards, the next within thin, membranaceous, attached on the summit; spathe without a bract, 1½ inch free, tube an inch free or more, limb acute, ⅜ inch long, white, with two yellow spots at the base of each segment, sepals near ⅓ wide, petals a little less, filaments white, *anthers white*, equalling stigmas, which are generally bifid at the end, pale, tending towards orange colour; flower produced in October before the leaves.

This plant is clearly allied to C. Ionicus, and it is possible that, as I only know the flower from dried specimens, I may have mistaken a naked bracteate spathe for an involucrate spathe without a bract, in which case this plant would stand next before C. Ionicus.

Sp. 2. C. *Cambessedeanus.*

C. Cambessedesii, *Gay*, *Bulletin de Férussac*, 15, 220. *Bot. Reg.* 1845, *t.* 57, *f.* 4.

C. cormi tunicis [vaginaceis basi in annulum persistentibus, *Gay*] foliaceis lævissimis, exteriore demum basi in fibras liberas solutâ imo cormo affixâ [spathâ bracteatâ, *Gay*] tubo exserto limbo ⅝ in unciæ [in sicco subalbo] sepalis extus purpurâ plumeo-tristriatis, filamentis brevibus, antheris luteis stigmata quatenus vidi simplicia aurantiaco-coccinea superantibus, [seminibus demum brunneis raphe et chalazâ albidis, *Gay*]; flore autumnali, foliis synanthiis.

Native of Majorca.

This very remarkable and pretty little autumnal crocus is only known to me by two dried specimens kindly lent to me by M. Gay, who describes the plant as having an involucre and a bracteate spathe, and states that a ring of the vaginaceous coats endures at the bottom of the corm. He thinks it akin to C. insularis, in which I cannot agree with him. Foliaceous coats quite smooth, affixed to the bottom of the corm; limb ⅝ of an inch long [seemingly whitish] with three deep purple feathery stripes on the outside of each sepal, filaments short, anthers golden, as far as I have seen longer than the stigmas, which are orange-red and simple. Seeds, according to M. Gay, ultimately brown with pale raphe and chalaza. I have as yet tried in vain to procure the plant alive.

Sect. 2. PARALLELOFIBROSI. *Bulb-coats with parallel fibres.*

Sp. 3. C. *pyrenæus.* Parkinson, Paradisus, 1629.
C. nudiflorus. *Smith*, *Eng.*, *Bot.* 1798, f. 491 (very bad).
C. multifidus. *Ramond*, *Bull. de la Soc. Philom.* 1800.
C. speciosus. *Eng. Bot. Suppl.* 2. 2752.

C. cormo ex basi et zonis omnibus aucto stolonibus elongatis, tunicâ foliaceâ

exteriore supra vel rariùs infra medium, proximâ summo fere cormo affixâ, gemmâ ascendente unicâ, vaginis circiter 6, intimis 2 subacutis, proximâ obtusâ, inferioribus truncatis, foliis 3–6 hysteranthiis marginibus brevibus crassis reflexis, involucro laxo tubato 1–2–floro, spathâ ebracteatâ elongatâ superne subvirescente tubo spatham superante fauce lævi, limbo magno violaceo, filamentis lævibus infra faucem insertis, stigmatibus subfasciculatè multifidis aurantiacis antheras aureas superantibus, seminibus e majoribus obscurè tristi-badiis raphe pallidè sublutescente angulatè sub-oblongis.

Inhabits the pastures of the Pyrenees up to 6000 *feet, the pasture of Cevennes, and Aquitania. Naturalized near Warrington, Halifax, and Nottingham, but not a native of England.*

Corm increased by runners from the base and any of the zones; outer foliaceous coat attached above or less often below the middle of the corm, the next nearly on the top; involucre loose underground, embracing one or two flowers; spathe without any bract, long, greenish upwards, tube exceeding it, throat smooth, limb large purple; leaves smooth, after the flowers; seeds amongst the largest, dark dull brown-bay oblong. Sir James Smith named this involucrate Crocus with a conspicuously elongated green spathe nudiflorus. Fortunately Parkinson's name has precedence. This is a beautiful and free species, and flowers in September. A white variety, if it could be found in the Pyrenees, where the plant abounds, would be a great acquisition to our gardens.

Sp. 4. C. *Asturicus.* Herbert, Bot. Mag., 3998, f. 2.

C. cormo ut in Pyrenæo, spathâ subvirescente $\frac{7}{8}$ unc. exserto, tubo purpureo infra pallidiore spatham $1\frac{1}{4}$ unc. superante, limbo $1\frac{1}{8}$ vel $1\frac{1}{16}$ unc. purpureo, laciniis (sepalis præcipuè) tristriatis, petalis $\frac{3}{4}$ unc. latis barbâ ad basim densâ pallidâ, sepalis $\frac{5}{16}$ unc. latis, fil. albis ore ipso insertis $\frac{5}{16}$ unc., antheris aureis ultra $\frac{3}{8}$ unc., stylo aurantiaco multifido antheras non æquante primulam leviter redolente; flore autumnali.

Native of the hills of Asturia, near Gijon and Santander.

I was fortunate in raising this plant from a single seed which fell out of a specimen in Sir Wm. Hooker's herbarium, from the maritime hills of Asturia, which had been mistaken for Pyrenæus. It agrees with that plant in producing its offsets on runners, but differs in having a bearded throat and deeper colour, being smaller in all its parts, and flowering at least a month later.

Sect. 3. Subparalleli. *Bulb-coats with confluent parallel fibres.*

Sp. 5. C. *serotinus.* Parad. Lond. t. 30, Bot. Mag. t. 1267, *excluding the synonyms.*

C. cormo e majoribus subrotundo, tunicâ vaginaceâ fibris parallelis superne confluentibus, foliaceâ exteriore membranaceâ supra medium cormum, interioribus 3 gradatim altiùs affixis, gemmæ vaginis circiter 5, 2 interioribus acutis cæteris obtusis vel truncatis, involucro tubato acuto inter-

dum ad pedem scapi bracteato, scapo brevi, spathâ tubatâ tubum non æquante superne viridi-nervatâ, bracteâ acutâ angustâ basi latiore tubum amplexâ, germine subluteo, tubo violaceo-striato exserto fauce intus pallidè flavescente ad laciniarum basim pubescente; limbo griseo-violaceo, sepalis extus striis sex pallidioribus intus maculâ ad basim subluteâ, filamentis a tergo canaliculatis summæ ferè fauci insertis subluteis antheras aureas non æquantibus, stigmatibus limbum sæpissime subæquantibus coccineis erectè breviter fasciculato-multifidis basi sæpius antheras superantibus, foliis circiter sex synanthiis marginibus crassis scabris.

Native of Spain; in Pine forests near Cadiz, and on the Sierra Nevada, flowering there in October, November, and December.

Mr. Ker confounded this plant, which is a native of pine forests in the south of Spain and in the Sierra Nevada, with the Portuguese crocus of Clusius named Clusianus by M. Gay, and with Pallas's specimens of his Crocus campestris, which grows on the low hills at the foot of Rhodope, and probably in some parts of the south of the Russian empire. This is a hardy species, but apt to flower with us in November, when sunshine is scarce. It is, however, very acceptable at that season in pots, or later, to stand upon the table.

Sp. 6. C. *Salzmannianus*. Herbert, in Bot. Mag., 3868, f. 2, C. Bot. Reg. 1847, 4 f. 4.
C. Salzmanni. *Gay*, *B. F.* 28, 220.
C. Tingitanus. *Herbert*, *Bot. Mag.* 3868, p. 2.

C. cormo pyriformi, tun. vagin. interiore submembranaceâ demum in fibras parallelas superne acutè confluentibus solutâ, exterioribus basi persistentibus foliaceis lævibus superne setosè apiculatis exteriore parum vel longè infra medium proximis gradatim altiùs, affixis, foliorum circiter 7 synanthiorum marginibus crassis lævibus costâ vix nervatâ lævi, canaliculis enervibus, spathâ pallidè subvirescente unciam vel sesquiunciam exsertâ ebracteatâ, tubo sesquiunciam exserto angulis sepalinis pallidis lateribus petalinis superne livido-purpureis, limbo circiter 1¾ unc. acuto pallidè violaceo fauce lævi intus sublutescente extus nebulosè sub-striato, filamentis lævibus luteis antheras aureas non æquantibus, stigmatibus pallidè aurantiacis asprè multifidis erectis antheras æquantibus vel superantibus.

An autumnal flowering species, inhabiting the hills near Tangiers.

This is probably the only African species of Crocus, and was found on the mountains near Tunis. The Crocus vernus, asserted by Desfontaines to be found, blue, white, and yellow, on Mount Atlas, has not been since observed, and I am informed that his dry specimens were flowers produced in the garden at Paris; excepting one damaged specimen, which had somewhat the appearance of C. versicolor. It was most probably C. Salzmannianus, if indeed he found any Crocus there, which I understand

the French have not since the occupation of Algiers. I have possessed the species a few years through the kindness of M. Gay, but I had seen the flower only in a dried state in the herbarium of Sir W. J. Hooker, till the 23rd of Sept., 1806, when one of the roots having acquired a larger size, produced its flower amidst seven erect leaves, having the general aspect of C. Clusianus on a larger scale. The bulbs had previously been more disposed to produce offsets than to increase in bulk. It is observable that C. versicolor, which Desfontaines' damaged specimen was said to resemble, stands next to this Crocus in affinity of structure. It requires much care to distinguish a dried specimen of C. suaveolens from C. Salzmannianus, and that plant is closely allied to Versicolor.

Sp. 7. C. *versicolor*. Ker, in Bot. Mag., 1110.
C. meridialis. *Osborne's Catalogue.*

C. tun. vag. duâbus interioribus infra non circumscissis fibris duris parallelis confertis superne acutè confluentibus prope basim affixis, foliaceâ exteriore nitidâ membranaceâ infra med. affixâ, involucro apiculato spathâ dimidio breviore, spathâ biflorâ exsertâ bracteam loratam angustam æquante, perianthii fauce lævi [intus pallidè flavescente] filamentis brevibus $\frac{1}{8}$ unc. infra faucem insertis, stigmatibus subtruncatis, foliorum canaliculis nervatis, marginibus (sæpe obsoletè) subscabris, seminibus e majoribus badiis. Flore verno.

Var. 1. *Princeps ;* Bot. Mag. 1110.
Varietas est in hortis nata, foliorum canaliculis uninervibus.

Var. 2. *Gallicus ;*
Canaliculis binervibus, sepalis extus pallidè stramineis tristriatis, petalis extus plumeo-purpurascentibus, fauce intus albâ vel pallidè lutescente.

Wild in the south of France, near Nice.

Crocus versicolor is well known to cultivators, and many handsome varieties have been raised, and are sent every year from the Dutch gardens. The wild plant is found in the neighbourhood of Nice, on the borders of France and Italy, but I do not find that it has obtained a place in the Italian flora. The plant figured in the Bot. Mag., to which Mr. Ker originally gave the specific name, is certainly one of the garden varieties, for I cannot find that it is anywhere found wild with the flower exactly similar. The vaginaceous coats of this species have parallel fibres, and are inserted near the base of the corm ; the outer foliaceous coat is smooth and shining, and attached below its middle. The prevailing colour of the flower is white, sometimes suffused with purple, and generally more or less richly streaked with purple on the outside. The throat inside is smooth, by which it may be readily distinguished from C. vernus, which has the inside of the throat always white and hairy ; that of Versicolor is sometimes white, sometimes pale yellow. The

smaller plants, with dark-coloured flowers, which Mr. Sabine called var. lineatus, plumosus, and purpureus, and Haworthi, have the throat white. I doubted at one time their having proceeded from the same stock, for the presence or absence of yellow in the throat seems to be a very constant specific feature in some species of this genus. I have, however, found seedlings raised at Spofforth from the wild Versicolor of Nice vary, with the throat white or pale yellow. The above-named varieties have become quite sterile by long cultivation from offsets, and I have never been able to obtain seed from them, but some of my seedlings from the other race approach to them a little. The wild Versicolor has the leaves more recumbent than the garden varieties. Its flower has a pale tinge of straw-colour on the sepals; and both it and many of the fine garden varieties bear seed freely.

Crocus versicolor, like the lagenæflori, likes to have its corm deep in the ground. If its seed is sown in a three-inch pot, plunged in a sand-bed, and left there, by the time the seedlings are two or three years old the bulbs will be found crowded and flattened against the bottom of the pot; and, if the hole in the pot is large enough to allow their escape, some of them will be found growing in the sand under the pot.

There is much affinity between C. versicolor, Imperatonius, suaveolens, and insularis. They extend from Nice to Naples, on the lower range of hills, the latter, however, confined to Capraria, Corsica, and Sardinia, and might be united as a group under the name C. sub-apenninus.* Versicolor having the throat white, varying to pale yellow, the fibres of the vaginaceous coats more parallel, and the foliaceous coat more smooth and shining, and the bract always lorate; Imperatonius, the throat yellow, the fibres of the vag. coats confluent upwards, and those of the foliaceous reticulate, and the bract always tubular; Suaveolens, the fibres of the vag. coat more reticulate, the bract wanting, and the style always fragrant; Insularis, the throat invariably white, the fibres reticulate upwards, and the bract usually wanting.

The only cross-bred I have flowered, or am quite certain of

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* Thus:—

Crocus sub-apenninus.

Var. 1. *Versicolor;* fauce albâ, interdum pallidè lutescente, t. vag. fibris parallelis, foliac. exteriore nitidâ, bracteâ angustâ loratâ.

Var. 2. *Imperatonius;* fauce luteâ, t. vag. fibris superne confluentibus, fol. exter. reticulatâ, bracteâ tubatâ.

Var. 3. *Suaveolens;* fauce luteâ, t. vag. fibris superne reticulatis, bracteâ obsoletâ, stylo odorato.

Var. 4. *Insularis;* fauce albâ, t. vag. fibris superne reticulatis, bracteâ plerumque obsoletâ, stylo inodoro.

having obtained, having flowered on the 16th of March, 1847, has shown, I think, the propriety of grouping Versicolor and the following Italian sorts together as different forms of one Crocus sub-apenninus. C. insularis, forced in my room at Manchester, had the anthers taken out and was set with pollen of the rare white variety of C. Imperatonius. One of the seedlings so obtained has flowered. It has taken from Imperatonius yellow into the throat, but pale, as in many varieties of C. versicolor. It has a bract within the spathe, not however tubular, like that of the male parent, but nearly lorate, and approaching to that of Versicolor. The colour is very pale lilac, streaked on the outside.

Sp. 8. C. *Imperatonius*. Bot. Mag., 3871, p. 2.
C. Imperati. *Tenore, Bot. Reg.*, 1993.

C. c. tun. vaginaceis exterioribus membranaceis, interiore fibris parall. superne et rariùs inferne confluentibus, foliaceâ exteriore crassâ intus glabrâ extus confertim confluenter parallelo-fibrosâ circiter vel infra medium cormum affixâ, involucro scapos infra arctè amplexo 2-floro, germine striato, spathâ bracteam tubatam acuminatam æquante, fauce lævi aurantiacâ, stigmatibus antheras intensè luteas superantibus cuneiformibus crenulato-incisis, foliis 4-6 hyperanthiis marginibus revolutis sesquilineam vel infra latis, tubo 1-3-unc. superne albo striato, limbo conspicuo intus saturatè violaceo, sepalis extus pallidè stramineis plumosè tristriatis, petalis basi tantum tristriatis, capsulâ 6-striatâ, seminibus pallidè badiis demum brunneis raphe et chalazâ rugosis. Flore verno.

Found at an elevation of 6000 *feet on Monte Pollino in Calabria, in other places in the South of Italy, and in the islands off the Coast.*

This fine Crocus is a native of lofty mountains in the south of Italy, producing its leaves before the flowers, which with us do not appear till spring. It is tolerably hardy, and handsomer than Versicolor, to which it is nearly allied; but is easily distinguishable both by the bulb-coats, the flower, and the tubular bract. This species varies with flowers striped and white.

Sect. 4. SUBRETICULATI. *Bulb-coats partly reticulate.*

Sp. 9. C. *suaveolens*. Bertoloni, Bot. Mag., 3864.

C. c. tun. vagin. interiore prope basim affixâ fibris parallelis superne reticulatè confluentibus, foliaceâ exteriore supra medium cormum affixâ pallidiore incisonotatâ, involucro bifloro spathâ breviore tubato apiculato, spathâ tubatâ acutâ ebracteatâ hyalinâ, tubo albicante ad faucem lævem aurantio-maculato, sepalis extus stramineis tristriatis, petalis ad basim 5-striatis, stigmatibus truncatis odoratis antheras superantibus, antheris filamenta duplo superantibus aureis, foliis lævibus canaliculis enervibus, capsulâ [quatenus vidi] estriatâ.

A native of the Campagna of Rome, and the Valle d'Inferno

in the kingdom of Naples, and on the calcareous hills near Fundi.

This very fragrant Crocus is nearly allied to C. Imperatonius, and forms a link between the reticulate and parallel-fibred species, and, in fact, should occupy an intermediate position. It is chiefly distinguished from C. Imperatonius by the reticulation of the upper part of its outer foliaceous bulb-coat, its scent, its more simple stigmas, and the invariable absence of the bract, which is tubular in the latter.

Sp. 10. C. *insularis*. Gay, B. F. 15, 221. Bot. Mag. 3871, p. 2. Bot. Reg. 1843, f. 21.

C. c. tun. vaginaceâ interiore fibris confertis parallelis superne reticulatè confluentibus infra demum liberis, foliaceâ exteriore læviore paullum infra vel supra medium c. affixâ, spathâ plerumque uniflorâ ebracteatâ, tubo longitudine variabili, limbo $\frac{3}{4}$—$1\frac{1}{2}$ unc. vel infra lilacino sepalis extus plùs minùs vel lutescentibus vel pallidè stramineis plùs minùs plumeo-3-(rariùs 5- vel 1- vel e-) striatis fauce lævi pallidiore (*nunquam luteâ*), filamentis albis lævibus infra faucem insertis, antheris aureis stylum coccineum subæquantibus, stigmatibus simplicibus fimbriato-truncatis vel pluries incisis, germine striato superne purpureo, seminibus badiis raphe et chalazâ pallidis, foliis angustis lævibus suberectis, canaliculis enervibus vel uninervibus. Flore verno. *Variat fibris plùs minùs reticulatè confluentibus, præsertim florum magnitudine sepalorum striis et colore exteriore, stigmatibusque fere integris vel pluries incisis suberectis vel reflexo-patulis, et seminum aspectu et magnitudine.*

The following are varieties of this plant :—

1. *Major ;* C. Corsicus, Vanucci, Tabl. Top. Bast., 1838 ; limbo sesquiunciali.
2. *Medius ;* limbo circiter unciali, limbo interdum valdè elongato.
3. *Minimus ;* C. minimus ; Decaud. limbo $\frac{3}{4}$ unc. Vidi etiam specimen magis pusillum limbo vix semunciali prope *Ajaccio* lectum.
4. *Geminiflorus ;* tubo fortiori, involucro geminifloro, spathâ interdum sed rarò loratè bracteatâ.

Found on the hills of Corsica, especially in the N.E. of the island, growing upon talcose schist. It also occurs in Sardinia and Capraria.

It is nearly akin to C. suaveolens of Italy ; but although so variable in the size and colouring of the flower, and especially of the sepals, or three outer segments, that two can scarcely be found exactly similar, and the seed of almost every variety has some difference of size, shape, and aspect, it has never either the fragrance or the orange marks in the throat which are invariable in that species. It bears seed freely, but each root produces usually only one flower and only one shoot, and it therefore rarely produces an offset. This plant, and the two preceding species, are pleasing plants, when forced early in the spring and placed upon the table, for the flowers once expanded in the room

are not much disposed to close again. I am indebted to Mr. Palmedo, the British vice-consul at Bastia, for bulbs collected between Bastia and Capo Corso.

Sect. 5. Reticulati. *Bulb-coats reticulate.*

Sp. 11. C. *odorus.* Bivona Bernardi, stirp. rar. sic., 3, p. 8.

C. longiflorus. *Rafinesque, Caratt.*, p. 84.

C. serotinus. *Bertoloni*, not of others.

C. c. tun. vagin. brunneis fibris superne reticulatis non cribrosis inferne fere parallelis prope basim affixis, foliac. exter. reticulatâ medio cormo vel infra aff. gemmæ vaginâ interiore acutâ 3 externis obtusis scapo unciali vel ultra involucro germen superante, spathâ ebracteatâ longè exsertâ subobtusâ superne viridi tubo flavescente spatham plùs unciâ superante, fauce luteâ intus sub petalorum basim pubescente limbo ultra sesquiunciali lilacino ad basim intus saturatè luteo, filamentis luteis lævibus infra faucem insertis, antheris luteis, stigmatibus aurantiaco-coccineis truncato-dentatis odoris, foliis lævibus angustis præcurrentibus costâ leviter sulcatâ canaliculis enervibus, seminibus subrotundis rufo-brunneis. Floret Octobri.

Of this plant there are two varieties: the one, longiflorus (*Bot. Reg.* 1844, 3, *f.* 4), *found in meadows near the coast of Sicily, on the mountains of the Val di Mazzaro and Palermo, on Mount Stella near Pæstum, and in the upland pastures of Calabria called Serra and Morgiana; the other*, melitensis (*Bot. Reg.* 1844, 3, *f.* 5), *occurs on Mount Verdala in Malta.*

Crocus longiflorus, to which the name odorus, given to it by Bivona, was much more appropriate, is a very fragrant and desirable plant, flowering and ripening seed well with us, if not placed in a very damp situation. It begins flowering in October, producing its leaves at the same time. It answers well in pots, to place upon the table in November. I have raised two or three seedlings in which the orange colour of the throat is continued by a golden stripe the whole length of the sepals on the outside. The Maltese plant is rather tenderer, and has the flowers smaller, not long in the tube, and streaked on the outside with purple, and the throat much paler. It maintains its difference by seed, but it seems too nearly allied to be separated from the Italian and Sicilian plant, as a distinct species. The name longiflorus is however quite inapplicable to it, and must remain affixed to the latter variety.

Sp. 12. C. *Hadriaticus.* Herbert, Bot. Reg., 1843, Misc. 77.

C. c. tun. absque stellâ ad basim persistente, vaginaceâ exteriore tenuissimâ membranaceâ, proximâ simili fibris confluentibus, interiore duriore crassiore fibris subtiliter reticulatis prope basim affixâ, t. foliaceis breviter

apiculatis exteriore circ. med. c. affixâ densè undulato-reticulatâ, cæteris similibus summo cormo aff. antheris aureis, stigmatibus indivisis superne incrassatis odoratis, foliis proteranthiis suberectis lævibus canaliculis vix nervatis, flore autumnali.

There are two varieties:—

Var. 1. *Chrysobelonicus;* Bot. Reg. 1847, 17, f. 8, 9. (*C. Cartwrightianus*, var. Leucadensis, Bot. Reg. 1845, Mis. p. 4), t. fol. exter. c. medio affixâ limbo albo fauce lævi aurantiacâ extus sæpe rubro livido notatâ vel striatâ, filamentis albis lævibus.

Native of stony hills in Santa Maura, flowering in October and November.

Var. 2. *Saundersianus;* Bot. Reg. 1847, 17, f. 7; t. fol. exter. supra c. medium (quatenus vidi) aff. limbo albo interdum biunciali fauce saturatè aurantiacâ extus sæpe saturatè lividâ.

From the hill of Bisdun, where the ancient Dodona once stood.

The first knowledge I had of this fine species was from a flower sent by Mr. Saunders, which had been gathered in December near Janina, and specimens of the entire plant of Sta. Maura from Sig. Mazziari. I found and dug up a few of the bulbs on the hill called Chrysobeloni, in Sta. Maura, in May, 1845, but they were scarce, and in the same month I received in Corfu a few bulbs of the Albanian plant from Mr. Saunders. Two of the former flowered at Spofforth in October, 1845, and more of them in 1846, after the middle of October, and as late as December. The Albanian bulbs began to flower in the border at Spofforth September 23, 1846, and had done flowering before the 21st of October, being decidedly earlier, and with larger flowers, but otherwise very similar to the Leucadian plants. The colour is white, with a deep golden throat, which is sometimes unstreaked on the outside, sometimes stained with dark livid reddish purple. The form and fragrance of the stigmas connect it with the group allied to C. sativus.

Sp. 13. C. *Visianicus*. Herbert, in Bot. Reg., 1845, Misc. 78.

C. Pallasianus. *Visiani fl. Dalm., without the synonyms.*

C. versicolor v. Dalmaticus? *Bot. Mag.* 3871, p. 2.

C. c. tun. satis C. Hadriatico conformibus, vaginaceis prope basim affixis fibris inferne densis subtilibus inferne parallelis superne reticulatis, foliaceis $\frac{3}{4}$ unc. apiculatis denè subtiliter reticulatis exteriore circiter med. c. affixâ, involucro 2-3-floro *interdum bracteato, spathis 1-2-floris bracteâ sæpius angustè loratâ subæquali, limbo violaceo fauce luteâ (*a Pallasiano et Thomasiano distinguendus*) stigmatibus truncatis, antheris aureis, foliis 6-7 angustis.

Flowers in the autumn in Dalmatia.

I have not yet been able to obtain this plant alive from Dal-

matia, though I have received many of the roots, taken up while growing, which died on the passage. Professor Visiani identifies it with C. Pallasianus and C. Thomasianus, but it is certainly very different from the latter, which I have flowered, and seems to be distinguished by the yellow throat from Pallasianus of the Crimea, and to approach more nearly to C. Hadriaticus, its nearer neighbour.

Sp. 14. C. *Cartwrightianus*. Herbert, in Bot. Reg. 1843, Misc. 131. Ib. 1844, f. 3; 1845, f. 37, b.

C. c. tun. omnibus tenuiter membranaceis fibris extus superne subtiliter reticulatis (tunicis obsoletis demum inferne parallelo-fibrosis), vaginaceis circiter quinque, duâbus inter quas zona radicalis est prope basim affixis tertiâ aliquantum supra, interiore medio cormo affixâ et duâbus foliaceis proximis basi spiraliter sæpe connexâ, foliaceis omnibus longè lato-complanatè apiculatis exteriore $\frac{1}{4}$ unc. infra apicem affixâ, tertiâ et quartâ a vaginaceis (nescio an semper) connatis, quintâ basi semicirculari, foliis 6-8 vel paucioribus angustis margine reflexo et costâ dorsali densè minutè ciliatis canaliculis vix nervatis ortu proteranthiis seriùs explicatis depressis, involucro bifloro (floribus interdum simultaneis) spathis hyalinis parum breviore, bracteâ acutâ tubum involvente non tubatâ spatham æquante, germine albicante, tubo sesquiunciam exserto, limbo albo vel purpurascente venis ad petalorum basim saturatè alies dilutiùs purpureis, fauce extus purpurascente intus albâ; barbâ albâ petalinâ, sepalorum basi lævi, filamentis albis lævibus $\frac{1}{4}$ unc. infra faucem ipsam insertis, antheris aureis ultra $\frac{3}{4}$ unc., stylo truncato odorato saturatè coccineo lobis usque ad faucem tubi divisis superne crassioribus stigmatibus breviter incisis, seminibus brunneo-purpureis in hôc genere magnis angulatè subrotundis.

Native of the islands Teno and Scyro, flowering in October, November, December, and January; a variety called creticus (*Bot. Reg.* 1845, 37, *f.* 7), *with the sepals pale yellow externally, and the limb usually smaller, has been found near the town of Canea in Candia.*

I am indebted to my excellent friend Mr. Cartwright, who has lately retired from the British consulate at Constantinople, which he had so long and so creditably filled, for the knowledge and possession of these desirable plants. They flower freely with me, and the flowers, which are fragrant, have the great merit of expanding easily, and not closing again willingly, standing open in cloudy weather, and even at night. I have seen them in flower in the garden at Spofforth as late as January, and as early as the end of September, and they ripen some seed with me, especially those which have been potted and flowered in the room. It is difficult to find two plants exactly similar. One only had a pure white flower; the prevailing colour is white, more or less starred inside with purple lines, but the ground is often of a pale and sometimes of a pretty rich purple. The throat, however, is never yellow.

Sp. 15. C. *campestris*. Pallas, in Herb. Lambert.
C. serotinus. *Ker, in Syn. Bot. Mag.*, 1267? *bad.*
C. hybernus. *Fridwaldsky, in Herb. From the foot of Mt. Rhodope, where it flowers in December.*
C. montanus, 2 *Clusius. From Byzantine Thrace?*

C. cormo unigemmato 1-rariùs 2-floro, t. vag. interiore confertim subparallelo-fibrosâ prope basim affixâ, foliaceis tenuiter reticulatis superne setosis ext. infra proximâ paullò supra med. c. affixâ, bracteâ (ni fallor in sicco) tubatâ, limbo griseo-cœruleo (in sicco), sepalis majoribus, stigmatibus truncatis.

Inhabits Roumelia, on the hills near the River Marissa.

There were many specimens of this plant collected by Pallas in his herbarium, in the hands of the late A. B. Lambert, Esq., with no memorandum as to the place of their growth. Mr. Fridwaldsky's specimens from the low hills of Rhodope, and Despoto Dagh, from which the Hebrus and its affluents arise, flowering in December in the neighbourhood of Carlowa, seem to be nearly similar, though rather less conspicuous. I have vainly tried to obtain the roots alive from a situation not easily accessible, perhaps 20 miles from Philippopolis, which is 200 from Constantinople. I think it is a variety of C. Cartwrightianus.

Dr. Grisebach has unaccountably quoted the name C. campestris, as published by me from the herbarium of Pallas, and at the same time has rejected it silently, and substituted the name hybernus, from the herbarium of Fridwaldsky. The insertion of a name in a herbarium is no publication, and, if it were, that of Pallas has long priority, on that account was preferred by me, and cannot be superseded.

Sp. 16. C. *Pallasianus*. Bot. Reg., 1844, 3, f. 2.
C. Pallasii. *Marsch. Bieb. Suppl.*

C. c. tun. foliaceis acutè apiculatis, exteriore subtiliter tenuissimè basi reticulatâ, proximâ subsimili supra medium cormum affixâ, tubo pallido vix spatham superante, fauce villosâ, limbo unciali pallidè violaceo ad basim extus saturatè striato, foliis 7 valdè angustis. Flore autumnali, foliis (vix?) hysteranthiis.

Found on sunny hills in the Crimea.

This native of the Crimea is very imperfectly described. I gave a figure of it, from a dry specimen, in the Bot. Reg. as above. I have not been able to procure it from the Crimea, but have a bulb from the Ghent nursery, which has not yet flowered. The coats are much more finely reticulate than those of Thomasianus. The Pallasianus of Grisebach, which he refers to the Italian, is Thomasianus, or perhaps Visianicus. Dr.

Grisebach, proclaiming that he does not know in what serotinus differs from sativus, shows that he has not studied this race of plants.

Sp. 17. C. *Thomasianus.* Herbert, in Bot. Reg., 1844, 3, f. 6.

C. Thomasii. *Tenore, Memoria, &c.*, 12.

C. c. tunicis foliaceis acutè apiculatis exteriore supernè fibris subtiliter reticulatis inferne parallelis, apice subsetoso, proximâ subsimili, involucro (quatenus vidi) ad basim scaporum singulorum bracteato, spathâ (quatenus in cultâ vidi) ebracteatâ (teste *Flor. Ital.*) in indigenis bracteatâ involucrum subæquante vaginis breviore, tubi parte exsertâ, limbo sesquiunciali saturatè purpureo estriato venis saturatioribus laciniarum basi intus hyalinâ, petalorum minutè barbatâ, sepalorum lævi, filamentis pallidè flavescentibus minutè pubescentibus vix $\frac{1}{6}$ unc. infra faucem tubo insertis, stigmatibus truncatis indivisis odoris coccineis antheras aureas vix subæquantibus limbo dimidio brevioribus, foliis angustis circ. $\frac{1}{16}$ unc. latis synanthiis seriùs excrescentibus erecto-recurvis costâ dorsali vix nervatâ canaliculis enervibus, capsulâ estriatâ, seminibus (*Flor. Ital.*) intensè violaceis. Flore autumnali.

Native of woods in Upper Calabria on the Serra di Bruno, and in Lower Calabria on the mountain della Stella: according to Tenore.

There are two varieties:—

1. *Princeps,* with the edges of the leaves and the angles of the midrib closely fringed.
2. *Lævis,* without any fringing hairs.

I was indebted to the Hon. W. Fox Strangways for a bulb of this autumnal Crocus, from which the figure in the Bot. Reg. was made. It appears to occupy an intermediate place between C. Pallasianus and Sativus, to which Cartwrightianus is also allied. The flower of this plant is smaller than that of Sativus, the well-known saffron Crocus, and without its conspicuous dark centre. It is confined to localities in the south of Italy to which we have no easy access. Its filaments are a little downy and pale yellow, while those of Sativus are purple and smooth. Its throat is colourless, though often tinged with yellow by the pollen, if wet.

Sp. 18. C. *Sativus.* Linn.—Red. Lil. 173.

C. autumnalis. *Eng. Bot.*, 343.

C. cormo e majoribus valdè prolifero, t. fibris stipatis reticulatè confluentibus, foliaceis apice setosis exteriore infra medium c. affixâ, vaginis 8-9 interiore (rarò tubatâ) basi tantùm inflatâ integrâ, cæteris tubatis truncatis, involucro (rarò tubato) acutè lorato scapum amplexo, bracteâ brevi obtusâ (interdum erosâ) inter seipsum et scapum, bracteâ longiore angustâ acutâ scapo elongato breviore oppositâ, interdum obsoletis, spathâ tubatâ apice acuminato exserto bracteâ loratâ acuminatâ æquali, bracteâ minutâ oppositâ interdum obsoletâ, germine cylindraceè oblongo albo ultrasemunciali, tubo exserto superne purpureo vel purpureo-maculato,

limbo pallidè purpureo venis et laciniarum inferne attenuatarum basi intus saturatè purpuris, petalorum basi minutè barbatâ sepalorum lævi, filamentis purpurascentibus lævibus ori ipsi tubi insertis, styli lobis sesquiuncialibus pendulis coccineis, stigmatibus truncatis odoris antheras aureas longè superantibus, foliis subundecim subsesquipedalibus erecto-recurvis marginibus et costæ angulis ciliatis, costâ dorsali fortiter nervatâ canaliculis enervibus.

Native country uncertain.

This plant was formerly cultivated at Saffron Walden in this country, for saffron, which its style constitutes; and I understand that it flowers pretty freely there, the chalky district being congenial to it. In my garden in Yorkshire I think it has only flowered, and that very sparingly, three seasons in the last 30 years, and on those occasions the summer had been warmer than usually. Dr. Royle found it in cultivation in Cashmere, which is beyond the eastern limits of wild Crocuses. Its native place is not known. It has been called wild in the Abruzzi, but is considered to have proceeded from ancient culture. It is said to be wild in parts of Scios, but that island became a wilderness after the extermination of its inhabitants by the Turks. The dry specimen which M. Mazziari of Sta. Maura put in my hands, with the live bulb, last year, and which he asserts that he found near the summit of Scarus, in that island, where he says that it is also met with, though rare, and sometimes entangled with Iris stylosa, on the stony steep of the cone of St. Elias, one of the highest points of Megaoros, is certainly C. sativus; and no cultivation seems likely to have been ever attempted on such rugged and elevated points. The fact rests on his authority; though I have no reason to doubt him, I cannot vouch for it personally; and I have found him incorrect as to other localities, for I have from him a specimen of a large golden crocus, asserted to grow near the telegraph Palæocastrizza, where in fact no crocus is to be found, but a white and yellow Trichonema, which is called by the natives, who eat the bulbs, Mámálokes, a name which Mr. Mazziari has published as belonging to C. vernus, which does not grow in the Ionian islands. The family with fragrant truncate styles, to which C. sativus belongs, extends eastward from Italy. Some persons have thought C. sativus to have been altered by cultivation from Crocus Thomasianus. I do not think so. Its original site may have been brought into cultivation. I found Crocus Mazziaricus extirpated by recent cultivation from Cana, in Sta. Maura, and C. Ionicus nearly so from Diamigliano and San Pietro, where three small bulbs, which I took from the sides of a few bushes, were the only remnant. I suspect that the birth-place of C. sativus has been long converted into vineyards. The various

Croci are so confined to peculiar localities, that a species may be easily so lost.

Sp. 19. C. *intromissus*. Herbert, in Bot. Reg., 1845. Misc. 2.

C. cormo pyriformi, tunicis pallidè purpureo-brunneis (ut in sativo) vaginaceis fibris submollibus tenuibus parallelis superne reticulatè confluentibus duâbus pariter ferè ad cormi basim tertiâ internâ parum supra affixis, foliaceis similibus dimidiatis vel spiræ modo connatis, apice multifido complanato submolli, exteriore medio cormo vel supra cæteris gradatim altiùs affixis, foliis quatuor brevibus.

Native of Syria.

Whether this unique bulb, dug up unnoticed on the calcareous mountains near Damascus in company with C. Damascenus, in 1845, is or is not a smooth-leaved variety of C. sativus, I cannot say. The plant by its coats, which in that climate do not soon perish, was certainly not less than eight years old, and had produced no offsets; whereas C. sativus increases by offsets superabundantly. That habit may however have perhaps arisen from long cultivation by offsets, and consequent sterility. The gentleman who procured the bulbs was not aware that two species grew where they were found; and the flowers of Damascenus and sativus could not be confounded. The bulb, carefully potted and plunged in a sand-bed with other Croci, became very weak the first season. It was planted in a border with other rare species of the genus the next autumn, but it rotted without vegetating. It must be sought for again on the calcareous hills near Damascus.

Sp. 20. C. *medius*. Balbi, Add. Fl. Pedem. el., p. 83. Bot. Reg., 1845, 37, f. 5. Bot. Mag., 3871, p. 4. Bertol. descr. 9. Gay, B. F. 1827, pp. 8 and 29.

C. tun. tenuiter demum cribrosè reticulatis, vaginaceâ interiore prope basim foliaceis summo cormo affixis, spathâ longè exsertâ subviridescente ebracteatâ, tubo prælongo exserto lividè purpurascente, limbo plùs minùs saturatè violaceo intus ad basim stellatè radiato biunciali, sepalis, petala superantibus extus ad basim 5-striatis, antheris luteis, stigmatibus multifidis, foliis lævibus hysteranthiis cum striâ albâ lætè viridibus erectis e latioribus, capsulâ nudâ, seminibus modicis rufobadiis subrotundis, raphe non corrugatâ, chalazâ circulari depressâ interdum medio apiculatâ. Flore autumnali.

Native of the eastern part of Liguria, in meadows; also of the mountains del Bracco, in western Liguria, near Laigueglia and Tinda.

This Crocus, which, after some years' failure, I obtained through the kind assistance of Sir Augustus Foster, from the mountain pastures of Ligurian Varese, is a great acquisition to

an English garden. Its flower is large and very conspicuous, the limb being often above two inches long, and appears in Yorkshire in September, or at the very beginning of October, commencing in general just as C. Pyrenæus and speciosus are going out of bloom, or even before they are passed away. It is quite hardy, and ripens its seed in the open ground, and there is a good deal of variety amongst the seedlings. It forms a link between C. sativus and Byzantinus, having been, however, named medius, as if intermediate between sativus and Pyrenæus, the last of which is not reticulate. Its flower has a general resemblance to that of Pyrenæus, but is easily distinguished by an internal star of dark lines.

Sp. 21. C. *Clusianus*. Bot. Reg., 1845, 37, f. 8. Misc. 1843, p. 32. Gay, B. F. 25, 220.
C. montanus, 1. *Clusius*.

C. tun. interiore membranaceâ perituràh fibris inferne parallelis ad basim persistentibus, foliaceis reticulatis circ. $\frac{3}{8}$ unc. apiculatis exteriore fibris inferne parallelis infra medium proximâ tenuiore supra medium cæteris summo cormo affixa, involucro 1-3-floro, spathâ $\frac{3}{4}$ unc. liberâ bracteam tubum involventem æquante, tubo $\frac{1}{4}$ unc. vel ultra libero, fauce intus pallidâ infra petala minutè barbatâ extus pallide lividolutescente, limbo circiter vel ultra unciali dilutè vel plûs minùs saturatè violaceo, basi interdum extus striatâ, filamentis lævibus albis circ. $\frac{1}{4}$ vix infra faucem insertis, antheris luteis $\frac{1}{2}$ unc. stigmata plurifida æquantibus, stylo subcoccineo 3-4-fido crasso erecto, foliis 4-6 angustis synanthiis. Flore autumnali.

Found in calcareous places in Portugal; rare near Lisbon, more common about Cintra.

This Crocus was first noticed by Clusius, whose description has been erroneously applied to C. serotinus of the Spanish pine-forests. It was recognised by M. Gay, who described it imperfectly from dry specimens. Perceiving that there were some small cretaceous tracts near Lisbon, and larger near Cintra, I suspected that this species would be found thereon; and accordingly they were discovered, plentiful at Cintra, rarer near Lisbon. It flowers in September, or early in October, sometimes producing three flowers from one involucre, which is unusual. It has the feathery stigmas of C. Pyrenæus and medius. The plants were obtained for me by the kindness of F. N. Hodgson, Esq., of Manchester, and his brother at Lisbon. Having recovered from the effects of their journey, they began to flower in 1836; at Spofforth in September, 1846.

Sp. 22. C. *Byzantinus*. Parkinson, Paradisus, 168. Ker, Bot. Mag., 1111, p. 2 (1808); Bot. Reg., 1847, 4, f. 5.
C. Banaticus, *Gay*, *B. F.* 25, 220 (1831).

C. speciosus, *Reichenbach, Icon. Bot. cent.* 10.
C. iridiflorus, *Heuffel and Reichenbach.*

C. cormo depresso complanato tunicis tenuibus vag. demum in fibras liberas subreticulatas inferne parallelas solutis interiore circiter medio proximâ prope basim affixis, foliaceis reticulatè nervatis supra med. c. affixis, spathâ ebracteatâ 1-2-floro, sepalis lætè violaceis sesquiuncialibus 1¼ unc. latis vel infra vel ultra petala pallidiora multùm angustiora (¼ unc. lata) interdum alba superne purpurascentia longè superantibus, antheris luteis, stigmatibus multifidis diffusis saturatè violaceis, foliis hysteranthiis latis utrinque attenuatis lætè viridibus striâ albâ ferè obsoletâ. Floret Septembri.

Inhabits thickets and woods in the Banat, and in Wallachia near Krajova. Parkinson had it from Turkey.

I am indebted for good dried specimens and live roots of this fine Crocus to Dr. Heuffel, who sent them to me from Hungary. It is a beautiful kind, very remarkable from its purple style, the size of its spreading sepals or outer segments, and the smallness of its erect pale petals, with the points a little recurved, and marked with purple lines, which give it the semblance of an Iris. In one of the dry specimens the sepals are intensely blue, and the petals pure white. The leaves, which are rather broad, are also remarkable from the white stripe being scarcely distinguishable in them. It inhabits mountain woods and bushy places, where it flowers in September, and will probably not like a very moist situation. In Yorkshire it flowered freely in October, 1846, beginning before the end of September. It was cultivated, as well as the cloth of silver, C. reticulatus, of old by Parkinson, but both had been long lost.

Sp. 23. C. *Carpetanus.* Boissier and Reuter, diagn. pl. nov. Hisp., p. 24.

C. tun. tenuissimè retic. maculis valdè elongatis, scapo flor. temp. ½ unc. (involucrato ?) spatha (ebracteata ?) tubo plus duplo breviore, arcta, albâ pallidè violac. striatâ tubo superne violaceo griseoque suffuso, limbi laciniis subæqualibus obovatis concavis pallidè lilacinis dorso medio saturatiùs coloratis ultra-uncialibus, fauce lævi albâ, filamentis albis antheras (aureas ?) non æquantibus faucè insertis, stigmate antheras vix subæquante pallidè *violaceo* striis intensioribus picto stigmatibus 3-4-lobatis brevissimè fimbriatis, capsulâ ovatâ obtusâ trigonâ violascente. Flore verno.

Found in the alpine region of the Sierra de Guadarrama, near Puerto de Nava Cerrada, in pine woods on the northern slope. Reuter.

This Spanish vernal Crocus is only known by Boissier and Reuter's description, flowering in the place above indicated. It agrees with C. Byzantinus in having a purple style. The proximity of Beira to the Sierra de Guadarrama makes it probable that the C. vernus of the Fl. Lusit. is this plant; C. vernus,

though extending westward to Cevennes, and said to be found, though very rare, in the Pyrenees, not having been discovered in Spain.

Sp. 24. C. *vernus*, L.

C. cormi tunicâ vaginaceâ interiore reticulatâ infra medium cormum affixâ, proximâ reticulatâ fibris inferne longis parallelis basim cormi non attingente (unde zona radicalis a basi distat) foliaceâ exteriore reticulatâ in fronte cormi affixâ, involucro tubato scapum laxè amplexo vaginas vix æquante, scapo sæpe elongato (triuncialem vidi) spathâ tubatâ acutâ ebracteatâ superne virescente tubum subæquante, tubi fauce barbatâ nunquam luteâ, limbo purpureo vel albescente vel bicolore aut striato, styli longitudine variabili, stigmatibus capitato-multifidis croceis (interdum in cultis albescentibus), foliis 3-4 utrinque attenuatis marginibus tenuibus lævibus costâ canaliculis vix nervatis angustiore.

I distinguish the following varieties :—

Var. 1. *Communis;* flore minore violaceo, vel albescente vel bicolore aut striato.

Subvar. 1. *Obovatus;* C. albiflorus, Schultz. Flore albo laciniis obovatis. In Alpibus Vindeliciæ.

2. *Elatior;* C. longiflorus, Heget Flora Sw. Flore acuto longiore; in Alpe Pilato.

3. *Albiflorus;* C. albiflorus, Schultz Mant, i. 367, limbo acuto. In Montibus Carinthiæ et prope Cevennas. Nascuntur in forestâ Lepizzæ prope Tergestem C. vernus v. albiflorus et v. violaceus, sed non in eodem loco.

4. *Aprilis;* Sabine, flore tardo violaceo.

5. *Parviflorus;* flore albo tubo violaceo. In Alpe Splugen dicto et alibi.

Var. 2. *Neapolitanus*, Bot. Mag., 860, var. culta 2240; flore majore sepalis saturatiùs violaceis petalis plumeo-violaceis. In Monte Calabro celsissimo Monte Pollino dicto mense Junio et Julio floret, et alibi in Lucaniâ et Calabria, ad alt. 5-6000 ped.

Var. 3. *Nivigena;* C. vernus; Marsch. a Bieb. C. Nivigena; Bot. Reg., 29. Misc. 130. C. tunicis quibusdam aliquando in spontaneis connatis, non ita in cultis, flore magno laciniis obovatis cucullatè incurvis pulcherrimè striatis; variat saturatè violaceus. Habitat deserta Steppes dicta prope Odessam.

Native of the Alps of Europe.

C. vernus is one of the most widely-extended Croci, and of the easiest culture, producing seeds abundantly, which, as neither the birds nor the mice seem to eat them, become almost a nuisance, from the multitude of self-sown seedlings, which come up spontaneously, and intrude where they are not wanted. It is the Crocus of the Alps, but its flower is small there, promiscuously purple and white or whitish, generally with the throat purple on the outside, but always white and hairy within. It reaches Cevennes; and I am told it is to be found, though rare, on the Pyrenees. Brotero states it to be found in the north of Portugal, but his plant is perhaps C. Carpetanus. It extends, with white acute flowers, into Carinthia, and is found white, with

very blunt obovate flowers, on the Bavarian Alps, sometimes assuming a blush of purple. I believe it is only found in particular spots on the Pyrenees, affecting the oolite or Jurassic limestone. On the Alps it reaches above 5000 feet of altitude. I have seen it both white and purple from the Tyrol. The finer purple Neapolitan variety inhabits the loftiest mountains of Calabria and Lucania, not descending lower than 5000 feet. On Monte Pollino it flowers as late as June and July, reaching an elevation of 6000 feet. On the Wengern Alp its flowers actually pierce the remaining snow in June.

The Odessa variety, which grows on part of the Steppes, is much finer, and from that stock the finest garden varieties seem to be derived. The segments of the flower are so rounded and concave, that the half-expanded flower is nearly spherical. They are white, sometimes beautifully striped in the inside, or deep purple.

C. Heuffelianus is usually distinguished by a dark spot, like two arches, near the end of each segment of the flower. It is a fine species, with habits that appear to be very different from those of C. vernus, as it is found in bushy places and moist woods of the valleys of the Banat, and in the mountain woods of the southern portion of the Banat; whereas C. vernus occupies the short sod on very lofty mountains, and C. Tomasinianus of Dalmatia is found on the sunny slopes of the mountains.

The var. *nivigena* was sent to me by Mr. Cartwright, who received it from Mr. Yeames at Odessa, with an account that the bulbs were taken up in flower at the commencement of March or last days of February, just after the melting of the snow on the Steppes. The bulbs were sent in a pot to Constantinople, and I was informed that there was one dark purple, one beautifully striped, and two whiter. It appeared afterwards that Mr. Cartwright had put a bulb of C. pulchellus into the pot; and, when he took up the roots to send them dry, had forgotten it, which proved to be the only live bulb marked dark purple, and understood to have had a dark purple vernal flower; from its bulb-coats I described it as probably a very dark variety of C. annulatus Adamicus, whereas the bulb was C. pulchellus, and the specimen sent to Mr. Cartwright a dark purple, C. vernus. I believe C. vernus is nearly confined to the Jurassic mountains or oolite. I found a solitary weak bulb of C. vernus, and also a weak plant of Anemone hepatica, and one of Lilium martagon, on the rocks near Chiavenna, which had evidently grown from seeds blown off the Jurassic summits, and seemed unable to thrive and propagate themselves where they were.

C. *longiflorus* of the Swiss Flora is only a variety of C. vernus found on Mount Pilate and some other Alps.

DIVISION II.—SUBNUDI; *i. e.* Crocuses having no involucre below the flowers, or a very imperfect one.

Sp. 25. C. *Heuffelianus.*

C. c. tun. vag. exteriore tenuissimâ membranaceâ hyalinâ, secundâ prope basim proximâ altiùs affixâ fibris subtilibus superne reticulatis inferne parallelis demum liberis, interiore supra medium affixâ glabrâ subtiliter reticulatâ truncatâ, foliaceis in vertice subreticulatis brevissimè apiculatis, involucro brevi sæpiùs obsoleto, limbi laciniis violaceis latè obtusis maculâ sæpissimè saturatiore biarcuata in parte superiore, petalis plerumque pallidioribus.

Native of thickets and damp woods in the Northern Banat, flowering in February and March.

I am indebted to Dr. Heuffel of Lergoph for the knowledge of this plant, which he had proposed to call C. Banaticus; but that name had been published by M. Gay, who affixed it to the autumnal plant found in the Banat; and although M. Gay's name cannot stand, because the plant had long before been named Byzantinus, it would create confusion to apply it now to another Crocus. I have therefore named it after the distinguished botanist who discovered it. It is closely akin to C. vernus, as well as Tomasinianus and Veluchensis, and that group forms the point of transition in the genus from the involucrate to the naked form.

Sp. 26. C. *Tomasinianus.*

C. vernus. *Biasol. Viag. del Re di Sass. in Dalm. Visiani, Fl. Dalm.*

C. c. tun. vag. interiore fibris inferne parallelis (membranâ obsoletâ) prope basim affixâ superne membranaceâ fibris angustè reticulatis foliaceâ exteriore (nisi fallor in sicco) medio circiter affixâ breviter apiculatâ membranaceâ fibris reticulatis non cribrosis, scapo nudo (in spontaneis) sesquiunciali vel ultra, spathâ laxâ ebracteatâ tubum ferè subæquante folia angusta linearia florendi tempore superante vel non æquante, limbi laciniis obtusè saturatè violaceis rariùs pallidis apicem versùs maculatis, filamentis albis vix $\frac{3}{8}$ unc. longis ori tubi insertis, antheris luteis $\frac{7}{16}$ unc. stigmatibus brevibus capitato-submultifidis aurantiacis.

Found wild in naked mountainous places in Dalmatia.

This plant was, as I am informed, first discovered in the mountain called Biokovo, in Dalmatia, by my highly-esteemed friend Signor Tomasini, president of the magistracy at Trieste, and has since been observed on the Triglau, and other mountains in Dalmatia, in sunny spots, and it has passed amongst botanists for C. vernus. I have carefully examined all the specimens sent to me by Professor Petter from Spalatro, and I find no vestige of an involucre in any of them, and I observe that all have nar-

row linear leaves, whereas those of C. vernus are always wider in the middle of the length, and taper towards each extremity. Amongst Signor Tomasini's specimens I perceived some with a very pale flower and a dark blotch, as in C. Veluchensis and C. Heuffelianus. It is certainly very closely allied to C. vernus.

Division III.—NUDIFLORI; *i. e.* Crocuses having no involucre.

Sect. 1. Reticulati. *Bulb-Coats reticulate.*

Sp. 27. C. *Veluchensis.*

C. c. tunicâ vaginaceâ interiore supra med. c. affixâ, proximâ prope basim, ambabus duris colore stramineo pallido fibris reticulatis non cribrosis inferne parallelis, tertiâ exteriore tenuiore peritura, foliaceis omnibus in vertice sitis breviter apiculatis, foliis sex vel ultra, scapo florendi tempore subnullo, spathâ et bracteâ tubatâ æqualibus, tubo extus violascente fauce extus concolore intus albâ barbatâ, limbo violaceo subcœrulescente laciniis obtusis superne cucullatè incurvis apice sæpe pallido vel albescente maculâ saturiore transversâ appositâ stylum stamina æquantem $\frac{1}{4}$ unc. superantibus, filamentis albis lævibus antheras aureas longitudine superantibus, stigmatibus brevibus crassis subintegris apice denticulato, foliis sublinearibus tempore florendi enascentibus, seminibus modicis oblongis vel subrotundis dilutè brunneo-badiis, raphe rugosâ pallidâ.

A native of the Morea.

This species is very closely allied to the variety of Crocus Heuffelianus, in which the involucre is often, but not always, obsolete. In Veluchensis the scape is so short at the time of flowering, that the ovary seems almost sessile, and it can scarcely be seen whether the plant has a naked scape and bracteate spathe, or an involucre and no bracte. When the scape grows longer, it is ascertained to be naked. It was found by Vrioni in pretty strong soil, on the lower parts, on the promontories, and on the summit of Veluchi, probably on the slopes, for it appears not to like a damp so well as a dry situation. Specimens of this Crocus were distributed by the collector, —— Sprunner, under the name of C. nivalis, *Bory*,—a plant which has the throat of the flower orange. I do not feel confident that an involucre may not be hereafter found occasionally in this plant and Tomasinianus, and that they may not rank as three local varieties of one, C. subnudus.

Sp. 28. C. *nivalis.* Bory, Voyage de la Morée.

C. sublimis. *Herbert, Bot. Reg.*, 1845, *Misc.* 73. *Ib.* 1847, 4, f. 2.

C. Sieberianus. *Gay, B. F.*, 25, 220.

C. cormi tun. duâbus vag. tenuibus membranaceis tertiâ interiore durâ pal-

lidâ fortiter reticulatâ non truncatâ neque cribratâ prope basim absque stellâ persistente affixâ, foliaceis setosè apiculatis in vertice sitis fibris reticulatis, foliis 4-7, canaliculis enervibus costâ nervatâ, spathâ bracteatâ, tubo pallido, fauce extus violaceo-fuscescente notato intus lævi luteo, limbo ad basim aureo sepalis majoribus saturatè violaceis petalis pallidioribus minoribus, filamentis lævibus aureis vel lutescentibus brevibus infra faucem insertis, antheris aureis erectis filamento duplo longioribus stylo brevioribus eique adpressis, stigmatibus brevibus vix fissis subaureis vel sub-coccineis, capsulâ apicem versùs purpureâ nudâ, seminibus parvulis compressione subangulatis glabris pallidè brunneis, chalazâ saturatiore prostante, raphe pallidâ corrugatâ. Flore verno.

Found on the summit of Mount Delphi, in Eubœa, by Vrioni, sent thither to seek it. A larger variety was collected by Sprunner on Mount Corydallus, near Athens.

Having obtained C. nivalis from Taygetus, I find it to agree with my C. sublimis, and not with Gay's C. Sieberianus, the outer foliaceous coat being inserted near the summit, the inner vaginaceous one near the base. This plant is described by M. Gay with the outer foliaceous coat attached at the base; and he stated it to be identical with Bory's C. nivalis, which grows on the summit of Taygetus, flowering near the unmelted snow, and late in May. Relying on his description, I considered the Eubœan C. sublimis to be distinct; but in order to solve my doubts I sent Signor P. Vrioni to Taygetus to obtain C. nivalis, where Bory had met with it; and having received it, I find that it agrees with my sublimis, and not with Gay's description of his C. Sieberianus from Crete and the Troad, of which I know nothing. I even entertain doubts of the existence of that species, unless it should be this misdescribed.

There is a variety which I call Vrionicus, the tube of which is obstructed by the down beard between the filaments, of which the base is also bearded; whereas the tube and filaments of C. nivalis, whether from Negropont or the Morea, are perfectly smooth; but I cannot think that it ought to be specifically separated on that account. There is a like difference between Asturicus and Pyrenæus, of which the former may perhaps be properly considered a variety, although this is not the only difference between the two.

The Gailahs or sloping table lands of the Lycian mountains are from 3300 to 5000 feet high. On the peaks above them, higher than the juniper reaches, C. nivalis was found by Forbes and Sprat close to the snow on the heights of Massicytus, whose loftiest peak is 10,000 feet high. Supposing my collector to have considered Mount Lycodino to be part of the forest of Kubaz, which I believe it is, and its summit to be its lowest ascertained position, the height thereof is about 3136 feet.

Sp. 29. C. *cancellatus*. Herbert, Bot. Mag., 1841, 3864, p. 2. Bot. Reg., 1843, Misc. p. 30. Ib. 1845, Misc. p. 81.

C. c. tun. vagin. tenuibus membranaceis fugacibus stellâ ad basim persistente, foliaceâ exteriore imo cormo affixâ durâ angustè densè reticulatâ demum cribrosâ, foliacearum apicibus in fibras longas setosas rigidas resolutis, spathâ bracteatâ bracteâ in unifloris tubatâ tubo longè exserto, limbo albo pallido vel violaceo, fauce luteâ lævi, antheris aureis, stylo aurantiaco, stigmatibus multifidis inodoris, foliis lævibus, canaliculis fortiter nervatis parum hysteranthiis. Floret autumno.

Three varieties must be distinguished :—

1. *Kotschianus*, with a violet limb about an inch and a half long.

This florid Crocus was found by Mr. Theodore Kotschy flowering profusely on a small elevated flat on the summit of Bulgar Dagh, 7500 feet above the sea, lying behind Tarsus, and stretching towards Kurdistan: it is one mile towards the N. from the lead-mines, and twelve miles from the Kulek Boghas or Pylæ Ciliciæ, Kulek being a corruption of Cilicia. The snow lies very late on this flat, and still covered it at the end of April in 1845; the soil is a dark reddish-brown ferruginous earth. This Crocus flowers upon that and other parts of the ridges of Mount Taurus at the end of summer, or rather in the autumn, where it is abundant, and it purples the ground. Some of the native specimens have three simultaneous flowers. I am indebted to Mr. Kotschy for indicating the precise place of their growth, and to John Clapperton, Esq., the British consul at Tarsus, and through his kind request to Reschid Effendi, the director of the lead-mines, for a box full of the roots taken up when flowering, but quite dead before they reached me. I hope, however, for a further supply at the season of rest. Many of a pale bluish tint, and some apparently almost white, were intermixed with them.

Var. 2. *Margaritaceus*. Bot. Reg., 1846, Misc. 74. Ib. 1847, 16, f. 4.

Limbo ultra sesquiunciali subalbo venis omnibus intus pallidè cœrulescentibus, fauce lutescente lævi, laciniis subobtusis concavis extus ad basim lac. cujusque violaceo saturatè tristriatis striis decurrentibus mediâ majore lateralibus inferne proxime concurrentibus superne subramosis, sepalis petala pallidiora superantibus, antheris aureis, filamentis brevibus albis lævibus, stylo limbum subæquante aurantiaco, stigmatibus multifidis inodoris, floribus successivis, foliis lævibus parum hysteranthiis.

When I first became acquainted with the Nauplian plant through a dried specimen, I saw that it conformed in structure with Kotschy's specimen from Mount Taurus, and, although the specimen had very little colour, I concluded that it had been purple when fresh. The hills near Nauplia were searched

for this plant in vain, late in May, the leaves having disappeared; but a few, of which one flowered, as above stated, at Spofforth, were dug up near the base of Mount Delphi in Negropont. I have seen a dried specimen from Mount Hymettus, which I referred to the next variety, Mazziaricus, but I did not closely examine it.

Var. 3. *Mazziaricus.* Bot. Reg., 1845, Misc. p. 3. Ib. Misc. p. 82. Ib. 1847, 16, f. 5, 6.

C. c. tun. vagin. stellâ ad basim persistente duriore longiore setosâ, limbo albo circ. sesquiunciali, antheris aureis stylo gracili superne tenuiter multifido pallidè coccineo semunciam vel infra brevioribus. Floret Octobri.

This variety was first discovered by Signor Mazziari on Phaneromeni, and near Caria, in Sta. Maura, where it appears in October, the flowers being white, with a yellow throat. In the latter site it has been since destroyed by the rapid progress of cultivation, and vines have usurped its place. I found it, however, where it had not been observed before, plentiful on the heights of Megaoros, and pretty abundant on an elevated hollow and flat between the highest point of Megaoros and St. Elias, which is another peak of the same mountain. They are said to be 3000 feet high. From that elevated flat, the rugged path begins to descend very gradually between two ridges of rocky mountain, and partly on the precipitous edge of one of them, towards the southern coast, occurs C. Mazziaricus; but it does not descend so low as Diamigliano in that direction, where C. Ionicus makes its appearance, though almost extirpated by cultivation. The plants of C. Mazziaricus nearest to Diamigliano have the throat deep yellow, and not much streaked; those which grow higher on the mountain, as well as those from the Cephalonian mountains, are more so. I met with the plant afterwards on Mount Ruthi, in Cephalonia, where the tubers were affected very much by a fatal murrain, that caused them to become soft and burst; and more abundantly in the short turf near the governor's villa, in the forest of Cephalonian firs on Mount Œnos (now called Megaoros by the natives) in close company with an Ornithogalum and a narrow-leaved Oporanthus (O. parvulus, *mihi*), and again just above the present position of the firs, which was much reduced many years ago by a lawless conflagration. It grew there in company with the Oporanthus and Orchis provincialis. This Crocus has not been found in Corfu or Zante. Its bulbs are sometimes compressed laterally, so as to be almost as flat as a pancake, by growing between stones where the seed has fallen.

Sp. 30. C. *Damascenus.* Herbert, Bot. Reg., 1845, 37, f. 1. Ib. Misc. p. 1.

C. c. tun. vag. membranaceis non reticulatis tenuissimis fugacibus interioris

basi fibris setosis tenuibus radiatis persistente, foliaceâ exteriore longè et tenuiter usque ad basim prope fundum affixam reticulatâ (in obsoletis demum cribrosâ) interioribus omnibus parvulis in ipso vertice sitis, vaginâ interiore acutâ exsertâ, tubo subterraneo, foliis 3-4 angustis lævibus hysteranthiis, scapis successivis, germine albido, spathâ vix inclusâ bracteam tubum involventem non tubatam parum superante, perianthii tubo $1\frac{1}{8}$ unc. exserto saturatè purpurâ sexstriato limbo plùs minùs griseo-cœrulescente fauce lævi pallidâ, petalis sepala extus plumeo-3-striata vix æquantibus, stylo albicante, stigmatibus profundè furcatis erectis, filamentis albis lævibus circ. $\frac{3}{8}$ unc. longis, antheris pallidè luteis $\frac{5}{8}$ unc. apice curvato stigmata superantibus, capsulâ longâ superne purpurâ striatâ et suffusâ, seminibus purpureo-rufis oblongo-ovatis, raphe productâ concolore. Flore autumnali.

Native of the dry limestone mountains near Damascus.

I am indebted for the knowledge and possession of this plant to S. Cartwright, Esq., and the vice-consul at Damascus. The bulbs were taken up in February and May, and it is said that the Arabs cook them and eat them. It is evidently allied to C. reticulatus, v. variegatus, of Dalmatia, Trieste, and the Crimea, and var. albicans of Odessa, Wallachia, and Podolia; but they are vernal, and this plant produces its flowers in autumn before the leaf. It is a weak plant, but very neat, though the flower is not large. When the first bulb flowered in September, I suspected that it must be out of course; but in the following autumn two of the bulbs in a pot flowered in October, and after the fine summer of this year, 1846, the bulbs which I have in a S. border are either in or coming into flower, without leaves, Sept. 29. It is, therefore, decidedly autumnal.

Sp. 31. *Fleischerianus.* Gay, B. F., p. 219 (1827).

C. c. tun. vaginaceâ interiore crassâ seriùs merè fibrosâ fibris tenacibus subtilibus seriebus parallelis rectis bifariam intertextis, foliaceis subtiliter reticulatim nervatis nunquam cribrosis, nonnullis connatis, exteriore medio cormo vel altius affixâ, bracteâ tubatâ, perianthii tubo superne fuscescente, limbi laciniis angustis acutis albis, petalis ad basim sepalis totâ longitudine fusco-purpureo striatis fauce intus breviter saturatè luteâ lævi, filamentis lævibus lutescentibus, stigmatibus profundè multifidis tenuibus rectis saturatè coccineis antheras aureas superantibus, floribus vernis 3-4 successivis, foliis prærrentibus angustis lævibus florendi tempore suberectis perianthium superantibus.

Found on the limestone hills of Smyrna.

This Crocus, which is very remarkable from the fine fibres of its old coats, which persist for many years in native specimens, and are interwoven in longitudinal stripes to the right and left, like basket-work, grows on the hippurite limestone near Smyrna. I succeeded, through the help of my friend Mr. Cartwright, who so long and ably filled the chief consulate at Constantinople, in obtaining a few live bulbs of it, but they are still too weak to flower. The first year's search produced me only a blue Tricho-

nema from the lowlands. A request that the adjoining hills of hippurite limestone, where I felt confident that the Crocus would harbour, might be examined, produced the right plant. The dried specimens show that the species is very florid, the flowers being white, slightly streaked on the outside.

Sp. 32. C. *reticulatus*. Marsch. v. Bieb., Bot. Mag., 1841, 3865, at the end. Bot. Reg., 1843, Misc. 30.
C. Susianus. *Ker*, *Bot. Mag.*, 652.

C. cormi tunicâ vaginaceâ interiore tenui citò deperiturâ fibris ad basim rigidis parallelis aculeiformibus stellatim persistentibus, foliaceis reticulatis exteriore demum cribrosâ prope basim affixâ, proximâ sæpius supra rariùs infra medium c. affixâ, cæteris in vertice, zonâ radicali inter tun. foliac. exteriorem et vaginaceam interiorem sitâ, foliis angustis synanthiis [lævibus, quatenus vidi] canaliculis enervibus, spatham bracteâ tubatâ subæquante, fauce et filamentis lævibus vel ferè lævibus, styli lobis suberectis stigmate incrassato breviter aut non inciso interdum subreflexis, capsulâ nudâ acutissimè acuminatâ. Flore verno.

Var. 1. *Auritextus;* Anglicè, Cloth of gold. Limbo intus aureo, foliis lævibus, canaliculis angustis, capsulâ purpurascente, seminibus rufo-badiis raphe concolore subangulatè obovatis.

Subvar. 1. *Reflexus;* Susianus malè, Bot. Mag., 652. C. fulvus, Pallas, Herb. Limbo aureo, sepalis sub sole revolutis extus fusco-purpureo striatis aut suffusis. *Crimea and Caucasus.*

Subvar. 2. *Rectilimbus;* similis, sepalis sub sole non revolutis, sed patulis. *Known only in gardens.*

Subvar. 3. *Immaculatus;* C. fulvus, Pallas, Herb. Limbo prorsus aureo.

Var. 2. *Variegatus;* Hornsch. et Hoppe; scapo elongato, germine subalbo, limbo pallidè purpurascente rariùs albescente, sepalis extus 3-striatis, fauce lævi flavescente, tubo saturatè 6-striato, capsulâ virente, seminibus longè pallidioribus.

Var. 3. *Dalmaticus.* C. Dalmaticus; Visiani, Flora Dalm. Cormi tunicarum maculis subtilioribus, foliis depressis angustis canaliculis enervibus margine recurvo lævi, [apud me sub lente non cartilagineo] spathâ bracteatâ, limbi fauce lutescente, laciniis acutis pallidè violaceis sepalis extus colore pallidè stramineo dilutè et punctatè substriatis, stigmatibus [ut in variegato] indivisis.

Var. 4. *Albicans;* Herbert, Bot. Reg., 1841, M. p. 83. Ib. 1847, 16, f. 2. C. neglectus, Nordman, MS., in literâ. Perianthio albo, laciniis limbi angustis acutis non libenter patentibus suberectis, sepalis extus purpurâ vel ferrugine striatis rariùs suffusis, fauce lævi flavescente, styli lobis brevibus suberectis. Colore et striis violaceis interdum rufescentibus aut fuscescentibus variat.

Var. 5. *Ancyrensis;* Herbert. Humilior, foliis gracilibus synanthiis lævibus canaliculis enervibus, tubo aureo rariùs purpureo, limbo dilutè aureo laciniis $\frac{7}{8}$ unc. longis latè ovalibus subacutis, sepalis interdum sub sole revolutis, fauce et filamentis lævibus, styli lobis tenuibus reflexis, stigmate parum incrassato plerumque indiviso. *Found wild near Angora.*

Native of the Crimea and the South-East of Europe.

The reticulate Crocus, of which the cloth of gold variety is the best known, called C. Susianus by the late Mr. Ker through some unaccountable error, since Susa lies far beyond the limits

of the genus Crocus, is distinguishable in the dry roots by the hard reticulation of their foliaceous coats, and the persistent star which is the remnant of the inner vaginaceous coat. Their leaves are usually smooth, very narrow, and the channels have no conspicuous nerves. The common cloth of gold has the sepals generally disposed to become revolute in the sunshine, but there is a variety in the gardens less irritable, in which they only become spreading. I can find no structural difference of any importance between this and variegatus, albicans, or the plain yellow reticulate Crocus of Ancyra; but, as far as I know, the yellow kinds are never found in company with the others. The cloth of gold, with the sepals streaked with brown in some specimens, and suffused in others, is found on barren slopes in Tauria. Cultivated, it seems to dislike sand very much, and I could never make the bulbs thrive in a pot of sand. I am not aware of any intermediate plant having been found between the yellow, the lilac, and the white local varieties. The lilac is found in Lipizza forest and on Monte Spaccato near Trieste, and a variety with white flowers is not uncommon amongst them, but they are all strongly streaked on the outside of the sepals. The lilac variety grows also in the eastern parts of Tauria. The variety albicans is found near Odessa, in S. Podolia, in Wallachia, near Bucharest, and in the Banat of Hungary. It is slenderer than the white casual variety of Lipizza, and a lilac variety is not found mixed therewith similar to the Tergestine plant, though it sports as to the colour of the streaks, and has rarely a little suffusion of lilac. The seeds of the Tergestine plant differ materially from those of the cloth of gold. I have tried to obtain a cross between them, and believe that I have succeeded; but the seedlings have not yet flowered, and we know not how the lilac and yellow will blend if they can be crossed. The lilac will probably be discarded, and the flower be either white or pale yellow. C. variegatus grows in a crumbling reddish earth on the stony *carso* upon the flat top of Monte Spaccato, and in richer blacker earth, because highly manured for the emperor's stud, in Lipizza forest. Albicans, from Bucharest, in a crumbling blackish earth on the Steppes, which looks like soil that covers chalk; but neither it nor the soil from Lipizza effervesce in muriatic acid. Albicans is Parkinson's cloth of silver crocus. I can find no sufficient grounds for separating Prof. Visiani's C. Dalmaticus otherwise than as a variety closely akin to variegatus of Monte Spaccato and Lipizza forest. In the living plant kindly given to me by himself, I find no difference but the suffusion of pale straw-colour, and the failure of the distinct purple stripes, which are faint and dotted on the outside of the sepals. No cartilaginous denticulation is discoverable on the leaves of my specimen,

as indicated in the Flora Dalmatica: it probably varies in that respect. The golden variety of Angora is very distinct from the cloth of gold, having in one specimen at Spofforth a purple tube, but in none that I have seen any stripes or suffusion on the sepals. The segments of the limb are broader, blunter, and of a lighter yellow. Its sepals sometimes become a little revolute.

Sp. 33. C. *Gargaricus*. Herbert, Bot. Mag. 1841, 3860, *ad calcem;* Bot. Reg. 1843, Misc. p. 30; Ib. p. 83; Ib. 1845, Misc., p. 6; Ib. 1847, 16, f. 1.

C. c. depressè complanato tun. foliaceâ exteriore fibris superne subtiliter reticulatis inferne parallelis prope basim affixâ dudum persistente demum (annis in Asiâ quatuor) cribrosâ, interioribus ipso vertice parvis inconspicuis, tunicæ vaginaceæ basi non aut vix persistente, flore verno aureo subaureo vel citrino laciniis limbi latè subovatis obtusis, filamentis sub lente vix minutissimè pubescentibus, stylo pallido, lobis brevibus erectis breviter plùs minùs incisis, foliis lævibus canaliculatis angustis synanthiis v. parum tardioribus, capsulâ subacutâ nudâ obscurè purpureâ, seminibus subrotundis subpallidè brunneo-badiis non rugosis, chalazâ circulari planâ obscuriore, raphe et hilo inconspicuis.

Var. 1. *Panchrysus*, limbo aureo. C. aureus, Clarke's Travels, 1812.

Var. 2. *Citrinus*, limbo citrino.

A native of Mount Gargarus.

The first knowledge of this plant was derived from Dr. Clarke's dried specimens from Mount Gargarus, called by him, erroneously, *C. aureus*. The greater part of his specimens are of a pale citron colour. I am indebted for bulbs of the species, collected by himself in the same place, to the late J. Lander, Esq., British Vice-Consul at the Dardanelles; but those which have flowered are deep golden yellow. It is a very ornamental, small species, flowering earlier than the *lagenæflori*, and produces seed at Spofforth.

Sect. 2. PARALLELO-FIBROSI. *Bulb-coats with parallel fibres.*

Sp. 34. C. *lagenæflorus*. Salisb. Parad. Lond. 1805.

C. c. tun. vag. interiore fibris parallelis prope basim affixâ, exterioribus tenuibus membranaceis basi tantùm persistentibus, foliaceâ exteriore membranaceâ circiter medium c. (sæpe obliquè) interioribus summo affixis, spathâ laxâ lorato-bracteatâ (bracteâ in cultis sæpe obsoletâ) perianthio aureo lutescente vel candido, ad basim sepalorum sæpe extus 3-striato, filamentis pubescentibus, antheris aureis apice attenuato divaricante, stylo inodoro antheras vix æquante lobis brevibus plùs minùs incisis sæpe pallidis, foliis margine reflexo et costâ dorsali ciliatis canaliculis dorsalibus vix nervatis, capsulâ oblongâ apice purpurascente, spathâ marcidâ persistenter obvolutâ, seminibus pallidè purpureo-brunneis (lusu interdum albidis), raphe et chalazâ pallidioribus conspicuis.

Var. 1. *Aureus;* Smith, Prod. Fl. Græc. 1, 24; perianthio aureo concolore spathâ in cultis sæpe ebracteatâ. Bot. Mag., 2986, var. γ. Parad. Lond. 106. Bot. Reg., 2986. Engl. Bot., 2646.

Subvar. 1. *Trilineatus ;* lineis 3 externis cœrulescentibus in summo tubo et sepalorum basi. *Variat lineis plùs minùs continuis. Spathâ ebracteatâ.*

Subvar. 2. *Sulphurascens ;* per. sulphureo-concolore pallidiore.

Subvar. 3. *Albus ;* perianthio albo, spathâ bracteatâ, interdum ebracteatâ.

Subvar. 4. *Lacteus ;* C. lacteus concolor, Sabine, Hort. Soc. Tr. v. 7. C. Mœsiacus, β. Bot. Mag., 1111. Perianthio lacteo fauce pallidè luteo-maculatâ, spathâ ebracteatâ.

Subvar. 5. *Lacteus penicillatus ;* Sabine, Hort. Soc. Tr. v. 7. Bot. Mag., 2645. Per. lacteo lineis ad sepalorum basim tribus cœruleis, spathâ ebracteatâ.

Subvar. 6. *Lutescens ;* Herbert, Bot. Mag., 3869. Tubo albescente pallidè cœruleo-lineato, limbo pallidè luteo, fauce et limbi basi maculâ radiatâ saturatè luteâ, spathâ ebracteatâ, foliis parum latioribus. *Four or five were found at Barton, in Suffolk, about seventy yards from the place where Crocus aureus (the outcast of some old garden) has now established itself. No doubt a seedling from aureus.*

Subvar. 7. *Sulphureus ;* Ker, Bot. Mag., 1384. Per. aureo-sulphurascente fauce aureâ, spathâ bracteatâ, antheris sterilibus, foliis angustis strictis.

Subvar. 8. *Pallidus ;* Sabine, Hort. Soc. Tr. v. 7. Limbo sulphureo-albicante ; cæterum sulphureo similis.

Var. 2. *Striatus ;* Ker, Bot. Mag., 938. Per. aureo-sulphurascente sepalis extus striatis ; cæterum sulphureo similis.

Var. 3. *Stellaris,* Haworth ; tun. foliaceâ exteriore duriore nitidâ obliquè sulcatâ, supra medium c. affixa, colore saturatiore.

Var. 4. *Syriacus?* Tun. pallidè lætè badiis nitidis, vaginaceâ interiore basi lacerâ superne leviter parallelo-fibrosâ, foliaceis superne sulcatis exteriore circ. med. proximâ prope med. aff., spathæ bracteâ latâ, tubo purpurâ striato, limbo vix unciali aureo, sepalis extus fusco-purpureo plumeo-3-striatis, foliis angustis.

Var. 5. *Luteus,* Lam. Enc. 6, 385. C. vernus, Bot. Mag., 25. C. Mœsiacus, Ker. C. tun. externis membranaceis tenuibus basi circumscissâ tantùm persistentibus, t. vag. interiore parallelo-fibrosâ prope basim affixâ, foliaceâ exteriore durâ nitidâ sulcatâ superne confluenter fibrosâ apiculatâ longè infra medium c. vel obliquè affixâ, spathæ bracteâ loratâ, tubo purpurâ 6-striato, limbo aureo subbiunciali, sepalis costâ inferne brunneo notatâ striis tribus utrinque brevibus, petalis ad basim tristriatis ; cæterum ut in aureo, stigmatibus crassioribus, antherarum colore saturatiore.

Var. 6. *Olivierianus ;* C. Olivieri, Gay, B. de F., 25, 219. C. tun. vag. ut in aureo, foliaceis lævissimis supra medium c. affixis, bracteâ loratâ, stigmatibus 4-6? exasperatis. *Found in Chios, and at Rhodosto in Roumelia.*

Var. 7. *Hæmicus ;* Herbert, Bot. Reg., 82. C. tun. vag. interiore lævi prope basim affixâ inferne sub lente fibris parallelis compactâ, proximâ exteriore tenui fibris paucis parallelis inter quas zona radicalis est, foliaceâ exteriore lævi non sulcatâ fibris intus parallelis paucioribus, perianthio aureo. *Mount Hæmus, near Adrianople.*

Var. 8. *Landerianus.* C. tun. vag. int. superne lævi membranaceâ inferne fibris parallelis manifestè compactâ, proximâ ext. tenui fibris paucis, foliaceâ ext. summo cormo affixâ curvè sulcatâ, spathâ triunciali ebracteatâ, perianthio aureo vel flavescente. *Found at Kurchumlu Tépé in the Troad.*

Var. 9. *Candidus ;* Clarke's Trav., 1812. Foliis lanc. lin. florendi tempore fl. brevioribus, stigmatibus antheras subæquantibus profundissimè

multipartitis, cormi tunicâ fibroso-costatâ, corollæ lac. ellipticis. *Mount Gargarus.*

Inhabits mountains in the most eastern parts of Southern Europe, and extends as far as the Troad in Asia.

This beautiful Crocus, branching into a great number of wild local varieties, from deep yellow to white, either unstreaked or with dark or blue streaks on the outside of the tube and base of the limb, extends from the Banat, over the Balkan, to Rhodosto and Constantinople, I believe on Silurian limestone; from thence it stretches to Gargarus and Chios, and some other islands, and to Bithynian Olympus. Mr. Sabine separated the white flowered plants, of which one was unstreaked, and the other had three short blue streaks on the outside, as two varieties of a separate species, which he named Lacteus, distinguished also by the absence of a bract from Lagenæflorus aureus; but they were merely garden varieties of the golden plant; and I have obtained seedlings from the same capsule representing Aureus, Lacteus concolor, Lacteus penicillatus, and Lacteus lutescens. There are natural varieties of the golden with and without the bract, which the bracteate varieties seem disposed to lose in our climate. It is observable that all the wild specimens of Lagenæflori seem to have grown with the bulbs five inches or more underground, and depth is very necessary to their preservation; for mice, which I have found usually to meddle with no other species, will scratch very deep in quest of them. The fine common large yellow Crocus luteus of the gardens differs sufficiently from the other varieties to make it pretty evident that it is a natural local variation of the species, and not a garden variety; but we know not whence it was derived. Mr. Ker called it Mœsiacus, and gave the same name to the garden variety, Lacteus penicillatus of Sabine. It is possible that luteus may be found in that quarter, but we do not know it. Dr. Sibthorp states that aureus grows in sand upon clay; and certainly all the varieties of this species seem to prefer a very light soil upon a clay subsoil, being planted five or six inches deep. Aureus, so treated, produces seed abundantly; planted near the surface, upon sandstone, or in a damp situation, it thrives ill, and often perishes. Crocus sulphureus concolor of Ker, and Sulphureus pallidus of Sabine, are certainly old seedling varieties of aureus, grown quite sterile, and with the anthers very defective from age and long increase by offsets; C. sulphureus striatus and stellaris of Haworth are equally sterile from old age, and have not been found except in gardens, where they were probably produced. The flower would raise a suspicion that they might have been crossed with reticulatus; but the bulbs do not uphold that surmise. There is in the Banksian Herbarium, however, a remnant of a specimen said to have

been gathered near Aleppo by Russell, which has a streaked flower much like that of Stellaris, and belongs, according to the bulb-coats, to lagenæflori; but I cannot hear that such a plant is to be found near Aleppo, or anywhere except in gardens; and there may be some error as to the specimen. If it is a genuine Syrian plant, we must look to it, though not precisely similar, for the parentage of those varieties. The points of the anthers of all the lagenæflori are tapering from a wider base, and diverge, while their base approaches the style. Their seeds are of a pale purplish bay, and are easily distinguished from those of any other species. I had one pod from aureus the spring before last, the season having been wet and cold, with white seeds. I have never seen the variety luteus (our large garden yellow crocus) attempt to form seed; it appears to be as positively sterile from old age as sulphureus, &c.; but it was not cultivated in Parkinson's time, and we do not know how or when it was introduced. The whole race are distinguished by the parallel fibres of the outer permanent coat, which is the base of the inner sheath, by the divarication of the sharp-pointed yellow anthers, by the small and comparatively pale style usually shorter than the anthers, and by the oblong acute capsule covered by the withered but persistent spathe.

Sp. 35. C. *Suterianus*. Herbert, Bot. Reg., 1845, Misc. p. 5, 1847, ic. 4, f. 1, under the name of *C. chrysanthus*.

C. cormo parvulo tun. præcipuâ durâ glabrâ crustaceo-membranaceâ badiâ a basi ad medium tenus demum parallelo-lacerè incisâ, proximâ interiore durâ glabrâ integrâ basi regulari cormo medio circiter vel infra affixâ, cæteris foliaceis apiculatis duris obscuris basi dimidiatâ vel magis imperfectâ quibusdam connatis, pedunculo elongato, spathæ bracteâ tubum involvente non tubatâ, tubo aureo vel lividè purpurascente limbo subunciali saturatè interdum subrubenter aureo rariùs ad basim extus livido, filamentis vix minutissimè pubescentibus, antheris aureis, stylo aureo lobis tenuibus recurvis sæpissimè profundè bifidis, stigmate incrassato indiviso, foliis infra medium dilatatis striâ albâ latâ costâ dorsali et marginibus multâ pube ciliatis canaliculis latis multinervibus, seminibus sub-purpureo brunneis chalazâ saturatiore apiculatâ mediæ magnitudinis vel ultra. Flore verno.

From the mountains of Nauplia.

This plant is nearly allied to C. lagenæflorus, but is sufficiently distinguishable. Its outer persistent coat is very hard and smooth, cleft into parallel shreds at the base; the next hard and smooth, attached near the middle of the corm; the flower small, of a fiery and sometimes reddish gold colour, with the tube very often of a livid colour, and sometimes a livid blotch near the base of each segment of the limb. It was sent by Mr. Suter,

the British vice-consul in Caramania, having been found in the neighbourhood of Angora.

A mistake has crept into the *Botanical Register*, 1847, t. 4, concerning this plant, in consequence of its corms having been mixed with some of *annulatus* or *pusillus* found by Vrioni on the mountains of Nauplia.

Sp. 36. C. *chrysanthus*. Herbert, Bot. Mag., 1841, 3862, p. 2. Bot. Reg., 1843, Misc. p. 27.

C. c. e minimis tun. foliaceis duris inferne annulatè circumscissis, spathâ et bracteâ tubum aureum amplexis æquantibus, limbo ¾ unc. aureo petalis obtusioribus quam sepala (ut videtur), styli lobis brevibus parum incisis antheras superantibus.

Inhabits the low mountains near Rhodope and the Despoto Dagh, flowering in February about the village of Carlova—Fridwaldsky. *In Macedonia and Thrace*—Grisebach, who calls it C. *sulphureus*.

This little plant, which appears to have the corm of the annulate crocuses, with a flower approaching to those of lagenæflorus and chrysanthus, is only known by Fridwaldsky's dried specimen. From its position, remote from all easy access, I have not been able to procure it. Dr. Grisebach errs widely in referring it to Ker's sulphureus, which I have had forty years in cultivation, and can assert to be very dissimilar; and in fact an old sterile garden variety of C. lagenæflorus aureus. It has no semblance of persistent rings to the vaginaceous coats.

Sp. 37. C. *annulatus*. Herbert, Bot. Mag., 1841, 3861, p. 4. Bot. Reg., 1843, Misc. p. 26.

C. c. tun. vagin. tenuibus basi annulatè circumscissâ persistente, foliaceâ exteriore membranaceâ durâ intus nitidâ infra medium c. affixâ, spathæ bracteâ cylindraceè involutâ (non-cylindricâ), limbi basi intus saturatè luteâ, filamentis pubescentibus, stylo subcoccineo, stigmatibus indivisis aspero-subtruncatis odoratis, foliorum marginibus reflexis, seminibus subsphæricis raphe et chalazâ conspicuis. Flore verno.

Var. 1. *Biflorus*, Miller. Bot. Mag., 845. Vaginis ortu primo *luteis*, scapo (vidi ipse) interdum furcato bifloro, limbo subalbo, sepalis extus stramineis, petalis maculâ extus ad basim plumbeâ 5-striatis, filamentis et fauce pubescentibus, foliorum margine crasso recurvo et costæ dorsalis margine ciliatis canaliculis dorsalibus binervibus.

Subvar. 1. *Stigmatosus*; Sabine. Stigmatibus limbum superantibus.

Var. 2. *Adamicus*; C. Adami, Gay, B. de F., 25, p. 219, 1831. Bot. Mag., 3868. Vaginis pallidis, limbo intus pallidè cœruleo-violaceo, sepalis extus saturatè cœruleo-violaceo 5-7-plumeo striatis, filamentis saturatè luteis lævibus ⅓ unc. infra limbum tubo insertis, stigmatibus integris plicatè truncatis subtiliter fimbriatis pallidè aureis antheras filamentis duplo longiores superantibus. *A native of the Caucasus.*

Var. 3. *Nubigena*; Herbert, Bot. Reg., 1843, M. p. 81. Vaginis pallidis, tun. vag. int. annulo fibris aculeiformibus ciliato, foliaceâ exteriore longè infra medium affixâ, interioribus ferè obsoletis basi gracili cir-

cumbracteatâ bracteis tunicarum fragmenta apiculata mentientibus, germine vix subterraneo, bracteâ loratâ spatham æquante tubo breviter exserto, filamentis antheras æquantibus luteis densè breviter pubescentibus, stylo superne subcoccineo lobis tenuibus simplicibus antheras subæquantibus vel parum superantibus, limbo subunciali, laciniis latis obtusis basi violascente aurantiacâ, sepalis saturatè totâ ferè longitudine plumeo-purpureis marginem versùs pallidis, tubo intus saturatè purpureo, antheris fuscis, polline aureo. Variat flore subalbo sepalis concoloribus vel extus brunneo-punctatis antheris aureis. *Found on the summit of Gargarus.*

Var. 4. *Purpurascens;* sepalis extus sæpe saturatè purpurascentibus. *Sent me from Dalmatia, by Petter.*

Var. 5. *Albus;* perianthio albo, rariùs sepalis extus parùm purpurascentibus. *From Opschina, near Trieste.*

Var. 6. *Pusillus;* Tenore. Vaginis pallidis, pube ferè obsoletâ, foliorum canaliculis vix nervatis et ciliis ferè obsoletis, sepalis extus stramineis 3-striatis; seminibus pallidis.

Subvar. 1. *Tenorianus;* minimus, limbo albo sepalis petala superantibus. *Inhabits S. Rocco, near Naples.*

Subvar. 2. *Argenteus.* C. minimus, perperam, Bot. Mag. C. argenteus, Sabine, Hort. Soc. Tr. Major, limbo subpurpurascente, (variat subalbo) sepalis petala 3-striata superantibus. *Found about Pisa and Lucca; the only kind belonging to the Roman States.*

Subvar. 3. *Lineatus.* C. biflorus Parkinsoni perperam Sabine. *Found near Parma.*

Var. 7. *Cærulescens;* limbo pulcherrimè cœrulescente sepalis extus substramineis 3-striatis, filamentis lutescentibus densè breviter pubescentibus. *From the neighbourhood of Naples.*

Var. 8. *Estriatus;* C. biflorus, Bot. Reg., 1987. Bracteâ tenuiore loratâ, limbo pallidè lilacino petalis sepala extus luteo-straminea non striata æquantibus; fauce saturatè aurantiacâ, seminibus badiis. *Found near Florence.*

Var. 9. *Tauricus;* tun. annulo ciliato; limbo intus a basi saturatè luteâ parum ultra-unciali, sepalis purpureis (interdum subalbis) extus saturatius plumeo-striatis, petalis subalbis basi extus cœrulescente, filamentis aureis lævibus, stylo gracili pallidè sub-aureo, stigmatibus subsaturatioribus parvulis. *Native of the vicinity of Odessa.*

Var. 10. *Græcus.* C. biflorus, Bory. Flore parvo, laciniis albis angustis acutis, sepalis extus tristriatis, petalis ad basim striatis, fauce et filamentis lævibus luteis stigmata subæquantibus, foliis angustis florendi tempore limbo brevioribus. *Nauplia.*

A native of the South-east of Europe, in various places from Italy to the Caspian.

This crocus, easily recognised by its hard smooth bulb-coats, which are cut into rings at the base, its yellow throat, and undivided fragrant stigmas, reaches, in some of its varieties, from Parma and Lucca to the vicinity of Naples, being, as far as we know, the most western of the Croci with a naked scape. From Italy it extends eastward nearly to the Caspian, which limits the habitation of the genus, being found on Caucasus. It is generally known by the garden plant, which has been called C. biflorus by Miller, and Scotch crocus by British cultivators: having probably been introduced into England and Holland from some garden in Scotland.

No trace of that variety can be discovered in a wild state, unless an imperfect specimen of Dr. Sibthorp's from Crete, without bulb, but with 5-streaked sepals, called in error C. vernus β (Smith, Prod. Fl. Gr.), be this plant. It is very remarkable amongst all Croci by the deep yellow of the sheaths which envelop the leaves when it first pushes, and amongst the varieties of its species by its 5-streaked sepals, and the stronger pubescence of its throat and filaments. Bory de St. Vincent states that C. biflorus grows all round the Saronic Gulf; but the variety which was found by Vrioni for me on the mountains near Napoli di Romania is a small variety liker to Tenore's pusillus. I can assert that no wild specimen of Miller's biflorus has been seen by me, and that neither in England nor on the continent have I heard of its having produced a seed, having become sterile through long cultivation by offsets. Its seeds are offered in the Neapolitan botanic garden, but two or three seeds, which were sent to me from thence with a printed label marked C. biflorus, proved to be of C. pusillus; and Professor Tenore has admitted that it does not produce seed at Naples.

Var. 2. Adamicus is a most beautiful variety of annulatus. Professor Steven informs me that it is a native of Caucasus, and M. Gay is probably mistaken in referring it to Tauria. To his kindness I was indebted for two bulbs, of which one has the colour more inclining to purple, while the other is of a bluer tint than any Crocus I have seen, excepting the dried specimens of C. Byzantinus, in which the sepals are of a splendid blue in the dry state, but I have not yet seen the fresh flower. Its seeds are bay, while those of the Italian pusilli are of a very pale colour, tending to white.

Var. 3. Nubigena was discovered near the summit of the highest peak of Mount Gargarus by Mr. Lander, who kindly sent me a few bulbs stated to have blue flowers. In this variety the rings are ciliated by pointed fibres, which, together with some other differences that are less marked in cultivation, induced me to look upon it as a separate species; but I have found the like ciliation of the rings in the variety from the Steppes near Odessa, which in flower comes near to the small pusillus of Tenore. Of three bulbs which survived, but which were checked and did not perfect their flowers last spring, one had a white flower, speckled without on the sepals, and two had the sepals suffused and feathered with very dark brownish purple, one of them having the anthers nearly black on the outside, though the pollen was yellow, the other having them yellow. Much variety and beauty in cultivation may be expected from this plant.

Var. 4. Purpurascens has a full-sized flower, with the sepals more or less purple on the outside, in some richly coloured. It

is found in Dalmatia, intermixed, however, with the white variety, similar to var. 5.

Var. 5. Of a pure white (though in a few specimens I have seen the outside tinged with purple), grows near Opschina, the well-known hill-station on the Austrian side of Trieste. For its possession I am indebted to Signor Tomasini.

Var. 6 was separated by Professor Tenore as a species under the name Pusillus. It does not appear to me advisable to consider the plants which I have united under the general name Annulatus as other than strong local varieties of one species, marked by very decisive characters. The smallest with the clearest white ground is found at St. Rocco, near Naples. The larger variety, figured in Bot. Mag. erroneously as Decandolle's C. minimus, and naturalized in Barton Park, near Bury St. Edmund's, in company with lagenæflorus aureus, is found near Pisa, and Sabine's argenteus is a seminal variety, whiter, but scarcely worth distinguishing, much like those which are found near Lucca, where Mr. Cartwright discovered one pure white, except a straw-coloured tinge on the outside of its unstreaked sepals. A variety found at Ossolone, in the Neapolitan territory, is very superior to all others in Italy, having larger flowers and a beautiful bluish ground. I have also smaller varieties from Naples with the blue tint. C. lineatus of Jan is the variety of pusillus which grows near Parma, and is scarcely, if at all, separable from Sabine's argenteus. Parkinson's plant, which Sabine called C. biflorus v. Parkinsoni, is in fact the same thing. It is the largest of the Italian pusilli, which have all 3-streaked sepals.

Estriatus, found near Florence, is a very peculiar plant, having bay seeds, not whitish, like the pusilli, a differently shaped bract, and a lilac-coloured flower, the sepals being of unstreaked straw-colour on the outside. I believe it will be found to come true from seed in cultivation.

C. annulatus, with vernal flowers, is the only membranaceous crocus which has the scape naked and the stigma truncate and fragrant. The rest have multifid stigmas and autumnal flowers.

Sp. 38. C. *aërius.*

C. Sibthorpianus. *Bot. Reg.*, 1845, *Misc.* p. 5, not 1843, p. 28.

C. cormo minimo, tun. omnibus membranaceis lævibus pallidè brunneo-badiis demum ad basim parallelo-laceris, foliaceâ exteriore (ni fallor) prope basim, proximâ parum altiùs affixâ, foliis 2-4 vel ultra angustis, spathâ hyalinâ bracteâ æquali inferne tubatâ, germine brevi albicante, tubo extus saturatè violaceo, limbo (in sicco) albo intus violascente $\frac{7}{8}$ unc. longo, filamentis $\frac{1}{4}$, antheris (aureis?) semuncialibus stigmata paucifida irregularia fimbriatè dilatata aurantiaca ferè æquantibus. Variat limbo saturate violaceo (in sicco) inferne luteo.

Var. 1. *Stauricus;* limbo albo violascente.

Inhabits the Alps of Trebizond, on Mount Koolat Dagh.

Var. 2. *Pulchricolor;* limbo saturatè violaceo, inferne saturatè luteo.

From the Bithynian Olympus.

I am indebted to the vice-consuls at Trebizond and Brussa for these plants, with imperfect specimens of the flower. The bulbs were scarcely bigger than a pea, and all but one of the whiter Stauric plants failed, and that has pushed a weak leaf and exists. The colour of the dry Olympic flower is very rich. The pass from Trebizond to Stauros is choked with snow till June, and both C. aërius and the autumnal C. vallicola appear to be few in number or not to flower freely on Koolat Dagh, for the result of two missions from Trebizond in search of them produced very few, and those in a weak and almost hopeless state. I hear that a third expedition was more productive in June, 1846, but the roots were afterwards lost; another attempt in the autumn and spring of 1847 may perhaps succeed.

Sp. 39. C. *lævigatus.* Bory de St. Vincent, Voyage du Morée.

C. vernus. *Smith, Prodr. Fl. Græc.*

C. c. tun. vaginaceis duris lævibus enervibus infra squamæformiter laceris, spathis 1-4 uniforibus, bracteâ subæquali, germine ferè exserto, tubo parum exserto, limbo subalbido, sepalis extus purpurâ tristriatis, fauce aurantiacâ, foliis synanthiis subangustis. Flore verno.

Native of the Morea; in Thermia and Melo; on Hymettus, and near the quarantine station of Zeitun.

All my attempts to procure this plant, though Vrioni went on purpose to seek it near the quarantine station at Zeitun, where it abounds with much variety of colour, have failed. On further reflection I am satisfied that, having no sufficient description of C. lævigatus, for Bory's is very meagre, and no opportunity of ascertaining the internal structure of the bulb-coats, I mistook two imperfect specimens in Sibthorp's herbarium for a separate soft-coated species. I now believe that they exhibit the outer foliaceous coat of C. lævigatus, which is nowhere described.

Sp. 40. C. *speciosus.* Marsch. v. Bieb.—Bot. Mag., 3861.

C. c. tun. membranaceis tenuibus lineis raris parallelis superne confluentibus, vaginacearum basi persistente lacerè disruptâ, foliaceâ exteriore infra medium c. affixâ, spathâ occultâ tubatâ, bracteæquali non tubatâ tubum amplexâ, tubo elongato exserto, fauce supra stramineâ pilis albis minutis hispidâ, sepalis cœruleo-purpureis lineis tribus et basi extus saturatioribus, petalis pallidioribus saturatè et pulcherrimè venosis, filamentis circ. $\frac{1}{4}$ unc. infra faucem insertis circ. $\frac{3}{16}$ unc. liberis, stigmatibus multi-

fidis, foliorum canaliculis non fortiter nervatis costâ dorsali deflexè densè ciliatâ, capsulâ obtusâ, seminibus subangulatis obscure subpurpureo-rufo-brunneis. Floret Sept. Oct.

Var. 1. *Caucasicus;* Bot. Mag., 3861, f. 1. Gemmâ in indigenis tunicâ unifloră, tubo tenuiore summâ parte vix purpurâ punctato, fauce albâ, filamentis albis, stigmatibus patulo-multifidis.

Var. 2. *Transylvanicus.* Ib. f. 2. Bot. Reg., 25, 40. Icone pro cœrulescente perperam rubescente, c. e majoribus (in cultis plurigemmato gemmis sæpius bifloris) germine flavescente, perianthio majore saturatè basim versùs purpurâ punctato, fauce pallidè subflavescente, limbo obtusiore saturatiore filamentis pallidè flavescentibus subulatis, stigmatibus fasciculato-multifidis laciniolis superne sensim crassioribus.

Var. 3. *Laxior;* Bot. Mag., 3861, fig. 3. Gemmâ 1-2-florâ, tubo confertiùs saturatiùs purpurâ punctato, stigmatibus laxiùs effusis. Floret Sept. Oct.

Inhabits Hungary and the countries near it to the Eastward as far as the Crimea.

This beautiful Crocus extends north of the Danube nearly as far as the Caspian, appearing first in Transylvania, next in the Crimea, and finally on Caucasus. It is hardy, and ripens seed freely, flowering abundantly in Yorkshire at the end of September and beginning of October. It is, perhaps, the finest of the genus. I cannot find that it has been discovered south of the Danube, where C. pulchellus seems to take its place. I am informed that in the Crimea it likes a dry rich soil on the table-land under trees. C. Pyrenæus, speciosus, pulchellus, and medius, the latest of the four, and Byzantinus, are equally free flowerers, and of exceeding beauty from the latter part to the end of October. C. longiflorus and Cartwrightianus, flowering with equal freedom, usually follow them, and continue sometimes till January. The accidental white variety of C. speciosus is not in cultivation.

Sp. 41. C. *pulchellus.* Herbert, Bot. Reg., 1843, Misc. 28; 1844, 3. Bot. Mag., 1841, 3862, p. 2.

C. c. tun. præcipuâ membranaceo annulo ad basim circumscisso fibris ciliato, spathâ occultâ, bracteâ latâ lorată spatham vix æquante, tubo gracili 2½ uncias exserto, limbo unciali vel ultra pallidè cœrulescente venis saturatioribus, fauce subbarbată aurantiacâ, filamentis croceis minutè hispidis, stigmatibus multifidis pallidè croceis prolapsuris antheras albas superantibus, foliis latis viridibus lævibus striâ albâ, seminibus parvis subrotundis lætè badiis. Floret Octobri.

Inhabits the forest of Belgrade and Mount Atlas.

The first knowledge I had of this plant was from a specimen in Sir W. J. Hooker's herbarium, gathered in Roumelia by Montbret, who mistook it for C. speciosus. His error was evident to me, and I requested Mr. Cartwright to have the kindness to send some person into the forest of Belgrade to look for it in October, thinking that a likely place for it. C. pulchellus was

accordingly found there, and afterwards on the Asiatic side of the Bosphorus, and also on Mount Athos, where C. speciosus had been erroneously said to grow. Its milk-white anthers distinguish it widely from C. speciosus. It is a great acquisition to our gardens, flowering freely at the beginning of October, and ripening its seed willingly. Three plants were found with the limb of the purest white, contrasting beautifully with the orange throat. I hope to multiply this variety by its own seed, and by the seed of the usual plant impregnated by pollen of the white, and I have young seedlings so obtained. The general tint is a pâle bluish pearl-colour, with darker veins within.

Sp. 42. C. *Tournefortianus*. Gay, Bull. de Fer., 25, 220. Bot. Reg., 1845, 37, f. 3. Ib. Misc. p. 6.
C. parvulus? *Bot. Mag.*

C. c. tun. membranaceis submollibus glabris badiis, vaginaceis interioribus prope basim affixis 1-2 persistentibus inferne demum lacerè parallelo-incisis, foliaceâ exteriore supra medium cæteris altiùs affixis minoribus, scapis 1-3 autumnalibus, spathâ bracteam non tubatam æquante hyalinâ, tubo breviter exserto, limbo sub—vel ultra—unciali subalbo violascente breviter ad basim extus violaceo striato libenter et constans patente, fauce pallidè lutescente ad petalorum basim subpubescente, filamentis pallidè luteis pubescentibus, antheris cum polline albis, stylo subcoccineo vel pallidè aurantiaco, stigmatibus multifidis sæpius toto capite antheras superantibus prolapsuris pendulis, foliis 4-5 angustis lævibus proteranthiis ortu depressis seriùs erectioribus, seminibus parvulis pyriformibus saturatè rufo-badiis.

A native of the Greek Archipelago, as Milo and Thermia.

I am indebted to the vice-consul at Syra, through the kindness of Mr. Cartwright, for three bulbs of this species, and they have increased a little. It was named, but very imperfectly described, from a dried specimen from Milo by M. Gay, who had not discovered that this plant and C. Boryanus have pure white anthers. I am uncertain whether my bulbs were from Syra, Tino, or Thermia. It is nearly allied to C. Boryanus, but differs in the pale blue tint of the limb, the paleness of the throat and filaments, the spathe not having green veins, the style being longer and pendulous, the tube shorter, the segments of the limb more linear, and, if once expanded, little disposed to close again, even at night. That circumstance makes it a desirable plant to stand in the room in November.

Sp. 43. C. *Boryanus*. Gay, Bull. de Fer., 25, 220.
C. Ionicus. *Bot. Reg.*, 1845, *M.* 3. *Ib.* 1847, 16, f. 10.
C. Veneris. *Tappeiner in Poech Pl. ins. Cypri*, p. 10, n. 24.
C. Caspius. *Fischer in Herbariis.*

C. c. tun. vaginaceis duâbus persistentibus prope basim affixis lævibus mollibus inferne demum parallelo-laceris, foliaceâ exteriore lævi circa vel infra medium c. affixâ, spathâ acutâ bracteam subæquante, germine pallido cum scapi parte exsertâ aut ferè exsertâ, tubo albo $\frac{2}{3}$ unc.—ultra 2 unc. libero, limbo unciali vel ultra biunciali albo vel potiùs colore florem lactis simulante, laciniis sæpe ad basim rarò totâ longitudine purpurâ extus tristriatis fauce intus aurantiacâ ad petalorum basim pubescentibus, filamentis ori tubi insertis luteis pubescentibus $\frac{1}{4}$ unc. longis, antheris circiter $\frac{2}{3}$ unc. albis stigmata tenuiter et profundè multifida recta plùs minùs saturatè croceo-coccinea non vel rarò æquantibus, foliis 4-8 angustis lævibus flores autumnales serotinos paullò antecedentibus, floribus 1-5 tribus interdum subsimultaneis, capsulâ parvâ, seminibus parvis pyriformibus badiis.

A native of the Greek Islands, the Morea, and Asia Minor.

This pretty autumnal Crocus, of which the flower is at first cream-coloured, then white, with an orange eye or throat, is remarkable for its pure white anthers. I first received it from Captain Lawrance, at the head of the police in Corfu, when, seeing its flower, and not supposing that Bory de St. Vincent and others who had collected specimens, and M. Gay, who had cultivated, but possibly had not flowered it, could have overlooked its white anthers, a thing not then known to exist in the genus, I looked upon the Corcyrean plant as very distinct; but having sent to the Morea expressly to clear up the doubts concerning Bory's two species from thence, which were very insufficiently described, I find that the plants received from Modon and Navarino, where Bory de St. Vincent discovered them, as well as those I have procured from Coron, Mount St. Nicolo, Mounts Evan and Ithorne, and the lower parts of Taygetus, agree perfectly with those from Corfu, Sta. Maura, and Zante; but those from the Morea and Mount Skopò in Zante grow in a redder earth, and are more vigorous. The finest were from Coron, of which one had the limb of the flower above two inches long. I have varieties both from Corfu and the Morea with purple lines outside at the base of the segments, and one from another place with three lines on the whole length of each, and there is not a single feature to separate Tappeiner's C. Veneris or Dr. Fischer's C. Caspius from this species. The flowers of the Corfu specimens, as far as I have seen, produced in calcareous rubble, are smaller than those which grow in red earth, and the corms of inferior size, and the leaf narrower. In the border at Spofforth those from Corfu began to flower at the end of September, 1846, after a hot summer, but it is a late autumnal species. I think it appears partial to the vicinity of the sea, and perhaps it might be natural in the red earth upon chalk with a southern aspect, as at Folkestone, or perhaps even near Tring. Those from Mount Skopò are very florid, producing from the same eye sometimes five flowers, and even three at once. I have seen no other Crocus

1. Achimenes pyropaa.

2. Achimenes Zimmeri.

expose the scape and germen above ground while in flower. It is a very ornamental species to bring into the room in pots in November, but the pots should stand at night out of doors or in a cold and airy place, to strengthen the flowers, and make them expand readily when brought in. A white autumnal Crocus, seen by Professor E. Forbes and Lieut. Sprat, at the end of October, on the lower flanks of the gigantic mass of Mount Massicytus, in Lycia, at an elevation where roses were then flowering, is doubtless C. Boryanus, extending from Cyprus in that direction.

XXXIII.—*Two New Species of Achimenes.* By Mr. George Gordon, Superintendent of the Plant Department in the Society's Garden. *With a coloured plate.*

(Communicated Sept. 3, 1847.)

Among the valuable Guatemala plants, for which the Society is indebted to Mr. Skinner, are two species of Achimenes which are perfectly distinct from those previously in cultivation. One of these has been named *A. Skinneri*,* in compliment to its introducer; and the other *A. pyropæa*,† on account of the ruby colour of its flowers; the first is related to *A. grandiflora*, the second to *coccinea*.

Achimenes Skinneri is a very handsome and distinct species, forming a link between the tall and dwarfer kinds, being exactly intermediate between *A. grandiflora* and *hirsuta*. The flowers are about the shape and size of those of *A. grandiflora*, and, like them, are quite flat and round, not reflexed and narrow in the upper petals like *A. pedunculata* and *hirsuta*; while, on the other hand, the flowers, like those of the tall kinds (*A. pedunculata* and *hirsuta*), have a large eye and a yellow spotted throat. In foliage it differs from its nearest ally, *A. hirsuta*, in the leaves being more pointed, more attenuated than cordate at the base, more deeply and sharply serrated on the margins, and of a lighter green in colour. The leaves of *A. hirsuta* are deeply cordate, overlapping the stem at the base, much broader, nearly ovate, much thicker, studded with strong hairs, and much more wrinkled on the surface.

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* *A. Skinneri;* erecta, pilosa, foliis ovato-oblongis grossè serratis hirsutis, pedunculis unifloris petiolis duplò longioribus, corollæ limbo obliquo subæqualiter 5-lobo laciniis rotundatis denticulatis, tubo basi obtuso calcarato.—J. L.

† *A. pyropæa;* erecta, foliis ovatis acutis carnosis pilosis basi cuneatis ultra medium serratis, pedunculis ebracteatis 2-3-nis petiolo parùm longioribus, corollæ laciniis rotundatis denticulatis superioribus paulò minoribus, tubo ecalcarato.—J. L.

Achimenes pyropæa, a charming little plant, is an intermediate form between *A. coccinea* and *rosea*, having the bright scarlet flowers of the former and the habit of growth and foliage of the latter. In brilliancy of colour it far surpasses either.

In cultivation these, like the other Achimenes with scaly roots, may be made to bloom any time from June to October in constant succession, and the "ruby" has the advantage of being much earlier in coming into bloom than the old *A. coccinea*, which seldom can be bloomed before August, and consequently too late for summer exhibitions; on the other hand, the ruby Achimenes, if treated in the following manner, will come in well for summer exhibition.

About the beginning of February the scaly roots should be separated, and the scales strewed over the surface of a pan or pot filled with a light rich soil, and slightly covered with fine sand (for starting), then placed in a cucumber or melon pit, or other similar situation, where there is a strong moist heat; and afterwards, when the plants are about two or three inches in height, removed by carefully transplanting them into pans four inches deep and 12 wide, well drained, and about three parts filled with a mixture of rough peat, half-decayed leaves, and a small portion of sand and very rotten dung. Each pan should have from six to eight plants carefully placed in each at equal distances. When the plants have nearly covered the surface of the pans, fill the remainder of the pans up to the brim with the same kind of compost as used before; and finally, water freely, but never overhead, and afterwards treat them as directed, vol. i. p. 259 of this Journal.

XXXIV.—*On the Culture of Roses, more especially the Propping, and Training of Tall, Climbing, or Tree-Roses.* By Mr. Alexander Forsyth, C.M.H.S., Gardener to the Earl of Shrewsbury, F.H.S., Alton Towers.

(Communicated August 19, 1847.)

If we wish to convey correct ideas of plants, we must adhere to botanical descriptions, and not to terms used in common conversation; for we find the term *tree* used in speaking of ligneous, herbaceous, and even annual plants. We have tree-pæony, tree-violet, and even tree-mignonette: no wonder, then, that we should have tree-roses.

The standard rose is generally termed a tree-rose; and, before we go further with the subject, it may be necessary to state, that

" when the branches are perennial, and supported upon a trunk, a tree is said to be formed."*

If I recollect rightly, Loudon has somewhere set the boundary mark for a tree at from " four to six inches diameter, with a single bole or stem." Now there are rose-plants here with stems six inches in diameter; still these dimensions do not constitute them rose-trees; for the common laurel will attain a diameter of six feet, and form an enormous head, yet the normal form of the laurel, as well as that of the rose, is decidedly a shrub; and accordingly in botanical works we find them constantly so named. The largest rose-plant to be met with scarcely amounts to the character of a small tree (*arbusculus*) by any reasonable stretch of courtesy. But I am reminded to get rose-plants with the appearance at least, and with the size of head of a tree (arbor), ay, even of such a tree as the princely cedar so graphically portrayed by Ezekiel in his vision of the fall of the kings of Egypt and Assyria; and if the fall of such a tree be terrible to behold, surely its standing clad with roses would be majestic and goodly fair to see.

The rose is unquestionably the most popular flower known, and its geographical range embraces, according to Loudon (Arb. Brit.), Europe, and the temperate regions of Asia, Africa, and America: in all these it is said to be found wild, but not in Australia. Now I have it from an eye-witness† that in the wilds of Australia the rose is seen in abundance, in the form of sweet-briar; it seems, therefore, to be as universally distributed as it is universally admired. From the language of holy writ it is clear that the rose was held in high esteem in the days of King Solomon; for if we compare the sentence, " I am the rose of Sharon," as rendered by King James's translators, with the same sentence in the Douay version of the Bible, " I am the flower of the field," and add the sentence, " I was exalted as a rose-plant in Jericho" (Eccles. xxiv. 18), we may conclude that in the valley of the Jordan there were fields of roses, and that the rose was there held in such favour as bordered on veneration, and this 3000 years before our day. In Geramb's Pilgrimage to Palestine in 1831, we find the following passages:—" The plain of Sharon which I traversed, so extolled in Scripture, was enamelled with flowers,"—" Rama, nearly on the borders of the plain of Sharon, is in a delightful situation,"—" The weather was brilliant, and reminded me of the beautiful spring days of Italy;" and farther on he adds, that in climbing the hills of Judea, " where there is not a trace of a road or of a plant save a

* Lindley's Introduction to Botany.
† Bishop Wilson, of Hobart Town.

few olive trees and some oaks, and these look as if scathed with the lightning; the eye, saddened with the sterility of the soil, needed some relief, and he turned from this scene of rocks piled one upon another to look back at that beautiful plain of Sharon and the sea which bounds it." We may now see the force of the phrase in the inspired song, "I am the rose of Sharon;" for if Sharon be thus lovely in ruin and under oppression, and after earthquakes, plagues, and plunderings, surely its rosy morn and its palmy day must have been glorious.

The Romans are said to have rioted among roses, and throughout Christendom the rose has constantly been cultivated around the dwellings of both rich and poor.

We read glowing descriptions of "*Syria, land of roses,*" yet we find, from the clearest evidence, that England boasts many a splendid rose, unknown and unsurpassed in Syria. The materials are in our own hands, and therefore there is no reasonable cause to hinder us from realizing fields of roses, ay, and trees of roses large as our wishes. I need not say that this cannot be accomplished if we are to confine our ideas of a rose-tree to the tuft of tiny rose-twigs on a dog-rose stem tied to an iron poker or a square stick, whose outline (especially in winter) resembles that of a besom, with the handle in the earth and the brush-part in the air.

Let no one imagine that I wish to speak slightingly of the ordinary culture of roses. I only wish to push the subject far beyond its present limits, to carry roses into fresh pastures, and unite them to *living* stakes or props, as "vines are wedded to their elms" in Portugal and Spain.

The ivy, standing in its own strength, is but a sorry shrub, and when unassisted with props, or unattended with culture, it only creeps and clambers, a lowly, uninteresting evergreen, forming a monotonous mass of dense and dingy foliage, draining the earth of moisture and nourishment, and thereby starving outright every vegetable in its vicinity which it had failed to choke with its fleece of leaves; yet we find the ivy, as at Wrotham Park, for example, standing on the lawn supported by its own stem, and forming a fine globular head. There are ivy trees here 30 feet high, with a conical outline like that of the Arbor vitæ. These examples may show how the outlines and habits of plants may be altered by subjecting them to a particular mode of treatment in the training and propping. The honeysuckle, unassisted, is little to be admired in its squat and shapeless mass; yet every one will bear witness to its charms when seen in bloom entwined on tree or bower. A mountain-ash in the grounds here has held up to admiration a plant of the honeysuckle high and wide for many years. A tall spruce fir propped for a long

time another honeysuckle close to the above-mentioned specimen. I mention this evergreen tree with its honeysuckle to prove that climbers or twiners will live and flower among the spray of evergreen trees; and further, to show that this is not a new combination, I need only quote the couplet,

> "Not a pine in my grove is there seen
> But a woodbine entwines it around."

Cottam and Hallen's cast-iron rose-stake may be regarded as perhaps the most ornamental and economical *dead* prop in use. This elegant stake I quote here, that I may compare its cost with the price of those I am about to introduce, and likewise that we may continue its services to prop the tiny growing roses worked upon other rose-stems, in order to bring them near the eye, so that ladies may closely examine the rose without stooping, and without being tempted to pluck it; for of all the casualties to be guarded against, that of not leaving the rose upon its stem until the flower has faded is the most important. The price of this stake, six feet long, and strong in proportion to its length, is said to be 1*s.* 6½*d.* (Encyclopædia of Gardening.) The square heavy heart-of-oak stake, if sufficiently strong to be durable, and well painted, will cost little less than the iron one above quoted. The drawbacks to dead props are, first, the necessity for continual painting, then rust in the iron under ground, and rot in wood at the surface of the ground, the too slender form of the iron stake, and the unnatural square form of the wooden one, so much at variance with the nicely-balanced and symmetrical proportions of live timber, whose wooden trunks are never square like our wooden rose-prop, neither are they so *fine drawn* as the fashionable form of a standard rose with an iron prop.

The mountain-ash, when growing as a tree, is admirably suited to prop a climbing rose. Its foliage is pinnate, and not to be easily distinguished from the foliage of the rose; the colour of its trunk and that of the stem of the rose are the same ashy grey; in size, it is decidedly a small-growing tree; in habit it is stiff and formal, with spray full of antlers or little hooks, all tending upwards, just as if Dame Nature had made a tree of pegs to hang her rosy mantle on. Now the price of these living props, three feet high, is THREE FOR A PENNY, and six feet high, only a penny each. Good plants of mountain-ash were delivered here, carriage paid, this season at 25*s.* per 1000, three feet high, and larger sizes at 1*d.* each, as I have stated. Now, lest any one should imagine that I think of filling up a flower-garden with mountain-ash trees, I must beg leave to state, that where there is room for the rose-trees that I propose, there will be no lack of space for the stakes or props, for they will be within the

rose-trees. These rose-trees were never intended for small gardens, and scarcely for large ones: they are the gigantic materials for fields of flowers high and wide, of long and deep avenues, the foreground figures fair and fragrant in the glades and dells of park scenery, where rides and drives invite. The bramble is another brother of the rose family, and this, as well as the mountain-ash, rambles at large by ravine and crag, growing freely in any reasonable situation, and in spots where neither grazing nor tillage can be carried on. Surely, then, we may reasonably hope to establish a climbing rose in a locality where two brothers of the same family already flourish.

The rose and its prop must be planted young in well-prepared earth; for, be it remembered, they will just grow and flower in proportion as they are fed, and therefore such a spread of foliage as is here expected requires something like a vine-border to give the necessary supplies of food, &c.

I do not write to please those parties who know so little of rose culture as to imagine that roses will not climb very high trees and flower freely. The Rosa arvensis climbs to the top of an arbor vitæ in the grounds here 20 or 30 feet, and its long and gracefully bending shoots may be seen dangling from the branches of high trees in the woods here and elsewhere. Loudon mentions (Arb. Brit., p. 790) Eastwell Park, Pains Hill, Claremont, Pepperharrow, Spring Grove, and Fonthill, where similar specimens may be seen of Rosa arvensis, and particularly the Ayrshire and the evergreen roses, producing a fine effect, flowering, and even forming festoons among high trees. I need scarcely add, that in length and strength of vine many of the cultivated roses equal and even surpass the wild rose. I have seen climbing roses against a wall here and at other places make shoots 20 feet long in a couple of seasons, and flower profusely; therefore, if the Rosa arvensis and its varieties climb trees of their own accord, surely art might train the twigs of other climbing roses in a track where nature unassisted prompts them to run. There is no plant of easier culture than the climbing rose; for all roses grow freely from cuttings, and thrive well in the common corn-land of the country, and even in places and soils where corn could scarcely be produced. They never fail running and flowering every year; and this running propensity, or, in other words, this truly desirable quick habit of growth, has hitherto caused this section of the rose family to be excluded from collections, or, if not excluded, to be unmercifully cut in, in order to keep them in bounds, which cutting, owing to the peculiar habits of this section of roses, amounts to nothing less than cutting off their heads; for if they are cut at all, the head or flowering part, being at the tip, is sure to be sacrificed, whe-

ther the cutting be only an inch or a pole in length. The climbing roses should either have a building to climb on, as a ruin, a bower, a wall, a trellis, &c., or, failing these, they may readily and cheaply be accommodated with a tree to climb for the small outlay of one penny. This arrangement is not confined to the culture of climbing roses only, but should extend to the culture of climbers of all kinds; for at the present time climbers cannot be grown in gardens, from sheer want of anything to climb upon. The grape-vine family, nearly all hardy, but seldom grown, produces the most beautiful foliage imaginable as a climber; but, alas! for lack of the prop, we lose the service of the vine. In an economical point of view the vine is worthy of a place with a tall yew hedge to back it, and, thus situated, something more than leaves would repay the planter. Any one who has eaten grapes cooked, even when not fully ripe, will allow that they are superior to any other tart-fruit, and, as they would come in late in autumn, could not fail to find a welcome at table when our native fruits were ripe or dead. The white bryony formed an object of the greatest beauty, growing up the face of a tall clipped yew hedge at Caenwood, in the kitchen-garden. This plant attached itself by its tendrils to the hedge; and, as it belongs to Cucurbits, it gives an admirable lesson to cucumber growers, for it formed a perfect fan, with rays nine feet long, *without the aid of man*. The cucumber is a plant adapted by nature for a similar situation; for its beautiful tendrils tell that they were never made to crawl, but to climb. But I need not go farther than to the pea for an example of the value of living props: hundreds of persons would grow peas if they had sticks to prop them with. I saw a neighbour with a row of peas well sticked with a couple of rows of living beans, which by a special blunder had been sowed after the peas were covered with the soil.

The cultivation of climbers is a field too great to be entered upon here, and yet too important to be passed over in silence. I have therefore thrown out these hints in passing, and leave it to the lovers and admirers of this class of plants to carry it out, resting assured that the scarlet trumpets of that splendid climber, the trumpet-flowering honeysuckle, alone will proclaim by their few and feeble specimens the truth of what I am endeavouring to show, namely, that for want of a prop we lose the services of the most beautiful plants that could adorn a garden, ay, and the services too of valuable esculents. But to return to the rose. The umbrella form of trellis is well suited to show to advantage certain kinds of roses. Now the dwarf or weeping elm, engrafted on the common elm, forms an elegant head of this form; and, as these artificial drooping-headed trees are monsters, and grow

slowly, they may be kept in dressed ground in small compass for many years. The one which I have before me has been four years planted; and one or two others, about 10 years planted, have yet but very small heads. I may here mention that the young shoots of the elm resemble an immense pinnate leaf, and thus the leaf of the rose harmonises better with the foliage of the elm than I was led to expect before I made the comparison with the rose and elm twigs united.

The weeping ash makes an admirable trellis for a climbing, or rather a trailing rose, and having pinnate leaves, the harmony of the foliage with that of the rose is complete. Nothing but a figure drawn accurately to a scale can give an idea of the excellent habit of this tree, standing as it does on a clean single stem, and forming a globular head with a fine bold outline, which may be varied by pruning to form an umbrella or semi-globular head, or may be allowed to feather down to the ground, and form an egg-shaped tent.

Every weeping tree gives the idea of being depressed, and its very name "weeping" implies a lack of comfort; therefore it should not be alone, but have a partner, whose rosy face should look upward, and at the same time look light and cheerful. To intertwine a weeping ash with roses would seem to mingle joy with its weeping, and make a striking contrast, since it could not fail to excite surprise to see a tree that usually hangs its head, and never shows a flower, come forth at last arrayed in such a bloom.

Various devices have been resorted to to hide the unsightly shank or stem of the standard rose, with more or less effect. I have sowed sweet peas round some, and planted other climbing plants round others, and have succeeded very well sometimes with such twiners as the ipomœas, &c., forming a cone of elegant flowers, and making the rose-stake serviceable to support a succession of flowers after the roses had faded. Still these creatures of a day, the ipomœas, &c., deserted me in my utmost need, for the least foul weather made them useless; and if they grew freely, they would not stop at any reasonable length, and, being so delicate when young, the smallest accident was sufficient to make a blank. The want of evergreens in a flower-garden in winter has long been felt, and, in short, to obtain a succession of beautiful living objects is the aim of every gardener in planting a garden.

Now in this garden there exists, whether by design or accident I know not, a thicket of tall yew-trees, and in front of these some very tall rhododendrons, and drawn up between the yews and the rhododendrons there stands a fine rose-bush, and, after the rhododendrons have flowered and faded, the rose blooms

in the face of this "dismal grove of sable yew." And it is to this contrast of bright rose-colour against dark green that I would invite notice: it sets off the rose to the greatest advantage, and always attracts attention, it being altogether unlooked for from such a sombre subject as the yew to wear a blush or other rosy hue upon its sullen face. Now, although the common yew-tree be well adapted to support a climbing or other rose, from its patiently enduring to be clipped or pruned into any reasonable or even unreasonable form, I would prefer the Irish yew, and make the head of the rose stand high enough to bloom above the yew. It is the ordinary system that nature follows to elevate the panicle or cluster of flowers of a plant above the foliage. By this combination we get rid of the unsightly rose-stake, by effectually hiding it in the thick foliage of the yew, and, instead of a leafless rose, with a long grey switch of a stem tied to round iron or square tree all the winter, we have an elegant evergreen tree, admirably suited to the stiff formal lines of geometrical flower-gardens; and surely a crown of roses, if properly worn, would set off to advantage the staid and sober virtues of the upright yew, neither would it derogate from its dignity thus to become handmaid to the queen of flowers.

The Robinia pseud-acacia, or Cobbett's locust-tree, having beautiful pinnate foliage, will make an admirable rose-tree; and the apple and pear-trees, beautiful and rosy in themselves both in flower and in fruit, in certain situations might be employed with excellent effect to prop roses.

XXXV.—*On the Treatment and Propagation of the Japan Anemone* (*Anemone Japonica*). By Mr. George Gordon, Superintendent of the Ornamental Department in the Society's Garden.

At page 61 of the first volume of this Journal will be found, amongst notices of new plants, some account of the Japan Anemone. From want of a better acquaintance with the plant it was at that time supposed to be best treated as a green-house plant. It has now, however, been ascertained to be perfectly hardy under all circumstances, and it has proved itself to be one of the most desirable of herbaceous plants for autumn decoration, blooming as it does profusely from the middle of August to the end of October. It forms quite a rival for the purple Chinese chrysanthemum, its rosy purple semidouble flowers being each nearly 3 inches in diameter, and elevated to a height of 2 or more feet. It grows freely in almost any situation, and is easily increased by seed, or by dividing the old plants when in a dormant state, or it may be raised from small portions of roots, if treated thus:—

Any time in spring, before the old plants commence growing, shake or wash the soil clean from them, and afterwards cut their slender wire-like roots into small pieces, from half an inch to an inch in length; and having provided some pans or pots well drained, and filled with soil composed of sandy loam, peat, and well-decayed cow-dung, in equal parts, strew the small portions of the roots over the surface, and cover them lightly with silver sand; then place the pots or pans in a frame or pit, where there is a gentle heat and plenty of moisture, they will soon commence growing, and by the beginning of May will be ready for potting, singly, in 3-inch pots, which should be filled with the same kind of soil as before used, returning the plants to the pit or frame in order to recover the effects of the shift. Afterwards, when fairly established in the 3-inch pots, they should be removed to rather a shady situation out of doors, where they will grow rapidly, and, by the end of June, will again require shifting into larger pots; or they may be planted out in the open beds, or borders, for blooming in autumn, observing, however, that whether kept in pots or planted out, the strongest plants be selected, and, to be successful, it is essential that they have rich soil and plenty of moisture.

If the plants are intended for green-house or conservatory decoration during autumn, they should be treated as follows:— About the end of June select some of the strongest plants in the 3-inch pots, and having well drained some large pots (12-inch), place about six of the plants out of the 3-inch pots, at equal distances in each large pot, employing rich soil of the description already mentioned; water freely, and place the plants in rather a shaded situation, afterwards treat them like Chinese chrysanthemums, and finally, about the middle of August, remove them to the green-house or conservatory, where they will keep on blooming until succeeded by the chrysanthemums; in fact, the Japan anemone requires, if grown in pots, to be divided annually like the chrysanthemum.

If intended for open borders the plants should be obtained from divisions of the old plants, taken off about the end of March, and not from small portions of the roots, for if raised from the latter the plants are never so strong, and seldom bloom well the first season. They should be planted out in May in a rich loamy soil, and afterwards freely supplied with water in very dry weather. When fairly established in the open border they will require no more care, except removing and dividing them once every two or three years, otherwise they become tufts of leaves and weak shoots, and never bloom so finely or so abundantly as when removed and replanted at intervals.

Seeds are only produced by plants grown in the green-house, and therefore the plan of raising plants in this way is not worth

time and trouble, except that there are chances of obtaining new varieties. I have but little doubt such may be obtained by hybridizing the Japan anemone with such kinds as the large white Anemone vitifolia, from the north of India, or the common garden Anemone coronaria, which may be had in bloom all the year by varying the season of planting, or even the beautiful yellow Anemone palmata might be made the male parent of a fine race of hybrids.

In such case all the plants must be cultivated in pots, and regulated, according to their time of blooming, so as to be brought into bloom at the same time as the Japan anemone, which is about the middle of August; it ripens its seeds about the beginning of November.

In collecting the seeds when ripe, care must be taken to gather them perfectly dry, and afterwards to place them where they will be out of the reach of damp until the following March, when they may be sown in pots or pans, lightly covered, and placed in a gentle rather moist heat. The seeds will soon vegetate, and the young plants will be ready for potting off singly by the end of May. Afterwards, when established, they should be transferred to the open air, where they may remain in 3-inch pots until October, when they should be wintered in a cold pit or frame, for they will not flower the first season from seed with any certainty. They may afterwards be treated like the old plants, but should never be allowed to become very dry even in winter, for Dr. Siebold states, in his 'Flora Japonica,' "that they inhabit damp woods on the edges of rivulets on the mountains of Japan." They suffer from drought more than from anything else.

XXXVI.—*The Vinery at Castle Malgwyn, near Pembroke, the Seat of A. L. Gower, Esq., F.H.S.* By Mr. W. Hutchison, Gardener there.

[On the 21st of August, 1847, the Vice-Secretary received from Mr. Abel Lewis Gower four bunches of grapes; one a Muscat of Alexandria, weighing 2 lbs. 9 oz., and the others Black Hamburghs, weighing respectively 2 lbs. 9 oz., 3½ lbs., and 5 lbs. The black grapes were rather deficient in colour, but of very large size and excellent quality. A desire having been expressed to know under what circumstances these grapes were produced, Mr. Gower was so obliging as to furnish the following statement from his gardener.]

The houses are heated with hot water and glazed with British sheet-glass 2 ft. 10 in. by 6 in. The parapet-wall in front is built on lintels supported by stone pillars, so that the roots of the vines planted inside the house have free egress to the border outside. A most important point to be observed is the making

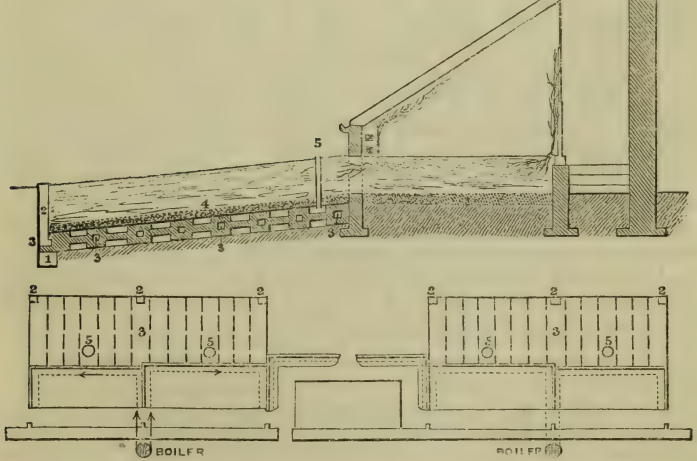
of the border, the bottom of which is gently sloped from the houses to the extreme edge, where is built a box-drain extending the whole length of the border, as shown in the accompanying section marked 1; this drain is one foot square, the top of it being level with the bottom of the border, as also shown in section. When this was completed dwarf walls, marked 3, were built across the border, three feet and a half apart, one foot square, in the pigeon-hole manner; on the top of these walls are laid rough flags; these in reality form the bottom of the border, and upon these is placed about six inches of broken stones and bricks, marked 4, then covered with turf with the grassy side down to prevent the soil mixing with the stones. There are flues or chimneys at each end of the border and centre communicating with the drains in the bottom, as shown in section marked 2; the top of these flues is nicely made of stone ten inches square, through which is cut a hole of six inches square, into which is inserted a plug of a wedge-like form, so as to fit tightly, but removeable at pleasure; these flues are about an inch above ground.

At the back of the border are placed cast-iron pipes (marked 5) perpendicularly, and also communicating with the drains underneath; those being higher than the flues in front cause a motion in the air beneath the border. After a long continuance of rain the plugs in the flues in front are taken out, thereby creating a great circulation of air, and thus to a vast extent accelerating the proper drying of the borders, which is deemed of much importance. In the winter season the borders are covered with leaves and stable manure to the depth of twelve inches. There is no air admitted underneath at this period; the compost used in the formation of the border was hazelly loam with its turf three parts and one part brick, lime rubbish, and broken stones, with a little rich old dung, the turf well rotted and the whole well incorporated; the borders are forked up and watered with liquid manure once a year.

The spur system of pruning the vine is adopted, but somewhat different to that generally practised: only every other or alternate spur is allowed to bear fruit; the spur which bore fruit the last year being cut back at the winter's pruning to the base will again push forward, which is stopped at the third bud, and when the grapes begin to ripen and the wood is hardening they are cut back within one inch of the second bud, which never fails to be large and plump; from this bud two or three bunches will push, but not more than one or two are allowed to remain, the first bud being rubbed off when they begin to swell at the forcing season, and so on annually in alternate succession: by pruning thus the spurs are always kept short and near the principal or leading shoot.

By the above mode five bunches of the Muscat of Alexandria have been grown from one bud, but this was merely an experiment to show what could be done, and by no means to be recommended. The leading shoot is allowed to ramble five or six feet, and then tied across the rafters at the top of the house, and when grown to the above length it is stopped once and no more. Before the grapes take their last swelling it is stopped weekly afterwards, taking care also from the onset to stop all laterals as they make their appearance. There is used for the first house patent felt to keep off heavy rains, and forcing is commenced with a low temperature, 45°, gradually increasing to 55° and no higher; before the buds are expanding syringing with tepid water morning and evening, and as the vines advance in growth so the temperature is increased to 70°, and when in flower from 74° to 77°; the air at this period is kept moist by steaming morning and evening. No difficulty has ever been found in setting the fruit, having always more bunches and berries to cut away than required for a crop. When the berries are set the temperature is reduced to 70° by day and from 60° to 63° at night, with every other top sash down from three to six inches during the night if the weather be fine.

When the grapes begin to colour the atmosphere is kept as dry as possible with a free circulation of air, which not only tends to give the fruit a good flavour, but also to ripen the wood.



Ground Plan of Houses, and showing Cross Walls beneath the Vine Borders.

NEW PLANTS, ETC., FROM THE SOCIETY'S GARDEN.

16. ECHEVERIA RETUSA.*

Raised from seeds, received from Mr. Hartweg in February, 1846, and said to have been collected on rocks near Anganguco, in Mexico.

This is a dwarf species, not unlike a contracted form of E. Scheerii. Its leaves are originally closely imbricated, but are never truly rosulate, and by degrees separate as the stem lengthens; they are broad at the point, but acute when young, but when old are extremely blunt, and irregularly crenated, as well as bordered with purple. The flower-stem is from 9 inches to a foot high, and bears at the very summit a compact panicle of handsome crimson flowers, covered with a delicate bloom, and orange-coloured inside.

It is a pretty greenhouse, half-shrubby species, and grows freely in a light mixture of sandy loam with leaf-mould and plenty of sand. It is easily increased by the leaves, rises from 1 to 2 feet in height, and flowers freely from November to April, that is to say, throughout the winter.

March 15, 1847.

17. RAPHIOLEPIS INDICA, *Lindl. in Trans. Linn. Soc.*, vol. xiii. p. 105.

Raised from seeds received from Mr. Fortune.

This is a much finer plant than the R. rubra, or phæostemon, previously in cultivation. It has a fine broad evergreen foliage, and flowers as large as those of a Plum-tree. The petals, however, are sharp pointed, and either white or beautifully painted, with rich rose colour. It is easily known from R. rubra by its broader leaves and narrower shorter bracts.

It is a neat half-hardy shrub, requiring the same protection as an Escallonia or Fuchsia: it grows in a mixture of sandy loam and peat soil, and is increased by cuttings or by seeds.

May 29, 1847.

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* *E. retusa;* foliis obovato-spathulatis demum sparsis vetustis retusis glaucis crenulatis caulinis lineari-oblongis integerrimis basi solutis, paniculâ densâ subcorymbosâ ramis paucifloris, sepalis linearibus inæqualibus corollâ brevioribus, petalis carinatis acutis basi gibbosis.—J. L.

18. Spiræa prunifolia, flore pleno. *Siebold and Zuccarini, Fl. Japonica*, i. 130, t. 70. *Van Houtte, Flore des Serres, &c., Oct.* 1846.

Received from Mr. Fortune in 1845, as a Prunus from the North of China. (No. 457.)

A bush, with deciduous leaves, and long slender branches, like those of Spiræa hypericifolia. Its leaves are oval, finely serrated, about an inch and a half long. The flowers, which are pure white, grow in clusters of 3 or 4 from the centre of the buds, and are agreeably relieved by 5 or 6 small green leaves that appear at the same time. These flowers are rather more than one-fourth of an inch in diameter, very regularly and perfectly double, and about as ornamental as those of the Double White Hawthorn.

It is a fine hardy shrub, growing freely in any good garden soil, and easily increased by cuttings or suckers. It rises from 4 to 6 feet high, and flowers most abundantly. It is a very valuable acquisition for the open border.

March 15, 1847.

19. Bletia Gebina.*

Calanthe Gebina. Loddiges' Catalogue, No. 1846.

Presented by Messrs. Loddiges in the spring of 1847.

Leaves broad, plaited, rising up the stem, from 6 to 8 inches long, or more, and 2 inches wide, the uppermost acuminate, the lowest obtuse. The flowers are about as large as *Bletia hyacinthina*, from 6 to 8 in a spike, $2\frac{1}{2}$ inches in diameter, nearly white, with a faint tinge of blush. The lip is pale delicate violet, obtusely 3-lobed, with 7 plates upon its surface, of which 2 at the side are confined to the middle lobe, and the 5 others are extended to the base, which is a little stained with yellow.

It is nearly related to *B. hyacinthina*, and, according to Messrs. Loddiges' catalogue, is a native of Japan. No description of it, however, is to be found in books.

It is a terrestrial Orchid, which requires a slight protection from frost, and to be kept rather dry while in a dormant state; afterwards it should be well supplied with moisture and heat. It grows freely in a mixture of fibry peat and half-decayed leaf-

* *B. Gebina;* foliis oblongo-lanceolatis plicatis acutissimis recurvis racemis strictis 6-9-floris, bracteis oblongis obtusis cucullatis membranaceis citò deciduis, sepalis patulis lineari-oblongis petalis subundulatis paulò angustioribus, labello trilobo laciniis obtusis intermediâ crenulatâ crispulâ lamellis 5 ad basin usque extensis duabusque brevibus lateralibus pone apicem, clinandrio crenato.—J. L.

mould, and is increased by dividing the old plants when in a dormant state.

It flowers in April.

Being nearly hardy, it is a desirable plant where there is no stove, as it may be grown in a cold pit kept close during summer.

April 21, 1847.

20. Pholidota chinensis.*

Received from Mr. Fortune as "Cœlogyne sp. with yellow flowers, from mountain sides, Hong Kong."

This is a small creeping epiphyte, bearing ovate wrinkled quadrangular pseudo-bulbs on a short stout rhizome. The leaves are rather coriaceous, pale green, with a warm brownish edge. The flowers are greenish white, in drooping racemes not more than 2 or 3 inches long, and are remarkable for opening earliest at the point of the raceme instead of the base. The lip is pure white, and, although it is nearly oblong, with an acuminate point, it is so bent back as to look as if it were 2-lobed. The anther opens by longitudinal slits, and is not bilabiate, as in some species.

This species has long been known from Chinese drawings, in which it is represented as bearing yellow flowers: with us, however, they are pale greenish white, changing to white tinged with cinnamon.

It grows best when suspended on a block of wood in the Orchid-house, where there is plenty of light and moisture, when in a growing state; but it prefers to be kept rather dry when at rest.

It is a small neat species, but not very ornamental.

May 16, 1847.

21. Pæonia Moutan; *Picta*.

No. 220. Received from Mr. Fortune in September, 1844, as P. Moutan, "flesh coloured var.," from Canton.

Leaves dull bluish green, not veined or tinged with purple; in breadth less than some varieties. Flowers the size of P. Moutan rosea, and with something of its appearance, but more semi-double. Petals with a rose-coloured ground colour, streaked,

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* *P. chinensis;* cæspitosa, rhizomate brevi, pseudobulbis obtuse tetragonis ovatis rugosis 1-2-phyllis, foliis oblongis undulatis acuminatis trinerviis, racemis brevibus recurvis, bracteis cucullatis membranaceis obtusis persistentibus, floribus centrifugis, sepalis ovatis, petalis linearibus, labello oblongo acuto basi concavo lævi apice refracto et quasi bilobo.—J. L.

stained, and veined with rich deep rose towards the edges, especially in the inside; rather ragged at the points, something in the manner of Parrot Tulips.

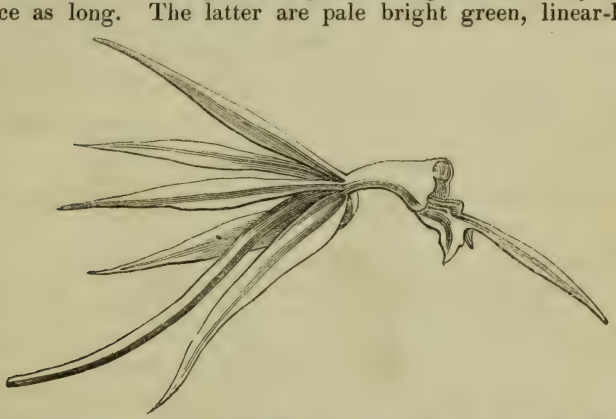
It appears to be as hardy as P. Moutan rosea, and to require a rich sandy loam to grow in, but protection is advisable in spring. It will be increased by grafting on the roots of Pæonia albiflora, or by dividing the old plants when large enough, and in a dormant state. It is very handsome.

May 22, 1847.

22. EPIDENDRUM LACERTINUM. *Lindl. in Bot. Reg.*, 1841, *Miscellaneous matter*, *No.* 109.

A Guatemala plant, presented to the Society in April, 1847, by G. U. Skinner, Esq.

A plant with the habit of Epidendrum nutans, but of smaller dimensions. The flowers grow in terminal, somewhat racemose corymbs, are about an inch and three-quarters long, but on account of their sepals and petals being reflexed they seem twice as long. The latter are pale bright green, linear-lanceolate, and nearly alike in size, form, and texture. The lip is adherent to the yellow column, whence it projects in the form of a dagger-shaped purplish blade, with a pair of triangular lobes at its base; the whole resembling a lizard's tail, the head being buried in the column. As the inflorescence has no spathe, but protrudes its flowers immediately from among the leaves, the species must be placed among the true Epidendrums.



It requires the same treatment as other Epidendrums, flowers in July and August, and, although not handsome, merits notice on account of the singularity of its flowers.

Aug. 20, 1847.

23. Coburgia stylosa.*

Received from Mr. Hartweg, who found it "in the ravines near Quito."

This fine bulb bears a strong resemblance in general appearance to the species already known, but it is sufficiently distinguished by its peculiar flowers, which are about five inches long and two inches across when fully expanded; they are sessile and uncovered at the base in consequence of the spathes falling off. Their tube is of a dark glaucous green colour, which also extends up the midrib of the lobes, especially on the outside. The lobes are otherwise rich orange red, firm and leathery in texture.

The species differs from *C. incarnata* in its long style, from the Mexican *C. trichroma* in its much larger flowers and longer coronet, from *C. variegata* in the total absence of all spathe and bracts at the time of flowering. The colour of the flowers is quite peculiar.

It is a pretty greenhouse bulb, which grows freely in a mixture of sandy loam and well decomposed dung or leaf-mould. It is increased in the ordinary way by the bulbs, grows about two feet in height, and flowers in March. Although not remarkable for gaudy colours, its singularity makes it worth cultivating where such plants are grown.

March 24, 1847.

24. Ipomæa melæna.†

The label of this plant having been lost, its history is unknown.

This has the manner of flowering of I. Horsfalliæ, and the appearance of a Batatas; but it has a 2-celled ovary. The leaves are sometimes entire, sometimes deeply 3-lobed; in all cases perfectly smooth and acuminate. The flowers appear in short clusters, are white, changing to pink, with a black eye.

It is a stove-climber, growing freely in any good rich soil, and easily increased either by cuttings or by seeds. It is of rapid growth, and flowers abundantly during April and May.

It is a fine plant of the second order, well suited either for training on a trellis or upon the rafters of a stove.

May 11, 1847.

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* C. *stylosa*; foliis rigidis acutis glaucis, umbellâ 3-5-florâ spathâ deciduâ, floribus sessilibus, tubo clavato arcuato decurvo, laciniis oblongo-ovatis coriaceis apiculatis, coronæ dentibus geminatis acutis patulis, stylo deflexo staminibus rectis laciniisque longiore.—J. L.

† *I. melæna*: (Diversifoliæ) glaberrima, foliis cordatis acuminatis integris trilobisque, pedunculis 4-floris rigidis petiolis æqualibus, sepalis rotundatis convexis, corollâ campanulatâ erectâ (candidâ subrubente basi nigrâ).—J. L.

25. The Double White Peach.

Received from Mr. Fortune from "the North of China."

The flowers of this plant are quite white, and full semi-double; they have not, however, a good form, and unless they should improve in appearance, as the plant becomes more healthy, they will not prove better than those of the French Double Cherry, which they resemble. It is, however, a very distinct variety.

It is probably as hardy as the Old Double Peach; and, like it, is increased by budding. It forms a small tree or large shrub, grows well in any good loamy soil, and flowers in March.

March 24, 1847.

26. Zingiber amaricans. *Blume enum. pl. Jav.* 43.

Received from F. Lewis, Esq., from Penang, in 1846.

A plant with the habit of ginger, but taller, deeper green, and with obovate massive spikes elevated six inches above the ground and at least four inches long. It is only slightly aromatic. The leaves are narrow, about eight inches long and one inch broad, much tapered to the point, a little narrowed to the base, deep dull green above, shining bright green beneath, with a few fine hairs when young. The ligula is very short and rounded. The bracts are rounded, convex, not mucronate, dull green inclining to dull red near the edges. The flowers are yellow, with a bluntly three-lobed lip, the middle of whose divisions is larger than the others, rounded, and speckled with purple.

In some respects this plant does not quite agree with the specific character given by Dr. Blume, especially in what concerns the form of the ligulæ and the hairiness of the under side of the leaves; it is, however, so much like Rumphius' figure of his Lampujum that it is certainly either the same species as Z. amaricans or very closely allied to it.

This is a singular kind of ginger, whose flowers expand in the evening and wither next morning. It requires the stove to grow in, and is of little importance as an ornamental plant.

July 1, 1847.

27. Hugelia elongata. *Bentham in Bot. Reg. sub. n.* 1622.

Gilia elongata. *De Cand. Prodr.*, ix. 311.

Raised from seeds received May 11, 1847, from Mr. Hartweg, who found it in fields near Monterey, in California.

Stem about six inches high, very little branched, much covered with cottony wool. Leaves also cottony at the base, but

green, and nearly smooth near the point, which is somewhat spiny, filiform, with two or three long segments of the same form. Flowers deep blue in cottony heads, closely surrounded by long pungent linear bracts. Anthers white, projecting beyond the corolla.

This quite agrees with the specimens formerly gathered in California by Douglas. It is rather pretty, on account of the contrast between its gray woolly leaves and brilliant blue flowers, and will make a variety among hardy annuals.

Like most plants of the kind from California, it flowers very early. The plant now figured, sown in May, flowered in August. By successive sowings it is, therefore, possible to have a continuation of it during all the season of growth.

Aug. 5, 1847.

28. Hollböllia acuminata.*

Raised from Nepal seeds received from the Honourable the East India Company, at various times.

This is an evergreen twining plant, with quite the habit of Hollböllia latifolia (*Bot. Register*, 1846, t. 49), from which it differs in having very taper pointed, not blunt, leaflets, racemes whose stalks are much shorter than the leaf-stalks, and purplish flowers not half the size; like that plant, it is deliciously fragrant. Hitherto male flowers only have been produced.

It has been treated as a greenhouse climbing plant, but it is probably hardy; it grows freely in a mixture of sandy loam and rough peat, and is increased by cuttings. Its sweet-scented flowers, resembling the orange in perfume, and nearly evergreen foliage, make it a very desirable plant either in the greenhouse or open air.

March 30, 1847.

29. Begonia biserrata.†

Received from G. U. Skinner, Esq., in April, 1847, and said to be from Guatemala.

A herbaceous plant, 2 feet or more in height, covered all over with a short harsh pubescence. The root is fibrous, and disposed to produce suckers from its crown. The stem is terete and dull purple. The leaves are palmate, doubly serrate, so oblique that there are frequently but four lobes instead of five, with the base triangular and not bordered by parenchyma. The flowers, which are pale pink, grow on stalks rather longer than the petioles, three or more in a cluster, in the upper axils or at the end of the branches. The males have two roundish, ovate, hairy, doubly serrate sepals, and a pair of very small smooth wedge-shaped petals toothed only at the point. The fruit is formed unwillingly, so that I have no means of describing its mature form.

It is a stove herbaceous species, which grows freely in a mixture of loam, sandy peat, and leaf-mould, in equal proportions. When done growing, it should have two or three months' rest by withholding moisture from the roots. It is easily increased by

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* H. *acuminata;* foliolis ternatis quinatisque coriaceis oblongo-lanceolatis acuminatis, pedunculis petiolis brevioribus, sepalis acutissimis.—J. L.

† B. (Diploclinium) *biserrata;* erecta, perennis, undique scabrido-pubescens, radice fibrosa, caule stricto, foliis palmatis trilobisque biserratis baseos sinu aperto triangulari, pedunculis terminalibus axillaribusque petiolis longioribus, sepalis 2 subrotundo-ovatis biserratis, petalis 2 multo minoribus subcuneatis dentatis glabris, fructu villoso fere isoptero, alis?—J. L.

cuttings, and may be flowered at any season of the year, by altering the time of starting and resting.

A very distinct plant, but not so ornamental as many of the other kinds.

Aug. 16, 1847.

30. AQUILEGIA LEPTOCERAS. *Fischer and Meyer, in the Linnæa*, vol. xii., *Litteraturbl.* 153.

Raised from seed received from Dr. Fischer in 1846.

A dwarf herbaceous plant, not growing more than 9 inches high, with slender purplish green stems thinly coated with scattered hairs. The leaflets of the triternate leaves are wedge-shaped, rounded, with about 3 lobes at the end. Each stem bears one or two flowers, on slender pedicels rather more than 2 inches long. The flowers are a pale bright violet, with the tips of the sepals greenish, and of the short petals a clear bright straw-colour.

It is a native of Siberia, beyond the Lake Baical, according to Messrs. Fischer and Meyer, who distinguish it from Aquilegia canadensis by its dilated sepals longer than the petals and stamens; from A. sibirica, by its straight or oblique but never hooked spurs; and from A. parviflora by the flat petals.

It is found to be a hardy perennial, growing best in a mixture of light sandy loam and a little leaf mould. It is increased freely by seed sown as soon as ripe. It must be considered a neat and very pretty plant, well suited for rockwork.

June 10, 1847.

31. WULFENIA AMHERSTIANA. *Bentham, Scroph. indic.* p. 46; *De Cand. Prodr.* 10, 455.

Raised from seeds presented by Capt. Wm. Munro, from Chinese Tartary in 1846.

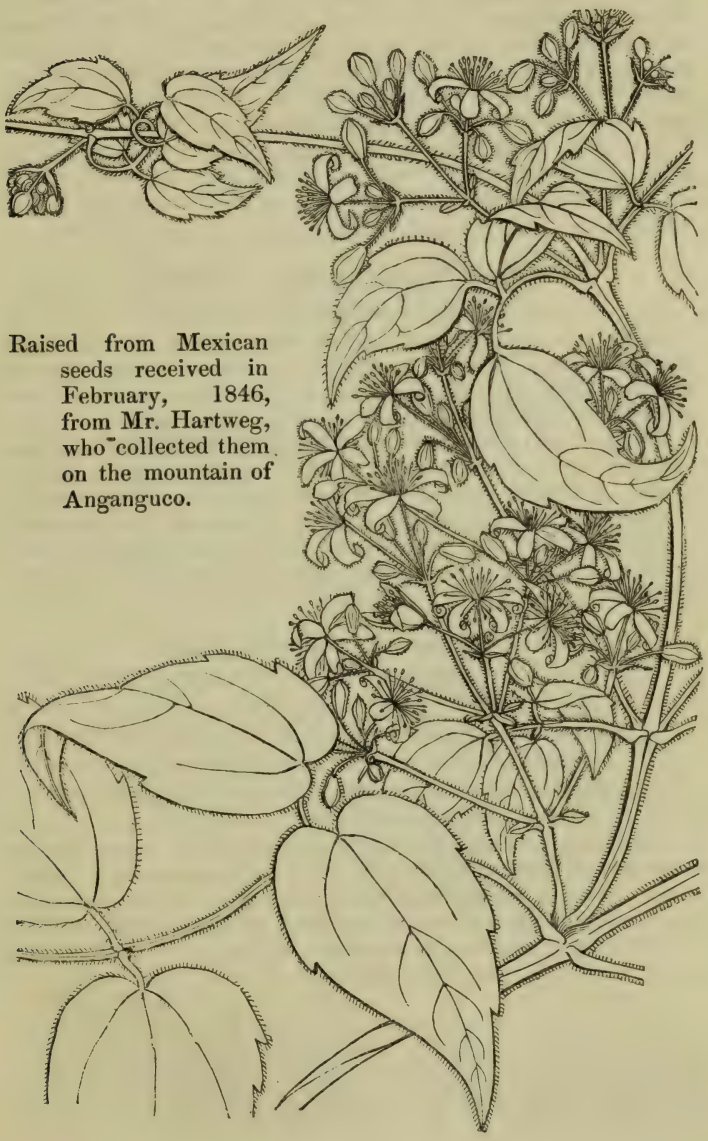
A stemless pale yellow-green perennial, with slender graceful one-sided drooping spikes of small lilac flowers about eight inches long. The flowers themselves are not more than a quarter of an inch long. The leaves are peculiarly convex as if blistering, very regularly and doubly crenate except near the base, where they become pinnatifid and lose the secondary crenels.

A hardy alpine perennial, well suited for rock-work, easily cultivated in any good garden soil, and increased by dividing the old plant or by seeds.

It will be useful for rock-work or other similar situations, where neat little plants are an object.

July 1, 1847.

32. Clematis Grahami. *Benth. Pl. Hartweg*, p. 1.



Raised from Mexican seeds received in February, 1846, from Mr. Hartweg, who collected them on the mountain of Anganguco.

A dicœcious scrambling shrub, of which the male only has flowered. It has much the appearance of Cl. virginiana, but its leaves are pinnated. The leaflets are ovate, slightly cordate, acuminate, with a few coarse serratures at the side. The flowers are small, downy, pale green, and produced in axillary and terminal slender downy panicled corymbs. They have no beauty; nor is the plant of much moment to gardens.

It proves to be a hardy climbing plant, flowering freely in August and September, and suited for covering trellis-work. It grows vigorously in loam, and multiplies abundantly by cuttings. *Aug.* 25, 1847.

33. Rosa anemoneflora. *Fortune.**

Found in the gardens of Shanghai.

As far as any opinion can be formed respecting the species of Rose, this would seem to be really a new form, approaching R. moschata in its habit and united styles, but distinct in its narrow acuminated leaflets, usually three, and in its hairless calyx. The flowers are small and clustered as in R. moschata, and, in the plants brought to Europe, have small rounded petals, forming a kind of cup to an infinite number of narrow, ragged, confused bodies, which result from the deformation of the stamens. Their colour is pale blush, and they have little beauty, but the plant may prove useful as a breeder if any perfect stamens or pistils are ever produced by it. *July* 1, 1847.

34. Navarretia squarrosa. *Hook. and Arn., Botany of Beechey's Voyage*, p. 368. *De Cand. Prodr.* 9, 310. Gilia pungens. *Hook. Bot. Mag.* t. 2977.

Raised from seed, collected by Mr. Hartweg in fields near Santa Cruz, and received at the Garden May 11, 1847.

This plant bears a considerable general resemblance to Triptilion spinosum, but the flowers are less intensely blue. It is covered all over with hairs, which secrete a viscid matter which emits a most unpleasant foxy odour. The leaves are spiny, dark green, and cut up into many sharp segments. The flowers appear among bracts and calyx-lobes in close spiny heads.

It is a hardy annual, growing freely in any good garden soil, and flowering in August and September.

Aug. 27, 1847.

* R. *anemoneflora;* (systyla) glabra, scandens, ramulis parcè setigeris et glandulosis, foliis 3-natis (raro pinnatis), foliolis ovato-lanceolatis acuminatis argutè serratis subtùs glaucis petiolis aculeolatis, stipulis angustissimis integris margine subglandulosis apice liberis subulatis, tubo calycis sepalisque subintegris glaberrimis.—J. L.

PROCEEDINGS AT MEETINGS OF THE SOCIETY.

May 1, 1846. (Regent Street—Anniversary.)

The following Fellows of the Society, viz.—

The Right Hon. Sir George Staunton, Bart., M.P.
E. Baker, Esq., and
F. G. Cox, Esq.,

were elected new Members of the Council, in the room of—

The Lord Prudhoe,
W. H. Pepys, Esq., and
Mr. Loddiges.

The following Fellows of the Society were re-elected Officers for the ensuing year, viz.—

The Duke of Devonshire, President,
Thomas Edgar, Esq., Treasurer, and
J. R. Gowen, Esq., Secretary.

The Auditors presented the following Report:—

"The Auditors on this the thirty-seventh Anniversary have to report to the General Meeting of the Horticultural Society of London, that they have examined the Accounts for the past year with the vouchers and find them to be correct.

"Geo. Bain.
"R. W. Eyles.
"C. Wentworth Dilke.
"H. Groom.

"21, *Regent Street, April 27th*, 1846."

Abstract of Receipts and Payments, &c. between the 1st of April, 1845, and 31st of March, 1846.

RECEIPTS.

	£.	s.	d.
To admission fees from Fellows, 44 at 6 Guineas each	277	4	0
To compositions for life from ditto, 5 at 40 Guineas each	210	0	0
To subscriptions received from ditto	3003	0	0
To amount of Transactions and Fruit Catalogue sold	74	6	0
To rent of apartments let off in Regent Street	120	0	0
To garden produce sold	17	10	8
To charges to Fellows for packing plants, &c.	54	0	0
To miscellaneous receipts	4	5	6
To Garden Exhibitions account: viz.			
Amount of Receipts £5034 1 6			
Deduct:			
Cost of Medals awarded £1182 5 0			
General Expenses of the Exhibitions * 1716 16 5			
2899 1 5			
	2135	0	1
To Garden Exhibitions, 1846—			
Received for tickets issued 125 0 0			
Deduct preliminary expenses paid 72 17 5			
	52	2	7
	5947	8	10
To Balance at Bankers, April 1, 1845 230 19 6			
To ditto in hands of Vice Secretary ditto 19 9 9			
	250	9	3
	6197	18	1

April 27, 1846.

This account has been examined, and found to be correct.

GEO. BAIN.
R. W. EYLES.
C. WENTWORTH DILKE.
H. GROOM.

* Exclusive of 201*l.* 1*s.* 1*d.* still unpaid as per Contra, which reduces the net profit to 1933*l.* 19*s.* 0*d.*

PAYMENTS AND LIABILITIES.

	Payments. £.	s.	d.	Liabilities. £.	s.	d.
By rents, rates, taxes, &c. Regent Street and Chiswick	256	4	4	410	3	0
By repairs of house in Regent Street	31	6	10			
By housekeeping expenses, Regent Street	36	18	6			
By salaries and collector's poundage	1015	10	8	148	17	10
By interest on loan notes	304	0	0			
By cost of Publishing Transactions	260	19	6			
By cost of Publishing Quarterly Journal	143	11	5	27	16	6
By library charges, for books, binding, &c.	5	3	11	6	13	0
By printing and stationery	58	7	1	7	11	0
By medals and rewards at Ordinary Meetings in Regent-st.	31	15	0	46	10	0
By cost of foreign missions and importations	432	2	3	563	12	8
By expenses of meetings, postage, &c.	121	14	8			
By miscellaneous expenses in Regent Street	31	12	0			
By ditto at the Garden for seeds, plants, carriage, &c.	121	2	4	7	19	6
By implements, mats, &c.	65	18	5	20	14	0
By garden tan, dung, mould, &c.	23	12	10	6	6	0
By expenses of distribution Department	157	12	1	4	15	0
By garden current labour	1108	4	8			
By coals and coke for Garden	101	19	0	10	7	0
By sundry repairs at Garden	230	15	0	22	19	3
By new works and alterations at ditto	318	3	6	43	8	6
By law expenses	.	.		78	19	0
By Garden exhibitions, 1845	.	.		201	1	1
By Garden exhibitions, 1846	.	.		2	3	0
	4856	14	0	1609	16	4
By Debt on open accounts due April 1, 1845 £1957 19 0						
Less discounts, &c. upon payments 10 16 7						
£1947 2 5	1150	7	3	* 796	15	2
	6007	1	3	2406	11	6
By Balance at Bankers, April 1, 1846 £182 15 8						
By ditto in hands of Vice Secretary ditto 8 1 2						
190 16 10						
	6197	18	1			
Debt on open accounts brought down	.	.		2406	11	6
By debt on loan notes	.	.		7600	0	0
Total debt April 1, 1846	.	.		10,006	11	6
Ditto April 1, 1845	.	.		9557	19	0
Increase in debt	.	.		448	12	6

* On medal account	£499 9 3
Miscellaneous accounts	297 5 11
	£796 15 2

May 5, 1846. (REGENT STREET.)

ELECTIONS. Henry Petre, Esq., 33, Portman Square; and John Charles Weir, Esq., East Acton.

AWARDS. *Knightian Medal* to Mr. Carton, gardener to his Grace the Duke of Northumberland, at Syon, for a noble specimen of Platycerium grande in fruit. Mr. Carton stated that the plant had been brought home by Mr. Bidwill in 1843, and was received at Syon in December of the same year. In 1844 it threw out a leaf in fructification, from which a quantity of young plants were raised similar to some accompanying the specimen. These His Grace desired to be presented to the Society. The seedlings in question were raised from seeds sown as soon as they were ripe; no symptoms of vegetation appeared in seeds sown after they had been kept for some time.

Banksian Medals to Messrs. Henderson of Pine-Apple Place, for Tremandra verticillata, a pretty Swan River plant, "which was received from Baron Hugel last year. It is a profuse bloomer; but of course—as we had to propagate from it—by no means so bushy as the plant is capable of becoming under judicious treatment. The flowers require sun to make them expand finely."

Certificate of Merit to Sir T. D. Acland, Bart., F.H.S., for an exceedingly fine sample of Asparagus; 106 heads weighing 10 lbs. 15 oz.; each head being thicker than the thumb.

NOVELTIES FROM THE SOCIETY'S GARDEN. Corethrostylis bracteata, a Swan River shrub, of which much has been expected; but its pink flowers, although produced in abundance, want brilliancy of colour to render them sufficiently attractive. Accompanying it was also Mina lobata, raised from seeds collected in Mexico by Mr. Hartweg in his new expedition to California. From the appearance of the foliage of this pretty little plant, nobody could doubt its being a Bindweed, but the flowers are unlike those of the order; they are produced in long one-sided racemes, and are bright orange when young, but become pale yellow when full blown.

BOOKS PRESENTED.

The Botanical Register for May. From the Publishers.
Andeutungen zur Charakteristik des Organischen Lebens nach Seinem Austreten in den Verschiedenen Erdperioden. By Dr. A. Wagner. (4to. Munich, 1845.)
Bulletin der Königlich Akademie der Wissenschaften, Nos. 51 to 57, for 1844; the Nos. for 1845; and Nos. 1 to 5, for 1846.
And Transactions of the Royal Bavarian Academy. Vol. 4, Part 2. From the Academy at Munich (1845).
The Athenæum for the month of April. From the Editor.

May 9, 1846. (GARDEN EXHIBITION.)

The weather on this occasion was very propitious, a brisk S.W. wind prevailing throughout the day. The exhibition of Orchids alone was 48 yards long, in a double bank, nor was there a bad specimen among them, and indeed this was the great and gratifying feature of the show. The fruit was not abundant; the best of it was excellent, and was suitably rewarded; but much was inferior. The exhibition was inspected by H. R. H. Prince Albert at an early hour; and the number of visitors altogether who entered the garden amounted to 4844, exclusive of exhibitors.

The AWARD was as follows:—

Large Gold Medals: 1. To Mr. J. Robertson, gardener to Mrs. Lawrence, F.H.S., for a collection of forty stove and greenhouse plants. 2. To the same for twenty species of Exotic Orchids.

Gold Knightian Medals: 1. To Mr. Barnes, gardener to G. W. Norman, Esq., of Bromley Common, Kent, for a collection of forty stove and greenhouse plants. 2. To Mr. Frazer, of Lea Bridge Road, for a collection of twenty stove and greenhouse plants. 3. To Mr. Mylam, gardener to Sigismund Rucker, Esq., F.H.S., for twenty species of Exotic Orchids. 4. To Mr. James Williams, gardener to C. B. Warner, Esq., F.H.S., for twelve species of Exotic Orchids. 5. To Mr. Hunt, gardener to Miss Traill, of Hayes Place, Bromley, for twenty species of Cape Heaths. 6. To Messrs. Fairbairn, of Clapham, for the same.

Gold Banksian Medals: To Mr. Hunt for a collection of twenty stove and greenhouse plants. 2. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of twelve stove and greenhouse plants. 3. To Messrs. Rollisson, of Tooting, for twenty species of Exotic Orchids. 4. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for twelve species of Exotic Orchids. 5. To Mr. G. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for six species of Exotic Orchids. 6. To Mr. W. Cock, of Chiswick, F.H.S., for twelve new varieties of Pelargonium in 8-inch pots. 7. To Mr. Dobson, gardener to Mr. Beck, of Isleworth, F.H.S., for the same. 8. To Mr. W. Cock, for twelve varieties of Pelargonium in 1-inch pots. 9. To Mr. Catleugh, of Hans Place, Chelsea, for the same. 10. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for twelve varieties of Roses in pots. 11. To Messrs. Paul

and Son, of Cheshunt, for eighteen varieties of Roses in pots. 12. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for twenty species of Cape Heaths. 13. To Messrs. Rollisson, of Tooting, for the same. 14. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for twelve species of Cape Heaths. 15. To Mr. Fraser, of Lea Bridge Road, for the same. 16. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for twelve greenhouse Azaleas. 17. To the same, for Tall Cacti in flower. 18. To Mr. Scott, gardener to Sir George Staunton, Bart., F.H.S., for Cyrtopodium punctatum.

Silver Gilt Medals: 1. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a collection of twelve stove and greenhouse plants. 2. To Mr. M. Clarke, gardener to W. Block, Esq., of Muswell Hill, for a collection of six stove and greenhouse plants. 3. To Mr. Catleugh, for the same. 4. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for the same. 5. To Messrs. Veitch and Son, of Exeter, for twelve species of Exotic Orchids. 6. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for the same. 7. To Mr. Hunt, gardener to Miss Traill, for the same. 8. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for six species of Exotic Orchids. 9. To Mr. Catleugh, for a collection of twelve new varieties of Pelargonium in 8-inch pots. 10. To Mr. Gaines, of Battersea, for a collection of twelve varieties of Pelargonium in 8-inch pots. 11. To Messrs. Lane and Co., of Great Berkhampstead, for eighteen varieties of Roses in pots. 12. To Mr. Taylor, gardener to J. Coster, Esq., of Streatham, for twenty species of Cape Heaths. 13. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for twelve species of Cape Heaths. 14. To Messrs. Veitch and Son, of Exeter, for the same. 15. To Mr. T. Malyon, gardener to T. Brandram, Esq., of Lee Grove, Blackheath, for six species of Cape Heaths. 16. To Mr. Dawson, of Brixton Hill, for the same. 17. To Mr. Falconer, gardener to Archdale Palmer, Esq., of Cheam, for twelve varieties of Greenhouse Azaleas. 18. To Mr. Barnes, gardener to G. W. Norman, Esq., for six varieties of greenhouse Azaleas. 19. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Tall Cacti in flower. 20. To Mr. Kemp, gardener to P. Grillion, Esq., of East Acton, for Grapes. 21. To Mr. Ingram, gardener to Her Majesty, at Frogmore, for the same. 22. To Mr. J. Davis, of Oak Hill, East Barnet, for the same. 23. To Mr. John Povey, gardener to the Rev. J. Thornycroft, Thornycroft

Hall, Congleton, for Pine Apples. 24. To Mr. J. Davis, for the same.

Large Silver Medals: 1. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a collection of twelve stove and greenhouse plants. 2. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for the same. 3. To Mr. Malyon, gardener to T. Brandram, Esq., for a collection of six stove and greenhouse plants. 4. To Mr. Cooper, at Mr. Pawley's, White Hart Hotel, Bromley, Kent, for the same. 5. To Mr. Taylor, gardener to J. Coster, Esq., of Streatham, for the same. 6. To Mr. Gaines, for a collection of twelve new varieties of Pelargonium in 8-inch pots. 7. To Mr. Stains, of Middlesex Place, New Road, for a collection of twelve varieties of Pelargonium, in 8-inch pots.* 8. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 9. To Mr. Parker, gardener to J. H. Oughton, Esq., of Roehampton, for a collection of six varieties of Pelargonium, in 12-inch pots. 10. To Mr. Gaines, for the same. 11. To Mr. Francis, of Hertford, for eighteen varieties of Roses, in pots. 12. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 13. To Mr. Plumbley, gardener to C. J. Dimsdale, Esq., of Essenden Place, Herts, for twelve species of Cape Heaths. 14. To Mr. Ayres, gardener to J. Cooke, Esq., F.H.S., for the same. 15. To Mr. Epps, F.H.S., for the same. 16. To Mr. Pamplin, of Walthamstow, Essex, for the same. 17. To Mr. E. Jack, gardener to R. G. Lorraine, Esq., of Wallington, Surrey, for six species of Cape Heaths. 18. To Mr. Plumbley, for a specimen Cape Heath. 19. To Messrs. Fairbairn, of Clapham, for the same. 20. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for twelve greenhouse Azaleas. 21. To Mr. Bruce, for six greenhouse Azaleas. 22. To Mr. Francis, of Hertford, for a collection of new hardy Evergreens, in pots. 23. To Mr. Gaines, for six varieties of Calceolaria, in 8-inch pots. 24. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for Azalea rubra plena. 25. To Mr. May, gardener to E. Goodheart, Esq., for Erica vestita coccinea. 26. To Mr. Frazer, for Boronia serrulata. 27. To Mr. Bruce, for Helichrysum humile. 28. To the Rev. John Clowes, F.H.S., for Oncidium phymatochilum. 29. To Mr. Dods, gardener to Sir Geo. Warrender, F.H.S., for Grapes. 30. To Mr. Mitchell, of Kemp Town, Brighton, for the same.

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* Afterwards altered to a Silver Gilt Medal, Mr. Stains having been erroneously supposed to be a nurseryman.

31. To Mr. Brewin, gardener to Robert Gunter, Esq., F.H.S., for Pine Apples.

Silver Knightian Medals: 1. To Mr. Epps, of Maidstone, F.H.S., for a collection of twelve stove and greenhouse plants. 2. To Mr. Pamplin, for the same. 3. To Mr. E. Jack, for a collection of six stove and greenhouse plants. 4. To Mr. G. Stanly, gardener to H. Berens, Esq., F.H.S., for the same. 5. To Mr. Slowe, for a specimen Rose, in a pot. 6. To Mr. Barnes, gardener to G. W. Norman, Esq., for six species of Cape Heaths. 7. To Mr. Bruce, for the same. 8. To Mr. Clarke, for the same. 9. To Mr. A. Balston, of Poole, for a specimen Cape Heath. 10. To Mr. Smith, of Norbiton, for six greenhouse Azaleas. 11. To Messrs. Lane and Son, for a specimen Fuchsia. 12. To Mr. Pamplin, for Epacris grandiflora. 13. To Mr. M. Clarke, for Pimelia spectabilis. 14. To Mr. H. Waterer, F.H.S., for Seedling Rhododendrons. 15. To Mr. Carson, for Azalea lateritia. 16. To Mr. Beck, for a Seedling Pelargonium "Competitor." 17. To Mr. G. Stanly, for six varieties of Calceolaria, in 8-inch pots.* 18. To Messrs. Veitch and Son, for a new species of Saccolabium. 19. To Mr. Mylam, Gardener to S. Rucker, Esq., jun., F.H.S., for the best-named collection of plants (*one error in thirty-six names*). 20. To Mr. Walter, Gardener to Capt. Hart, of East Hoathly, Sussex, for Grapes. 21. To Mr. Chapman, of South Lambeth, for Grapes. 22. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for Peaches and Nectarines. 23. To Mr. D. Judd, gardener to W. H. Whitbread, Esq., F.H.S., for Melons. 24. To Mr. J. Davis, of Oak Hill, for British Queen Strawberries.

Silver Banksian Medals: 1. To Mr. A. Kendall, of Stoke Newington, for a specimen Fuchsia. 2. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for Crowea saligna. 3. To Mr. Frazer, for Chorozema Henchmanni. 4. To Mr. Ivery, of Peckham, for a collection of Cinerarias. 5. To Mr. Beck, F.H.S., for a seedling Pelargonium, "Hebe's lip." 6. To the same, for a seedling Pelargonium "Bacchus." 7. To Messrs. Veitch and Son, for Eranthemum variabile. 8. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Hydrolea spinosa. 9. To Mr. May, for a specimen Cape Heath. 10. To Mr. Frazer, for the same. 11. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for the second best-named collection of plants (*no error in*

* N.B.—Nos. 1 and 2 (Mr. Geo. Elliott) would have received a medal had they not been disqualified by being shown contrary to the regulations.

twenty names). 12. To Mr. Taylor, gardener to J. Coster, Esq., for the third-best named collection of plants (*no error in twenty names*). 13. To Mr. Fleming, gardener to the Duke of Sutherland, F.H.S., for Grapes. 14. To Mr. H. Eyre, gardener to R. W. Barchard, Esq., F.H.S., for Keen's Seedling Strawberries.

Certificates of Merit: 1. To Mr. Dods, gardener to Sir Geo. Warrender, F.H.S., for Dysophylla stellata. 2. To Messrs. Veitch and Son, for Rhodostemma gardenioides. 3. To Mr. Cameron, of the Botanic Garden, Birmingham, for Anthericum cæruleum. 4. To Mr. Beck, for a seedling Pelargonium "Patrician." 5. To Mr. Miller, of Ramsgate, for a seedling Pelargonium, "Mount Etna." 6. To Mr. Kinghorn, gardener to the Earl of Kilmorey, Orleans House, Twickenham, for a seedling Calceolaria, "Masterpiece." 7. To Mr. Gaines, for a seedling Calceolaria, "Lord Hardinge." 8. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a seedling Calceolaria, "La Polka." 9. To the same, for Achimenes picta. 10. To Mr. Brunsell, gardener to J. C. Weir, Esq., of East Acton, for Azalea indica alba. 11. To Messrs. Rollisson, for the fourth best-named collection of plants (*one error in twenty plants*). 12. To Mr. Barnes, gardener to G. W. Norman, Esq., for the fifth best-named collection of plants (*four errors in forty plants*). 13. To Richard Brook, Esq., F.H.S., for a collection of Apples and Pears.

June 2, 1846. (REGENT STREET.)

ELECTIONS. Mr. William Healy, 130, Fleet Street, London.

AWARDS. *Banksian Medals:* To Mr. Saunders, gardener to the Earl of Carnarvon at Highclere, for a charming collection of hardy hybrid Azaleas. Some were the result of a cross between A. pontica and the red-flowered A. rubescens of the United States, and showed in a remarkable degree the value of such crosses; for in the mules the yellow flowers of A. pontica partook of the rich crimson tints of A. rubescens, in a greater or less degree of intensity, and a beautiful display of various-coloured flowers was the result. This was also the case in another group of hybrids obtained from A. sinensis; they had the glaucous foliage and inflorescence of that species modified by various tints of crimson—these colours blending well, and producing a striking effect. Another charming hybrid, to the habit of Rhododendron azaleoides or fragrans, added the colour of

the broad-leaved Kalmia. It had been obtained between the Azalea rubescens and the Highclere Rhododendron. Other mules also came from the same gardens in the shape of our hardy European purple Rhododendrons, greatly improved in foliage by the use of the crimson Indian kinds. These kinds were not only beautifully spotted, but in one instance displayed a peculiar play of colour, the purple half-transparent flowers being beautifully shaded with violet. To Mr. Widnall, Nurseryman, Cambridge, for a specimen of Fuchsia serratifolia, nearly 6 feet in height, well bloomed, but considerably damaged by travelling.

Certificates of Merit: To Messrs. Veitch and Son, of Exeter, for Didymocarpus crinitus (the long-haired Didymocarp), a Gloxinia-looking plant with snow-white flowers, streaked in the throat with yellow; and to Mr. Fish, gardener to Colonel Sowerby, for excellent specimens of Royal George Peaches. Along with the latter were also two melons. "They are sent to exhibit a singularity not often manifested. From the fruit-stalk, and very near its junction with the fruit, a slender shoot proceeds; that is supplied with another fruit, which is swelling freely, and which would no doubt have reached maturity if the ripe one had been cut away below the point of junction. Those much conversant with Melon-growing know how difficult it is to set different fruit, and get them to swell freely on the same plant when set at different times; and hence their anxiety to start the requisite number at the same time, that they may obtain equal chances of growth. There are some varieties, chiefly of the Cabul kinds, which I find are not so particular in this respect. In such cases a young fruit will commence and swell rapidly, especially when the older fruit is full grown, and is approaching maturity. I have frequently noticed fruit showing, and even setting upon twigs coming from the fruit-stalk, as in the present instance, but this is the only one I have met with in which such a fruit swelled freely before the other was fully ripened. The Melon-plant is growing in a 12-inch pot, filled with loam and charcoal, and is trained over the back path of a stove, the pot being set on the curb wall of the bark bed."

Novelties from the Society's Garden. Achimenes patens, figured at p. 233; Mr. Fortune's Campanula nobilis; Heliophila trifida, an annual with light blue cruciform flowers, with white centres. They open in the morning, close about noon, and drop off soon after. This short duration of the flowers is the more to be regretted as they are produced in

tolerable abundance; and in the morning, when open, have rather a striking effect. Along with these there was a noble mass of Phalænopsis amabilis, obtained from Manilla by Mr. Fortune.

Books Presented.

The Athenæum for May. From the Editor.
The Botanical Register for June. From the Publishers.
The Quarterly Journal of the Geological Society, No. 6. From the Society.
Dodonæa, ou Recueil d'Observations de Botanique, 1st and 2nd Parts. Par Charles Morren. From the Author. 8vo. Bruxelles, 1841, 1843.

June 13, 1846. (Garden Exhibition.)

Although the gaiety of the Azaleas of May was missed on this occasion, yet the general effect was as good as ever. The Pelargoniums were in their glory; Orchids and Cape Heaths were magnificent; and the fruit, which was so meagre in May, did honour to the skill of English gardeners. The day was hot and dry, the thermometer ranging as high as 86° in the shade, and 97° in the sun; but the heat was rendered unoppressive by a brisk north-east wind. The exhibition was inspected by his Highness Ibrahim Pacha and suite; and during the afternoon 13,421 visitors entered the Garden, exclusive of exhibitors.

The Award was as follows:—

Large Gold Medals: 1. To Mr. J. Robertson, gardener to Mrs. Lawrence, F.H.S., for a collection of forty Stove and Greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Gold Knightian Medals: 1. To Mr. Frazer, of Lea Bridge Road, for a collection of twenty Stove and Greenhouse plants. 2. To Mr. Rae, gardener to J. J. Blandy, Esq., F.H.S., for twenty species of Exotic Orchids. 3. To Mr. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for twelve species of the same. 4. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for six species of the same. 5. To Mr. Hunt, gardener to Miss Traill, for twenty species of Cape Heaths. 6. To Messrs. Fairbairn, for the same.

Gold Banksian Medals: 1. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a collection of twenty Stove and Greenhouse plants. 2. To Mr. Barnes, gardener to G. W. Norman, Esq., of Bromley Common, Kent, for a collection of twelve Stove and Greenhouse plants. 3. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for twenty species of Exotic Orchids. 4. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for six species of the same. 5. To

Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for twenty species of Cape Heaths. 6. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for twelve species of the same. 7. To Mr. Dawson, of Brixton Hill, for the same. 8. To Mr. Terry, gardener to Lady Puller, Youngsbury, Herts, for twelve varieties of Roses in pots. 9. To Messrs. Lane, of Great Berkhampstead, for eighteen varieties of the same. 10. To Mr. Cock, of Chiswick, for twelve new varieties of Pelargonium in 8-inch pots. 11. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 12. To Mr. Cock, for twelve varieties of Pelargonium in 8-inch pots. 13. To Mr. Dobson, for the same. 14. To Mr. Green, gardener to Sir E. Antrobus, Bart, F.H.S., for Tall Cacti in flower.

Silver Gilt Medals: 1. To Mr. Hunt, gardener to Miss Traill, for a collection of twenty Stove and Greenhouse plants. 2. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of twelve Stove and Greenhouse plants. 3. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a collection of six Stove and Greenhouse plants. 4. To Mr. P. N. Don, gardener to F. G. Cox, Esq., F.H.S., for twelve species of Exotic Orchids. 5. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for six species of Exotic Orchids. 6. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for twenty species of Cape Heaths. 7. To Messrs. Rollisson, of Tooting, for the same. 8. To Messrs. Veitch and Son, of Exeter, for twelve varieties of the same. 9. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for the same. 10. To Mr. Bruce, for six varieties of the same. 11. To Mr. Dobson, gardener to Mr. Beck, of Isleworth, for eighteen varieties of Roses in pots. 12. To Messrs. Paul, of Cheshunt, for the same. 13. To Mr. Gaines, of Battersea, for twelve new varieties of Pelargonium in 8-inch pots. 14. To Mr. Robinson, gardener to J. Simpson, Esq., of Thames Bank, for twelve varieties of Pelargonium. 15. To Mr. Catleugh, for the same. 16. To Mr. Falconer, gardener to A. Palmer, Esq., for Tall Cacti in flower. 17. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Tremandra verticillata. 18. To Messrs. Veitch, for Mirbelia illicifolia. 19. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for Aërides odoratum. 20. To Mr. Ingram, of the Royal Gardens, Windsor, for a miscellaneous collection of Fruit. 21. To Mr. Davis, of Oak Hill, East Barnet, for the same. 22. To Mr. S. Barnes, gardener to T. Whitmore, Esq., F.H.S., for Black Ham-

burgh Grapes. 23. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for Muscat Grapes. 24. To Mr. Davis, for Grapes. 25. To Mr. Churcher, gardener to J. Gritton, Esq., of Little Park, Wickham, Hants, for Pine Apples. 26. To Mr. Jackson, gardener to H. Beaufoy, Esq., of South Lambeth, for a Pine Apple.

Large Silver Medals: 1. To Mr. Epps, of Maidstone, F.H.S., for a collection of twelve Stove and Greenhouse plants. 2. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for six species of Stove and Greenhouse plants. 3. To Messrs. Rollisson, of Tooting, for twenty species of Exotic Orchids. 4. To Mr. Bruce, gardener to Boyd Miller, Esq., for six species of the same. 5. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for twelve varieties of Roses in pots. 6. To Mr. Francis, of Hertford, for eighteen varieties of the same. 7. To Messrs. Lane, for a collection of Roses, in fifty varieties. 8. To Mr. Bunney, gardener to J. H. Slater, Esq., F.H.S., for the same. 9. To Mr. Barnes, for twelve varieties of Cape Heaths. 10. To Mr. Frazer, for the same. 11. To Mr. Jack, gardener to R. G. Loraine, Esq., for six varieties of the same. 12. To Mr. Staines, of Middlesex Place, New Road, for twelve new varieties of Pelargonium, in 8-inch pots. 13. To Mr. Catleugh, for the same. 14. To Mr. J. Coysh, gardener to R. Hudson, Esq., of Clapham Common, for twelve varieties of the same. 15. To Mr. Gaines, for the same. 16. To Mr. Cock, for six varieties of the same, in 12-inch pots. 17. To Mr. Gaines, for the same. 18. To Mr. Gaines, for six species of Calceolaria, in 8-inch pots. 19. To Mr. T. S. Airzee, of 25, Vaughan Terrace, City Road, for a collection of Ranunculuses, in twelve varieties. 20. To Messrs. Tyso and Son, of Wallingford, for a collection of the same in twenty-four varieties. 21. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for six varieties of Greenhouse Azaleas. 22. To Mr. Scott, gardener to C. Barclay, Esq., F.H.S., for a collection of Hybrid Alströmerias. 23. To Messrs. Veitch and Son, of Exeter, for a new species of Balsam, from Java. 24. To Mr. Waterer, of Knap Hill, Bagshot, F.H.S., for a collection of new hardy Evergreens, in pots. 25. To Mr. Hunt, gardener to Miss Traill, for a specimen Cape Heath. 26. To Mr. Epps, F.H.S., for the same. 27. To Mr. Dods, gardener to Sir Geo. Warrender, Bart., F.H.S., for a miscellaneous collection of Fruit. 28. To Mr. G. Wortley, gardener to J. F. Maubert, Esq., F.H.S., for Grapes. 29. To Mr. Dods, for the same. 30. To Mr. Chapman, of South Lambeth, for the same. 31.

To Mr. Spencer, gardener to the Marquis of Lansdowne, for Pine Apples. 32. To C. W. Packe, Esq., M.P., F.H.S., for a Providence Pine Apple. 33. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for Pine Apples. 34. To J. G. Fuller, Esq., for a Ripley Queen Pine Apple.

Silver Knightian Medals: 1. To Mr. Pawley, of Bromley, for a collection of six Stove and Greenhouse plants. 2. To Mr. Malyon, gardener to T. Brandram, Esq., of Lea Grove, Blackheath, for the same. 3. To Mr. Catleugh, of Hans Place, Chelsea, for the same. 4. To Mr. Malyon, for six varieties of Cape Heaths. 5. To Mr. Pamplin, for the same. 6. To Mr. Betteridge, of Milton Hill, Abingdon, for a collection of Moss Roses, in twelve varieties. 7. To Messrs. Lane, for the same. 8. To Mr. Milne, gardener to C. S. Chauncey, Esq., for a collection of Roses, in fifty varieties. 9. To Mr. Mitchell, of Piltdown Nursery, Sussex, for the same. 10. To Mr. Staines, for twelve varieties of Pelargonium in 8-inch pots. 11. To Mr. Slowe, for six varieties of Pelargonium in 12-inch pots. 12. To Mr. Stanly, for six varieties of Pelargonium. 13. To the same, for six varieties of Calceolaria in 8-inch pots. 14. To Mr. S. Hale, of Hillingdon, for twenty-four varieties of Pinks. 15. To Mr. C. Turner, of Chalvey, near Windsor, for the same. 16. To Mr. D. Aust, of Somerset Place, Hoxton, for a collection of Ranunculuses, in twelve varieties. 17. To Messrs. Lane, for a collection of new hardy Evergreens in pots. 18. To Mr. Munnock, gardener to the Rev. C. Pritchard, of Clapham Common, for a specimen Fuchsia. 19. To Mr. Scott, gardener to Sir Geo. Staunton, Bart., F.H.S., for a specimen Cape Heath. 20. To Mr. Dawson, of Brixton Hill, for the same. 21. To Mr. Jackson, of Kingston, for Erica Massoni. 22. To Mr. Ayres, gardener to Jas. Cook, Esq., F.H.S., for Clerodendron paniculatum. 23. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Clerodendron fallax. 24. To Mr. Cutter, of the Royal Nursery, Slough, for a collection of half-hardy Conifers. 25. To Messrs. Veitch, for Chirita zeylanica. 26. To the same, for Æschynanthus pulcher. 27. To Messrs. Rollisson, for the best-named collection of Plants. 28. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for the second best-named collection. 29. To Mr. Hamp, gardener to Jas. Thorne, Esq., of Mawbey House, South Lambeth, for Grapes. 30. To Mr. Davey, gardener to G. Smith, Esq., of Colney Hatch, for the same. 31. To Mr. Mitchell, of Kemp Town, Brighton, for the same. 32. To Mr. M'Ewen, gardener to Col. Wyndham, F.H.S., for Pine Apples. 33.

To Mr. J. M. Elliott, gardener to Sir Wm. Ingilby, of Ripley Castle, for a seedling Pine Apple. 34. To Mr. Ingram, of the Royal Gardens, Windsor, for a Queen Pine Apple. 35. To Mr. Spencer, gardener to the Marquis of Lansdowne, F.H.S., for Peaches and Nectarines. 36. To Mr. Kemp, gardener to P. Grillion, Esq., of East Acton, for Peaches. 37. To Mr. Davis, of Oak Hill, East Barnet, for Peaches. 38. To Mr. Davey, gardener to Geo. Smith, Esq., for Melons. 39. To Mr. Spencer, gardener to the Marquis of Lansdowne, for Strawberries. 40. To Mr. G. Wortley, gardener to J. F. Maubert, Esq., F.H.S., for the same.

Silver Banksian Medals: 1. To Mr. E. Jack, gardener to R. G. Loraine, Esq., of Wallington, Surrey, for a collection of six Stove and Greenhouse plants. 2. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for the same. 3. To Mr. Geo. Wiltshire, gardener to J. Reynell, Esq., of East Sheen, for six species of Achimenes. 4. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for a specimen Rose, in a pot. 5. To Mr. Terry, for a collection of Moss Roses, in twelve varieties. 6. To Messrs. Paul and Co., for the same. 7. To Mr. Terry, for a collection of Roses, in fifty varieties. 8. To Mr. T. Cole, of Bath, for the same. 9. To Messrs. Paul and Co., for the same. 10. To R. Moseley, Esq., of 8, Pine Apple Place, for twelve varieties of Pelargonium, in 8-inch pots. 11. To Mr. R. Ellis, of Albert Terrace, New Road, Woolwich, for twenty-four varieties of Pinks. 12. To Messrs. Norman, of Bull Fields, Woolwich, for the same. 13. To Mr. J. L. Catmur, of Britannia Street, Hoxton, for a collection of Ranunculuses, in twelve varieties. 14. To Mr. Francis, of Hertford, for a collection of hardy Evergreens, in pots. 15. To Mr. Kendall, of Stoke Newington, for a specimen Fuchsia. 16. To Mr. Gaines, for a collection of fancy Pelargoniums. 17. To Messrs. Fairbairn, for Erica tricolor. 18. To Mr. Pamplin, of Walthamstow, for Campylia (Pelargonium) holosericea. 19. To Mr. Jackson, of Kingston, for Pelargonium tricolor. 20. To Mr. W. Wells, of Walthamstow, for Vinca rosea alba. 21. To Messrs. Veitch, for Siphocampylus coccineus. 22. To Mr. Green, gardener to Sir E. Antrobus, Bart., for Ixora coccinea. 23. To Mr. G. Wiltshire, gardener to J. G. Reynell, Esq., for Gloxinia Cartoni. 24. To Mr. Glendinning, of Turnham Green, F.H.S., for Cryptomeria japonica. 25. To Mr. Mylam, gardener to S. Rucker, Esq., F.H.S., for a new Nepenthes. 26. To Mr. Carson, for Cattleya granulosa. 27. To Messrs. Tyso, of Wallingford, for a collection of Ranunculuses. 28. To Mr. Stanly,

gardener to H. Berens, Esq., F.H.S., for a specimen of Pelargonium elatum. 29. To Mr. Parsons, gardener to A. George, Esq., of Enfield, for Grapes. 30. To Mr. Dodemeade, gardener to W. Leaf, Esq., F.H.S., for Grapes. 31. To Mr. Ingram, for Strawberries. 32. To Mr. Davey, for the same. 33. To Mr. Braid, gardener to H. Perkins, Esq., of Hanworth Park, for Figs. 34. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for Citrons. 35. To Mr. Parker, gardener to F. H. Oughton, Esq., for Nectarines. 36. To Mr. Paxton, F.H.S., gardener to His Grace the Duke of Devonshire, for Peaches. 37. To Mr. Parker, for a Melon. 38. To Mr. Buck, of Blackheath, for British Queen Strawberries. 39. To Mr. T. Cole, of Bath, for Cole's early prolific Strawberry.

Certificates of Merit: 1. To Messrs. Cobbett, of Chobham, for a collection of Moss Roses, in twelve varieties. 2. To Mr. James Baker, of Bull Fields, Woolwich, for twenty-four varieties of Pinks. 3. To Mr. Henbrey, of Croydon, for the same. 4. To Mr. H. Ward, of Bull Fields, Woolwich, for the same. 5. To Mr. Beck, for a seedling Pelargonium of 1846, "Centurion." 6. To the same, for a seedling Pelargonium of 1846, "Gem." 7. To the same, for a seedling Pelargonium of 1846, "Cassandra." 8. To Mr. Hoyle, of Guernsey, for a seedling Pelargonium of 1846, "President." 9. To Mr. F. C. Ball, of Taunton, for Gladiolus rex rubrorum. 10. To Mr. Robinson, gardener to James Simpson, Esq., for a specimen Fuchsia. 11. To Mrs. Kendall, of Stoke Newington, for the same. 12. To Mr. Glendinning, of Turnham Green, F.H.S., for Ruellia macrophylla. 13. To Mr. Green, for Tropæolum polyphyllum. 14. To Messrs. Veitch, for Calandrinia umbellata. 15. To Mr. Jack, for Achimenes longiflora. 16. To the same, for Crinum amabile. 17. To Mr. Barnes, for Cypripedium spectabile. 18. To Mr. Hunt, gardener to Miss Traill, for the third best-named collection of plants.

July 7, 1846. (Regent Street.)

Elections. The Dowager Marchioness of Hastings; the Earl of Ellesmere, Worsley Hall, Manchester, and 18, Belgrave Square; and Ralph Gerard Leycester, Esq., Toft Hall, Knutsford, Cheshire.

Awards. *Knightian Medal* to Mr. Carton, gardener to His Grace the Duke of Northumberland, at Syon, for a cut specimen of the Clove tree (Caryophyllus aromaticus). The specimen bore large shining pale green leaves, and had on it several of its fragrant coriaceous flower-buds, which

are the Cloves of Commerce. On account of the difficulty of keeping it alive, this remarkable tree is still comparatively rare in this country. At Syon, however, it has been found to succeed well, planted in Norwood loam and sand, in which the Mangosteen and Nutmeg have likewise been found to thrive. "The tree from which the branch was cut is now a fine plant fifteen feet in height, in a tub, some of the branches bearing seven buds on a cluster. It was received—a young seedling plant—at Syon in the year 1839."

Certificates of Merit to Mr. Norman, of Woolwich, for very fine boxes of Piccotees and Carnations; and to Mr. Barnes, of Bicton, for a dish of large white Strawberries, which were rather over ripe, and somewhat bruised by travelling. "They have been greatly admired by all who have seen them growing, and partaken of them. We have no Strawberry that is more productive: its colour is remarkably bright, clear, and shining, when fresh gathered, if well ripened; and its flavour is good, though different from all others. It comes into use after other varieties are over, or nearly so; thus the Strawberry season may, with good management, be prolonged considerably, which is a great desideratum."

Novelties from the Society's Garden. Buddlea Lindleyana, one of Mr. Fortune's first importations from China, which, if not altogether hardy, has been proved to be at least as hardy as a Fuchsia. Various dried Chinese fruits, or sweetmeats, brought over by Mr. Fortune; they consisted of Dates, the produce of the Jujube tree (Ziziphus Jujuba), of which there are many varieties; also Litchis and Longans. The Litchi fruits are the largest, having a much rougher coat than the Longan, which is, moreover, an inferior variety. Both are round fruit, with sweet pulp surrounding the stone, covered by a tough thin leathery coat, which is semi-transparent and colourless. Another dish contained pressed Oranges, a preserve obtained from a small acid Orange, common about Chusan; it looks as if the pulp had been taken out, and the rind boiled in sugar, and pressed. Associated with these was also a dish of the Wampee—Cookia punctata, whose small peculiarly-flavoured berries form a preserve more agreeable to Chinese than English taste.

Books Presented.

The Botanical Register for July. From the Publishers.

Journal of the Royal Asiatic Society of Great Britain and Ireland. No. 17, Part 1. From the Society.

Recherche sulla Natura del caprifico, e del Fico, e sulla Caprificazione. From the author, Guglielmo Gasparini. 4to., Napoli, 1845.

July 11, 1846. (GARDEN EXHIBITION.)

The July exhibition is always expected to be inferior to its predecessors; but on this occasion, while some parts of it were equal to the best of the May and June meetings—as the Orchids, for example—others much exceeded them. The Heaths in particular were very fine, and there was a noble display of fruit, as will be seen from the following table of the weights of some of the pines:—

Name of Exhibitor.	Variety of Pine.	Weight when placed on the Table.	
		lbs.	oz.
Mr. FLEMING	Queen	4	15
— WILMOT	Moscow Queen	4	14½
— BREWIN	Queen	4	14
— ELPHINSTONE	Ripley Queen	4	12
— FRAZER	Queen	4	6
— BRAY	Ditto	4	5½
— HEWITT	Ditto	4	3½
— FLEMING	Ditto	3	15
— DEATH	Ditto	3	14
— BRAID	Ditto	3	12
— SPENCER	Ripley Queen	3	10
— BENNET	Queen	3	2
— DODS	Globe	3	0
— DAVIES	Queen	2	15
— AYRES	Ditto	2	11
— BROWNE	Providence	8	13
— COLLINSON	Ditto	8	10¼
— BELTON	Ditto	8	8
— DODS	Ditto	8	5¼
— CHRISTIE	Ditto	7	10¾
— SPENCER	Ditto	7	6
— THOMPSON	Ditto	6	2½
— M'EWEN	Ditto	6	1¼
— BAGGS	Enville	4	2½

The total number of Pine-apples exhibited was 60, of which 35 were weighed. Judging from the appearance of those not weighed, as they stood side by side with those that were, the total weight may be estimated at 272 lbs.; and when they were first cut the weight must have been considerably greater.

The beautiful grounds at Chiswick House were, through the liberality of the Noble President of the Society, thrown open to the visitors, among whom was his Highness Ibrahim Pacha. Five military bands were in attendance, and, the day being favourable, the effect of the whole was satisfactory. The number of visitors was 6083, exclusive of exhibitors.

The AWARD was as follows:—

Large Gold Medals: 1. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for a collection of forty Stove and Greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Gold Knightian Medals: 1. To Mr. Frazer, of Lea Bridge Road, Leyton, for a collection of twenty Stove and Greenhouse plants. 2. To Messrs. Rollisson, of Tooting, for twenty species of Exotic Orchids. 3. To Mr. Don, gardener to F. G. Cox, Esq., F.H.S., for twelve species of Exotic Orchids. 4. To Mr. Hunt, gardener to Miss Traill, of Hayes Place, Bromley, for twenty species of Cape Heaths. 5. To Messrs. Fairbairn, of Clapham, for the same. 6. To Mr. Spencer, gardener to the Marquis of Lansdowne, F.H.S., for a miscellaneous collection of Fruit.

Gold Banksian Medals: 1. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a collection of twelve Stove and Greenhouse plants. 2. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for twenty species of Exotic Orchids. 3. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for twelve species of Exotic Orchids. 4. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for six species of Exotic Orchids. 5. To Mr. Robertson, for twenty species of Cape Heaths. 6. To Messrs. Rollisson, of Tooting, for the same. 7. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for twelve species of the same. 8. To Mr. Frazer, of the Lea Bridge Road, for the same. 9. To Messrs. Lane, of Great Berkhamstead, for eighteen varieties of Roses in pots. 10. To Mr. Fleming, gardener to his Grace the Duke of Sutherland, F.H.S., at Trentham, for a miscellaneous collection of Fruit.

Silver Gilt Medals: 1. To Mr. Malyon, gardener to T. Brandram, Esq., of Lee Grove, Blackheath, for a collection of twenty species of Stove and Greenhouse plants. 2. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for twelve species of the same. 3. To Mr. Catleugh, of Hans Place, Chelsea, for six species of the same. 4. To Mr. Redding, gardener to Mrs. Marryat, F.H.S., for twelve species of Exotic Orchids. 5. To Mr. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for the same. 6. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for twenty species of Cape Heaths. 7. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for six species of Cape Heaths. 8. To Mr. Epps, of Maid-

stone, F.H.S., for the same. 9. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for twelve varieties of Roses in pots. 10. To Mr. Dobson, gardener to Mr. Beck, F.H.S., of Isleworth, for eighteen varieties of the same. 11. To Mr. Stains, of Middlesex Place, New Road, for twelve new varieties of Pelargonium, in 8-inch pots. 12. To Mr. Dobson, for the same. 13. To Mr. Stains, for twelve varieties of Pelargonium, in 8-inch pots. 14. To Mr. Bassett, gardener to R. S. Holford, Esq., F.H.S., for Aërides odoratum. 15. To Mr. Falconer, gardener to A. Palmer, Esq., of Cheam, for Renanthera coccinea. 16. To Messrs. Veitch, of Exeter, for a new species of Ixora. 17. To Mr. Hunt, gardener to Miss Traill, of Hayes Place, Bromley, for Grapes. 18. To Mr. Hamp, gardener to James Thorne, Esq., of Mawbey House, South Lambeth, for the same. 19. To Mr. Mitchell, of Kemp Town, Brighton, for the same. 20. To Mr. Dods, gardener to Colonel Baker, F.H.S., for Pine Apples. 21. To Mr. Fleming, for a Pine Apple.

Large Silver Medals: 1. To Mr. Epps, of Maidstone, F.H.S., for a collection of twelve Stove and Greenhouse plants. 2. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of six Stove and Greenhouse plants. 3. To Mr. Jack, gardener to R. G. Loraine, Esq, Wallington, for the same. 4. To Mr. Hunt, gardener to Miss Traill, of Hayes Place, Bromley, for six species of Exotic Orchids. 5. To Mr. Jack, for the same. 6. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for six species of Cape Heaths. 7. To Mr. Dawson, of Brixton, for the same. 8. To Mr. Bruce, for a specimen of Cape Heath. 9. To Messrs. Rollisson, for the same. 10. To Messrs. Lane, of Great Berkhamstead, for a collection of Roses, in fifty varieties. 11. To Mr. Robinson, gardener to J. Simpson, Esq, of Thames Bank, Pimlico, for twelve varieties of Pelargonium, in 8-inch pots. 12. To Mr. Turner, of Chalvey, near Windsor, for twenty-four varieties of Carnations. 13. To Messrs. Norman, of Woolwich, for the same. 14. To Mr. Turner, for twenty-four varieties of Piccotees. 15. To Mr. G. Edmunds, of Wandsworth, for the same. 16. To Mr. Waterer, of Knap Hill, Bagshot, F.H.S., for a collection of new hardy Evergreens, in pots. 17. To Mr. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for Stephanotus floribundus. 18. To Mr. Frazer, of Leyton, for Allamanda cathartica. 19. To Mr. Green, gardener to Sir E. Antrobus, Bart., for Lisianthus Russellianus. 20. To

F. Scheer, Esq., F.H.S., for a new species of Echinopsis from Bolivia. 21. To Mr. Dods, gardener to Sir George Warrender, Bart., F.H.S., for a miscellaneous collection of Fruit. 22. To Mr. Frost, gardener to Lady Grenville, F.H.S., for Grapes. 23. To Mr. Davey, gardener to G. Smith, Esq., F.H.S., for the same. 24. To Mr. Tillery, gardener to his grace the Duke of Portland, for the same. 25. To Mr. Collinson, gardener to the Marquis of Westminster at Eaton Hall, for Pine Apples. 26. To Mr. W. Browne, gardener to C. W. Packe, Esq., M.P., F.H.S., for a Providence Pine Apple. 27. To Mr. Frazer, gardener to E. D. Davenport, Esq., F.H.S., for Pine Apples.

Silver Knightian Medals: 1. To Mr. Collins, gardener to E. H. Chapman, Esq., of Harringay House, Hornsey, for a collection of twelve Stove and Greenhouse plants. 2. To Mr. May, of Woodford, for a collection of six Stove and Greenhouse plants. 3. To Mr. Bruce, gardener to Boyd Miller, Esq., for the same. 4. To Mr. Young, gardener to C. Barron, Esq., of Camberwell, for six species of Cape Heaths. 5. To Mr. Jack, for the same. 6. To Mr. Pamplin, of Walthamstow, for the same. 7. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S. for a specimen of Cape Heath. 8. To Messrs. Fairbairn, for the same. 9. To Mr. Frazer, for the same. 10. To Mr. R. Moseley, for six varieties of scarlet Pelargonium. 11. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for six species of Pelargonium. 12. To Messrs. Lane, for Moss Roses, in twelve varieties. 13. To Mr. Terry, gardener to Lady Puller, of Youngsbury, for a collection of Roses, in fifty varieties. 14. To Messrs. Paul and Son, of Cheshunt, for the same. 15. To Mr. Slowe, for a collection of Roses, in twenty-five varieties. 16. To Messrs. Cobbett, of Chobham, for the same. 17. To Mr. Coysh, gardener to R. Hudson, Esq., of Clapham Common, for twelve varieties of Pelargonium, in 8-inch pots. 18. To Mr. Gaines, of Battersea, for the same. 19. To Mr. Ward, of Woolwich, for twenty-four varieties of Carnations. 20. To Mr. Dickson, of Acre Lane, Brixton, for the same. 21. To Messrs. Norman, of Woolwich, for twenty-four varieties of Piccotees. 22. To Mr. Dickson, for the same. 23. To Messrs. Lane, for a collection of new hardy Evergreens, in pots. 24. To Mr. Gaines, for a Fuchsia, "Duchess of Sutherland." 25. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for Veronica salicifolia. 26. To Mr. Young, gardener to C. Barron, Esq., for Stephanotus floribundus. 27. To Mr. Dawson, for Erica Irbyana. 28. To Mr.

Stanly, gardener to H. Berens, Esq., F.H.S., for Gloriosa superba. 29. To Mr. Taylor, gardener to J. Coster, Esq., for a collection of British Ferns. 30. To Messrs. Veitch, for a new species of Æschynanthus. 31. To Messrs. Rollisson, of Tooting, for the best-named collection of Plants. (*No error in forty names.*) 32. To Mr. Dodemeade, gardener to W. Leaf, Esq., F.H.S., for Grapes. 33. To Mr. Wright, gardener to the Hon. Mrs. Rushout, F.H.S., for Grapes grown in pots. 34. To Mr. Chapman, of South Lambeth, for Grapes. 35. To Mr. Wilmot, of Isleworth, for the same. 36. To Mr. T. Belton, gardener to Charles Wynne, Esq., F.H.S., for a Pine Apple. 37. To Mr. W. Christie, gardener to Viscount Folkestone, for Pine Apples. 38. To Mr. T. Bray, gardener to E. Lousada, Esq., of Sidmouth, for a Pine Apple. 39. To Mr. J. Hewitt, gardener to G. Purday, Esq., of Bayswater, for Pine Apples. 40. To Mr. Wright, for Peaches and Nectarines. 41. To Mr. Parker, gardener to J. H. Oughton, Esq., F.H.S., for the same. 42. To Mr. Elliott, gardener to J. B. Boothby, Esq., F.H.S., for Bigarreau Cherries. 43. To Mr. Whiting, gardener to H. T. Hope, Esq., F.H.S., for Bigarreau and Circassian Cherries. 44. To Mr. Fleming, for a Melon.

Silver Banksian Medals: 1. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for a collection of six stove and greenhouse plants 2. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for the same. 3. To Mr. Taylor, gardener to J. Coster, Esq., of Streatham Common, for the same. 4. To Mr. Francis, of Hertford, for eighteen varieties of Roses, in pots. 5. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for a specimen Rose. 6. To Mr. Dobson, for the same. 7. To Messrs. Paul and Son, for a collection of Moss Roses, in twelve varieties. 8. To Mr. Francis, for a collection of Roses, in fifty varieties. 9. To Mr. Taylor, for six varieties of Cape Heaths. 10. To Mr. Wood, gardener to J. G. Seager, Esq., of Poole, for a specimen Cape Heath. 11. To Mr. Hunt, for the same. 12. To Mr. Ellis, of Woolwich, for twenty-four varieties of Piccotees. 13. To Mr. Ward, for the same. 14. To Mr. Cutter, of Slough, for a collection of new hardy Evergreens, in pots. 15. To Mr. Kendal, of Stoke Newington, for Fuchsia, "Erecta elegans." 16. To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Pavetta Borbonica. 17. To Messrs. Veitch, for Cuphea cordata. 18. To Messrs. Henderson and Co., of Pine Apple Place, Edgeware Road, for Æschynanthus Boschianus. 19. To

Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for the second best-named collection of Plants. (*One error in twenty names.*) 20. To Mr. T. Umpleby, gardener to H. Benyon, Esq., for Grapes. 21. To Mr. T. Bray, for the same. 22. To Mr. Gadd, of Betchworth, for the same. 23. To Mr. M'Ewen, gardener to Colonel Wyndham, F.H.S., for a Pine Apple. 24. To Mr. Thomson, gardener to G. Byng, Esq., of Wrotham Park, Barnet, for the same. 25. To Mr. R. Braid, gardener to H. Perkins, Esq., F.H.S., for the same. 26. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for Pine Apples. 27. To Mr. Collinson, for Nectarines. 28. Mr. Mason, gardener to Sir John Kenaway, Bart., Escot House, Devon, for Peaches. 29. To Mr. Collins, for the same. 30. To Mr. T. Bray, for Black Eagle Cherries. 31. To Mr. Kendall, gardener to H. Pole Carew, Esq., Anthony House, Devonport, for Citrons. 32. To Mr. M'Ewen, for Melons. 33. To Mr. Parker, for a Melon. 34. To Mr. Braid, for the same.

Certificates of Merit: 1. To Mr. Francis, of Hertford, for a collection of Moss Roses, in twelve varieties. 2. To Mr. Ellis, for twenty-four varieties of Carnations. 3. To Mr. Griffin, of Uxbridge, for the same. 4. To Mr. Edmonds, of Wandsworth, for a seedling Piccotee, "Mrs. Reeves." 5. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Chironia floribunda. 6. To M. Frost, gardener to Lady Grenville, F.H.S., for Triptilion spinosum. 7. To Mr. Young, gardener to C. Barron, Esq., for Clethra arborea. 8. To Mr. Cole, of Bath, for cut Hollyhocks. 9. To Mr. Jack, gardener to R. G. Loraine, Esq., for Cuphea miniata. 10. To Messrs. Veitch, for Clematis glandulosa. 11. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for the third best-named collection of Plants. (*Three errors in forty-two names.*) 12. To Mr. Fleming, for Peaches and Nectarines. 13. To Mr. Elliott, for Melons. 14. To Mr. Hewitt, for Circassian Cherries. 15. To Mr. Meyer, of Boston Lane, Brentford, for Cherries.

August 4, 1846. (REGENT STREET.)

In consequence of the glass lantern of the meeting-room having been destroyed by the hail-storm of Aug. 1, no meeting took place, as was duly advertised in the daily papers; nevertheless, several objects deserving of notice having been sent from the country, the following is an account of some of the more remarkable.

From Messrs. Veitch and Son, of Exeter, was a cut specimen of a new Leschenaultia, which has been named L. splendens; but which is, perhaps, L. laricina. From the same nursery was also Pleroma elegans, a very fine deep purple-flowered greenhouse shrub, with shining evergreen leaves. It was stated to have been raised from seeds received from Mr. W. Lobb, who found it in the Organ Mountains, at an elevation of 6000 feet. The flowers continue open for three or four days. Of fruit, Mr. Spencer, gardener to the Marquis of Lansdowne, at Bowood, sent a magnificent Melon, said to be the true Ispahan. It measured 19½ inches in length, and 6 inches in diameter, weighed 13 lbs. 7 oz., and was of the finest possible quality. It was stated to have been grown in a common brick-pit, without any fire-heat; and the same plants were mentioned to be each producing three or four similar fruits. Three Providence Pine Apples were sent by Mr. Turnbull, gardener to the Duke of Marlborough, at Blenheim, which were stated to be the produce of 2½-year old plants, grown in pots. They weighed, respectively, 11 lbs. 8 oz., 11 lbs., and 9 lbs.; the heaviest measured 22 inches in circumference, and the number of pips was 11. They were handsome, well-formed fruit, with moderate-sized crowns. Finally, Mr. James Cowie, gardener to the Earl of Radnor, Coleshill House, Berkshire, sent a Cabul Melon, weighing about 7½ lbs., which had been raised in a pit heated by fermenting material.

September 1, 1846. (Regent Street.)

Elections. Lady Constable, of Burton Constable, Yorkshire; Miss Hinckes, Tattenhall, Wolverhampton; John Blayds, Esq., Oulton Park, Leeds; Charles Druce, Esq., of Denmark Hill, Camberwell; William Maury, Esq., Liscard, Cheshire; Thomas Wood, Esq., 39, Craven Street; Everson Harrisson, Esq., Tolethorpe, Stamford; and Mr. John Weeks, Gloucester Place, King's Road, Chelsea.

Awards. *Knightian Medal:* To Messrs. Loddiges, of Hackney, for various Orchids, especially a Warrea from Guiana; a Saccolabium from Bombay; a variety of Cattleya granulosa; and a lovely specimen of Dendrobium chrysanthum.

Banksian Medals: To Messrs. Rollisson, of Tooting, for a very fine plant of Dendrobium formosum; and to Mr. Barnes, of Bicton, for three handsome Queen Pine Apples, an account of which appeared at vol. i. p. 260: they weighed, respectively, 6½ lbs., 5 lbs. 14 oz., and 5 lbs. 11 oz. The heaviest, especially, was a fine fruit, forming a regular

pyramid, 1 foot in height and 18 inches in circumference, surmounted by a rather small crown.

Certificates of Merit: To Messrs. Veitch and Son, of Exeter, for Tromsdorffia speciosa, a soft-wooded Gesneraceous-looking plant from Java; it is erect growing, with large opposite obovate leaves, from whose axils spring clusters of Chirita-like flowers—pale blush, with the tube shaded with violet: the plant had been grown in a stove, but in a specimen from the greenhouse, sent along with it, the tube was much deeper coloured. To Mr. Mitchell, gardener to E. Lawford, Esq., for large bunches of Black Hamburgh Grapes, with finely swelled berries, but hardly sufficiently coloured; they were produced in a greenhouse, without the aid of fire-heat. To Mr. Josling, of St. Albans, for a Seedling Grape, some account of which has been given at p. 296, vol. i.; it is an excellent variety, rich and sugary, with a Frontignan flavour, and deserving of extensive cultivation.

Novelties from the Society's Garden. Spathoglottis Fortuni, one of the first plants Mr. Fortune met with on the granitic mountains of Hong Kong; Iochroma tubulosum, a half-hardy shrub with long tubular deep porcelain-blue flowers, found by Mr. Hartweg on the mountains of Yangana, near Loxa; Mr. Fortune's Abelia rupestris; and a new pale yellow-blossomed Clematis graveolens from Chinese Tartary, which promises to become a useful addition to the arboretum wall.

Books Presented.

Flora Batava, Nos. 142, 143, and Index, &c. From His Majesty the King of Holland.
Voyage Botanique le long des Côtes Septentrionales de la Norvège depuis Drontheim jusqu'au Cap Nord. Par Ch. Martins. From the Author.
The Athenæum for June and July. From the Editor.
The Journal of the Royal Geographical Society of London, Vol. 16, Part 1. From the Society.
The Botanical Register for August and September. From the Publishers.
Annals of the Lyceum of Natural History of New York, Vol. 4, No. 5. From the Society.
Mémoires de la Société de Physique et d'Histoire Naturelle de Genève, Tome 11, Part 1. From the Society.
Seven Parts of the Proceedings of the Zoological Society. From the Society.

October 6, 1846. (Regent Street.)

Elections. Joseph James Ward Rigley, Esq., 29, Lansdown Place, Cheltenham; Samuel Morton Peto, Esq., Somerleyton Hall, Suffolk, and 47, Russell Square, London; William F. Cooke, Esq., 345, Strand, and Elliot Hill, Blackheath; Lionel Place, Esq., R.N., Elstead Park,

Godalming, Surrey; Charles Robert Scott Murray, Esq., Danesfield, Great Marlow, Bucks; and Alexander Oswald, Esq., M.P., Clarendon Hotel, and Auchincruive, Ayrshire.

AWARDS. *Silver-Gilt Medal:* To Mr. Wilmot, of Isleworth, for a magnificent collection of Pine Apples, not only remarkable for fine growth, but also for novelty. It contained two Moscow Queens, the heaviest weighing 5 lbs. 6 oz.; a Montserrat, weighing 5 lbs. 2 oz.; two smooth Cayenne Pines, a variety much cultivated in France, and certainly one of the best of the juicy Pines in cultivation, the heaviest weighing 6 lbs. 11 oz.; a Ceylon, a juicy-looking lemon-coloured variety, weighing 4 lbs. 10 oz.; a Ripley Queen, 4½ lbs.; an Antigua Queen, 4 lbs. 7 oz.; an Enville, 5 lbs. 2 oz.; a variety named Buck's Seedling, measuring 13 in. in length; and, finally, a Maranham, weighing 6½ lbs. In addition to these Mr. Wilmot also sent two fruit of the Cayenne raised from a crown taken off a fruit exhibited about two years ago; it was planted and threw up two stems, united at the base, each stem producing a large and well-ripened fruit of handsome form.

Large Silver Medals: To Mr. Hewitt, gardener to J. Purday, Esq., of Bayswater, for two magnificent Queen Pines. The heaviest weighed 6 lbs. 11 oz., the other 5 lbs. The former measured 11 inches in height and 18 inches in circumference; the number of pips was 11. It was well formed, finely swelled, and in all respects must be regarded as a fruit of first-rate excellence. To Mr. Rae, gardener to J. J. Blandy, Esq., of Reading, for various Orchids, more especially Lælia Perrinii, Cattleya Aclandiæ, Dendrobium formosum, Maxillaria Rollissonii, Miltonia candida, Trichocentron fuscum, and Phalænopsis amabilis.

Knightian Medals: To Messrs. Rollisson, of Tooting, for a fine collection of Orchids, comprising Warrea bidentata; Camaridium ochroleucum; the red variety of Rodriguezia secunda; Miltonia Clowesii; and the pretty Demerara plant, Aganisia pulchella. To Mr. Povey, gardener to the Rev. J. Thornycroft, for a Providence Pine Apple weighing 9 lbs. 14 oz.; it measured 9½ inches in height and 22 inches in circumference; the number of pips was 10. "It was the produce of a plant 2 years and 9 months old, that had been grown in a pot and treated in the manner described at p. 144, vol. i., except that I never put in my Providence suckers until the middle of December, as I find when they are put in earlier they become well rooted, and in a fine state for growing rapidly, just as the dark season commences, which causes them to grow very white and

tender in the heart; but when they are left thus late, by the time they are rooted the days are considerably on the turn, and they never fail to grow away without any check whatever."

Banksian Medals: To Mr. Davey, gardener to G. Smith, Esq., of Colney Hatch, for fine bunches of Wilmot's Black Hamburgh Grapes, grown under glass, weighing respectively 2¾ lbs., 2¼ lbs., and 1½ lb. To Messrs. Loddiges, of Hackney, for various Orchids, comprising the scarce Stanhopea bucephalus, Dendrobium rhombeum, a Dendrobium from Java resembling D. Heyneanum, Angræcum bilobum, and Oncidium incurvum. To Mr. Redding, gardener to Mrs. Maryatt, of Wimbledon, for a compact and finely-bloomed specimen of Odontoglossum grande. To C. B. Warner, Esq., for a tall Oncidium unguiculatum, a new and distinct species, not showy, but having the merit of remaining long in flower. To Mr. Don, gardener to F. G. Cox, Esq., of Stockwell, for various Orchids, especially a good specimen of the brown-coloured Houlletia Brocklehurstiana. To Messrs. Veitch and Son, of Exeter, for Hoya campanulata, a new species, producing a bunch of some 16 or 20 bell-shaped, waxy, cream-coloured flowers, each about the size of a shilling. "It was sent to us from Java by Mr. Thomas Lobb, and arrived in England in August, 1845. It appears to be a free bloomer, and is a plant of easy cultivation; it has been treated as ordinary stove-plants are in this establishment." Also to the same for a fine specimen of Æschynanthus Lobbianus. "This we send to show what an exceedingly free-blooming plant it is. When exhibited at Chiswick in July it had not near so much bloom on it. It is the same plant as was then exhibited, and has been in flower ever since. We have had small plants in 4-inch pots covered with flowers of this one as well as of pulcher and radicans. The treatment they receive is the same as that adopted with the older species. We are of opinion that bottom-heat is very beneficial, and find plants grown without it not blooming so freely as those receiving it." Along with these was Fuchsia serratifolia, which was sent in consequence of some people entertaining an opinion that it is a shy bloomer. "We have this season had quantities of plants in 5-inch pots not 12 inches high blooming all over, and all our larger plants have flowered equally freely. We attribute the failure of some parties in not blooming it to arise from their growing it too freely, by potting it in too rich a soil, and giving it too much pot-room, and also in growing it in too warm a house. We

have proved that small pots, common garden earth, and exposure to the open air from the beginning of May, is the best way to grow it; and we have seen instances in which it has been planted in the common soil of the garden, thriving and flowering most abundantly, and forming a most lovely object. These remarks will serve to explain our reason for exhibiting a plant now become so plentiful, hoping, when its proper culture is more generally known, it will become as great a favourite as it deserves to be."

Certificates of Merit: To Mr. Dobson, foreman to Mr. Beck, of Isleworth, for a nice Oncidium leucochilum, and a lovely dwarf specimen of Achimenes patens, that had been struck from leaves inserted in sand in June, potted off into small pots in July, and after being well rooted, put into slate pans in August, thus offering a ready means of obtaining nice dwarf plants at this season. To Mr. Holmes, gardener to the Marquess of Winchester, at Amport House, for beautiful bunches of Black Hamburgh Grapes; "they were the produce of vines to which *no artificial heat whatever* had been applied; the vines were syringed once a day during a fortnight whilst 'breaking;' afterwards, to the time of colouring, a moist atmosphere was kept up; the house is also used for greenhouse plants, and is completely shaded from the afternoon sun by a group of Elms." To Mr. Hally, of Blackheath, for fine bunches of the same variety from the open wall. And to Mr. Jackson, gardener to H. Beaufoy, Esq., of South Lambeth, for an Enville Pine Apple weighing 4 lbs. 11 oz.

Novelties from the Society's Garden. Epidendrum ceratistes, a species introduced by Mr. Hartweg; the flowers are very like those of E. selligerum, and are rather sweet-scented; Batatas Jalapa, of which some account was given at p. 308, vol. i.; cut flowers of Mr. Fortune's Buddlea Lindleyana. Too much heat and rich soil causes this to grow over luxuriantly, and consequently to produce few flowers. It has been found that the plant requires age to flower well, and with these two requisites—age and rather poor soil—it has proved itself to be one of the best autumn flowering shrubs we possess. Along with it were blooms of Anemone japonica, from the open border, to which the plant promises to become an important addition; also of the blue Torenia concolor (another of Mr. Fortune's plants), which, being a native of marshes, will probably not succeed well in a dry situation. Of Sweet Chesnuts, several French and English varieties were exhibited, to show what

the late warm season has done for the ripening of this fruit. Of the former, the Marron Cornu was the largest and finest; it was broad at the base, full, tapering abruptly to a slightly curved apex, and of a bright light colour. The Noir, though not black, was much darker than any other. The Ancisse generally contains one large nut in each husk; colour rather dark. The Rallue resembles it, but is not so broad. The Brétonne is large, but had scarcely acquired its ripe colour at the base. The English sorts considerably resemble each other, but are much smaller than the French varieties, in consequence of a greater number (sometimes five) growing to maturity in one husk. The Downton is remarkable from its having a short-spined husk.

BOOKS PRESENTED.

The Journal of the Royal Asiatic Society, Vol. 10, Part 1. From the Society.
The Botanical Register for October. From the Publishers.
Journal of the Royal Agricultural Society of England, Vol. 7, Part 1. From the Society.
The Quarterly Journal of the Geological Society, No. 7. From the Society.
The Proceedings of the Royal Society of Edinburgh, Nos. 27 and 28. From the Society.
A few Observations on the Mismanagement and consequent Barrenness of numerous out-of-doors Grape Vines in and about London, and on the means likely to restore many to a state of fruitfulness. By F. N. From the Author.
Journal de la Société d'Horticulture de Maçon, No. 1, Vol. 1. From the Society.
Notice sur l'Impossibilité de Naturaliser les Végétaux. Notions sur l'Art de faire les Boutures. Art de Construire et de Gouverner les Serres. Par M. Neumann. From the Author.
The Athenæum for August and September. From the Editor.
Comptes rendus hebdomadaires des Séances de l'Académie des Sciences à Paris. 1er. Semestre, 1846. From the Academy.

November 3, 1846. (REGENT STREET.)

ELECTIONS. The Earl of Stamford, 33, Hill Street; Sir Walter C. Trevelyan, Bart., Nettlecombe, Taunton; Henry Stuart, Esq., Kempston, Bedford; D. S. Merewether, Esq., Hillingdon, Uxbridge; Samuel Bennett, Esq., 18, High Street, Bath; John M. Yeells, Esq., Bathford, near Bath; James G. G. Seager, Esq., Longfleet, Poole, Dorset; and Mr. James Veitch, nurseryman, Exeter.

AWARDS. *Knightian Medals:* To Messrs. Veitch and Son, of Exeter, for a most beautiful specimen of Cattleya labiata superba, from the coolest part of their Orchid-house, where it had been allowed plenty of air during the summer months; the handsome bright red-flowered Begonia fuchsoides, and a new Clerodendron, a noble-looking plant with numerous large panicles of white or rather blush-coloured flowers, sent from Java by Mr. Thos. Lobb. "It was discovered in the mountains of Seribú at an elevation of 2000

feet, and was received by us late in the autumn of last year. As will be perceived, it is an abundant bloomer, and we have now two other plants equally loaded with bloom. We treat it the same as the other kinds already in cultivation, giving it rich soil, with a moist warm atmosphere, and bottom-heat." To Messrs. Loddiges, of Hackney, for Calanthe curculigoides, Catasetum saccatum, and a tall Oncidium oblongatum.

Banksian Medals: To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Saccolabium denticulatum. To Mr. Webster, Eartham Gardens, for a cut spike of Renanthera coccinea. "The plant from which it was cut is growing upon a log of wood covered with moss; it was taken out of a very moist and warm house about the middle of June, and placed at one end of a late Peach-house, *with its top nearly touching the glass*, the whole plant being exposed to the full force of the sun. The house shortly afterwards was thrown open day and night: in this dry and airy situation water was given every evening with a syringe, and a flower-stem shortly afterwards made its appearance. The plant has been growing in the same exposed situation until within the last three weeks, when it has been removed to a warm house. Although the spike is not so large as it would have been in a more congenial atmosphere, yet the flowers are not inferior either in size or colour. As the plant became reconciled to its cold exposed situation, I had the gratification of seeing six more flower-stems make their appearance, being in all seven at one time upon the plant. These are of course in a more backward stage, and will not be in flower for some time. I am inclined to believe that the Renanthera may be made to flower while very young by attending strictly to the plan of keeping the top of the plant nearly close to the glass, giving it full exposure and abundance of moisture." To Mr. Moore, gardener to R. Hanbury, Esq., for a fine Cattleya labiata. To Mr. Gold, gardener to Sir W. W. Dixie, Bart., for four Queen Pine Apples, the heaviest of which weighed 5 lbs. 6 oz., and the others respectively 4 lbs. 6 oz., 5 lbs. 2 oz., and 4 lbs. 2 oz. To Mr. Reid, of Noblethorpe, for four Queens, weighing respectively 5 lbs. 6 oz., 5 lbs. 5 oz., 4 lbs. 7 oz., and 3 lbs. 12 oz. To Mr. Mitchell, of Kemp Town, Brighton, for very excellent bunches of Black Hamburgh Grapes, from vines which had ripened off a fair crop about the end of February. The bunches were not large; but the berries were finely swelled, sweet, and good, and the crop was said to be large. After the first crop had been

gathered and the vines allowed about two months' rest, they were pruned, and, although they bled profusely, they pushed well, and ripened an abundant crop. The young wood for the next year was stated to be well ripened, with plump buds, showing every prospect of an excellent future. It was not, however, contemplated to take two crops from the vines next year. To Mr. Smith, gardener to the Hon. J. Norton, Anningley, near Chertsey, for fine Cannon Hall Muscats.

Certificates of merit: To Mr. Hewitt, gardener to J. Purday, Esq., for three Queen Pine Apples, weighing respectively 5 lbs., 4 lbs. 12 oz., and 4 lbs. 10 oz. To C. B. Warner, Esq., F.H.S., for various Orchids, especially Cattleya labiata, Lælia Perrinii, and Phalænopsis amabilis. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for a handsome Oncidium with a large pale yellow lip and brown-barred petals. To Mr. Glendinning, F.H.S., of the Chiswick Nursery, for a new white-flowered Hoya.

Novelties from the Society's Garden. Phalænopsis amabilis coming profusely into blossom a second time; large, noble-looking bushes, just coming into bloom, of Veronica speciosa and salicifolia; and a small-flowered Chrysanthemum, sent from China by Mr. Fortune; it is called the Chusan Daisy, and is held in great repute by the Chinese. Among Pears from the Garden were Figue de Naples, an excellent bearer as a standard, and one of those kinds that must not hang long on the tree, otherwise it will not become melting; Napoleon, from a wall; Doyenné Gris, from a standard, as was also Bezi de la Motte and Bergamotte Cadette, the latter possessing the property of ripening in succession all the winter; some from the same tree have been ripe early in October, whilst others only became fit for use in March. The Apples were Pearson's Plate, one of the best dessert varieties; Rymer and Waltham Abbey Seedling, both Kitchen Apples, the former a great bearer and a good keeping variety; the latter requiring scarcely any sugar in cooking.

Books Presented.

Paxton's Magazine of Botany from May to October inclusive. From Mr. Paxton.
Transactions of the Linnæan Society, Vol. 20, Part 1. List of the Fellows for 1846; and Proceedings of the Society, Nos. 25 to 29 inclusive. From the Society.
The Botanical Register for November. From the Publishers.

December 1, 1846. (Regent Street.)

Elections. James Wheble, Esq., Bullmarsh Lodge, Reading,

and Jeremiah B. Favell, Esq., of Featherstone Hall, Pontefract.

AWARDS. *Knightian Medal:* To Mr. Robertson, gardener to Mrs. Lawrence, F.H.S., for Veronica speciosa, Barkeria Lindleyana, and Saccolabium denticulatum.

Banksian Medals: To Messrs. Veitch and Son, of Exeter, for Lysionotus longiflorus, a Java plant, with large red flowers, and apparently new. "It was not well bloomed, only two flowers being open, but these were sufficient to show the brilliancy of the colours; when the sun is on it, the tint is particularly rich. We have no doubt it will prove a free bloomer, as we have several plants much smaller forming buds. Mr. Lobb states that he found it in damp forests, at an elevation of from 3000 to 4000 feet. We have treated it as a stove-plant, but one by *no means requiring a high temperature.*" To C. B. Warner, Esq., for a finely-coloured and well-bloomed Epidendrum Skinneri.

Certificates of merit: To Mr. Munnock, gardener to the Rev. C. Pritchard, for a pretty Centropogon fastuosum. To Mr. Tillyard, gardener to the Duke of Buckingham, for specimens of Oxalis Deppei, whose large fleshy fangs form an inferior, but, under some circumstances, a useful accessory to a table. Of the productiveness of the root, it was stated that 18 square yards had produced 980 roots, weighing 217 lbs. This weight had been obtained from ground which at one time had been a walk—the gravel and sand, with the addition of some leaf-mould, being trenched up together. The sets or little roots were planted on the 2nd of May. To Mr. Tucker, gardener to J. Moorman, Esq., of Clapham Road, for fine specimens of Marie Louise Pears, in excellent condition even at this late season.

NOVELTIES FROM THE SOCIETY'S GARDEN. Mr. Fortune's Jasminum nudiflorum, and the little Chusan Daisy; a richly-coloured variety of Lycaste Skinneri, and the Vicar of Winkfield Pear, a rather uncertain variety as regards quality.

BOOKS PRESENTED.

The Botanical Register for December. From the Publishers.
Notice sur la Construction d'une nouvelle Serre de Palmiers au Jardin Impérial de Botanique à Ste. Pétersbourg. From Dr. Fischer, F.M.H.S.
The Quarterly Journal of the Geological Society, No. 8. From the Society.
The Address delivered at the Southampton Meeting of the British Association for the Advancement of Science, Sept. 10, 1846. By Sir Roderick Impey Murchison, President. From the Author.

January 19, 1847. (REGENT STREET.)

ELECTIONS. Miss Charlotte Sim, Coombe Wood House, near Kingston, Surrey; and Mr. Conrad Loddiges, of Hackney.

AWARDS. *Knightian Medal:* To Mr. Carton, gardener to His Grace the Duke of Northumberland, at Syon, for a ripe fruit of Theobroma Cacao. This fruit was believed to be the first that has been produced in this country. It was set about the beginning of August, and the plant has continued to flower from the stem and branches up to the present time. The tree is between three and four years old, about 7 feet high, with a clear stem of about 5 feet; it has been grown on the large shift system, abundantly supplied with water, but well drained. Mr. Carton also sent some fruit of Carica papaya. There is another variety at Syon which produces a cluster of fruit at the top, close to the stem of the plant, but the fruit is not quite so large as those now sent; the fruit-bearing flower of this variety is produced at the end of the long foot-stalks, and is about double the size of the other flowers.

Banksian Medals: To Mr. Catleugh, of Chelsea, for an exceedingly well grown specimen of Eranthemum pulchellum, measuring at least 5 feet in diameter; and to Mr. Mason, gardener to Sir John Kennaway, Bart., for a Queen Pine-Apple, handsome for the season, weighing 4 lbs. 2 oz.

NOVELTIES FROM THE SOCIETY'S GARDEN. The true Habrothamnus elegans, one of Mr. Hartweg's introductions. It proves to be a handsome greenhouse-plant, very different from the things sometimes sold under that name, many of which have turned out to be unworthy of cultivation.

BOOKS PRESENTED.

The Athenæum for December. From the Editor.
The Botanical Register for January. From the Publishers.
On the Correlation of Physical Forces, being the substance of a course of Lectures delivered in the London Institution in the year 1843. By W. R. Grove, Esq. And Vols. II. and III., in continuation, of the Library of the London Institution. From the Managers of the London Institution.
The Agricultural Magazine and Journal of Scientific Farming, for December, 1846, and January, 1847. From the Editor.
The Mystery Solved, or the Potato Decay; its Cause and Remedy. By James Glenn, of New York. From Viscount Palmerston.
The Cause of the Potato Disease ascertained by Proofs, and the Prevention proved by Practice. By Law. Rawstorne, Esq., Penwortham, near Chorley. From the Author.
The Naturalist's Pocket Almanac for 1847. From the Publishers.
Parts 3 & 4, Vol. III., Parts 1, 2, 3, 4, Vol. IV., and Part 1, Vol. V., of the Journal of the Agricultural and Horticultural Society of India. From the Hon. the East India Company.

February 16, 1847. (Regent Street.)

Elections. W. Edgar, jun., Esq., Eagle House, Clapham; John Allcard, Esq., Stratford Green, Essex; and Mr. John Parsons, nurseryman, Flushing, Long Island, New York.

Awards. *Knightian Medal* to Messrs. Rollisson, of Tooting, for a collection of Orchids, including four varieties of Lycaste Skinneri, one very distinct, with uniform velvety violet flowers; two forms of Lælia anceps; Leptotes bicolor; Epidendrum vitellinum; Maxillaria cruenta; Dendrobium nobile, and moniliforme; a variety of Oncidium Cavendishii; Cyrtochilum maculatum; Phalænopsis amabilis; Goodyera discolor; and Zygopetalum crinitum.

Banksian Medal to Mr. Beck, of Isleworth, for various Orchids, consisting of Dendrobium nobile and Pierardi; Leptotes bicolor and the curious little Cephalotus follicularis; Oncidium Cavendishii, nudum and unguiculatum. Mr. Beck remarked "that upon this last are two distinct sets of flowers, as regards size and colour. The plant has been in bloom all the winter, and the flowers on the first stem are now old; they were always inferior to those on the second one. Indeed I rather despised the plant on account of its faded appearance in the brown colour of the flower. That opinion has yielded to more favourable impressions; and I think the plant now a great acquisition."

Certificate of Merit to Messrs. Rollisson, of Tooting, for a very distinct white variety of Cyclamen ibericum.

Novelties from the Society's Garden. The true Cyclamen vernum, the large-flowered Snow-drop (Galanthus plicatus), which is handsomer than the common Snow-drop; and a cut spike of a magnificent specimen of Lælia superbiens, which was then in flower in the Garden. Also, Cuttings of—Werder's Early Heart Cherry, a German variety, earlier than the May Duke—Bigarreau Napoléon, or Laurmann's Kirsche; a great bearer; larger than the Bigarreau—Royale Hâtive Plum, a purple fruit, early and exceedingly rich—and Ickworth Impératrice (Figured, Trans., 2nd Series, vol. ii.), superior to the Old Impératrice.

Books Presented.

Miscellanea Botanica, No. 5. From the Author, Signor Antonio Bertoloni. (4to., Bologna, 1846.)
Paxton's Magazine of Botany for November, December, and January. From the Editor.
The Botanical Register for February. From the Publishers.
Journal of the Royal Geographical Society, Vol. 16, Part 2. From the Society.
The Floricultural Cabinet for January and February. From the Editor, Mr. Joseph Harrison.

Fifteenth Annual Report of the Royal Horticultural Society of Cornwall. From the Society.
Observations on Amaryllis Tinæi. From the Author, Baron Thomas Melazzo, at Palermo.
The Agricultural Magazine and Farmer's Journal for February. From the Editor.
The Quarterly Journal of the Geological Society, No. 9, and Index, Title-page, &c., of Vol. 4 of the Proceedings of the Society. From the Geological Society.

March 2, 1847. (REGENT STREET.)

ELECTIONS. Sir J. T. Tyrrell, Bart., M.P., Boreham House, Chelmsford; T. W. Booker, Esq., Velindra House, Cardiff; Francis Passingham, Esq., Truro; C. Child, Esq., Palace, Bromley; Mrs. G. Holford, Buckland, Brecknockshire; W. H. Smith, Esq., Kilburn House, Kilburn; Mr. F. Dickson, Nurseryman, Chester; and Mr. J. Salter, Nurseryman, Versailles.

AWARDS. *Knightian Medals:* To Messrs. Loddiges, of Hackney, for a very handsome Cymbidium, quite new, and remarkable for the large size of its flowers, which are snowy white, except the lip, which has a streak of yellow in the centre. To Messrs. Veitch and Son, of Exeter, for a noble bush of Dendrobium nobile, finely flowered, and an equally well-managed Epacris variabilis.

Banksian Medals: To Messrs. Loddiges, for various Orchids, more especially the rare Ansellia africana, a large variety of Dendrobium nobile, Phaius Wallichii, Oncidium lacerum, and Brasavola venosa. To Mr. Donald, gardener to Mrs. Lawrence, of Ealing Park, for a collection of Orchids, consisting of Phalænopsis amabilis, Barkeria Skinneri, Phaius Tankervillia, Epidendrum vitellinum, and three others.

Certificate of Merit to Mr. Jones, gardener to E. J. Hutchins, Esq., Dowlais House, Glamorganshire, for two Providence Pine Apples, handsome for the season, weighing respectively 6 lbs. 8 oz. and 6 lbs. 4 oz.

NOVELTIES FROM THE SOCIETY'S GARDEN. Mr. Fortune's Forsythia viridissima, Daphne Fortuni, Azalea squamata, and A. obtusa, with the double-flowered variety of Spiræa prunifolia; also Pear-Cuttings, consisting of—Althorp Crassane; a variety raised by Mr. Knight; hardy, and an abundant bearer as a standard; the fruit buttery and rich; and in season in October and November—March Bergamot; also raised by Mr. Knight; an excellent hardy variety; fruit middle-sized; Bergamot-shaped, rich, and valuable for its late keeping—Thompson's; found amongst a number of unnamed Belgian seedlings; fruit middle-sized, melting, and exceedingly rich; in season in November—and Suffolk

Thorn; a variety which bears well as a standard; possessing the flavour of Gansel's Bergamot, with less grittiness.

BOOKS PRESENTED.

The Botanical Register for March. From the Publishers.
The Journal of the Royal Asiatic Society, No. 17, Part 2. From the Society.
Prince's Manual of Roses (New York, 1846). Prince's Descriptive Catalogue of Roses, 1846 and 1847. Catalogues of Rare and New Fruits, &c. From Messrs. Prince, of Flushing, Long Island, New York.

March 16, 1847. (REGENT STREET.)

ELECTIONS. Viscount Fielding; George Hudson, Esq., M.P., York; Mrs. Cotton, East House, Terrace, Turnham Green; and Mr. Edward Pierce, Nurseryman, Yeovil, Somersetshire.

AWARDS. *Knightian Medals:* To Messrs. Loddiges, of Hackney, for various Orchids, especially fine specimens of Dendrobium macrophyllum and densiflorum. To Messrs. Rollisson, of Tooting, for six varieties of Lycaste Skinneri, all differing more or less from one another in size and colour, and for a plant of the scarce Dendrobium Cambridgeanum.

Banksian Medals: To Messrs. Henderson, of Pine-Apple Place, for the new yellow Dendrobium chrysotoxum. To Mr. Glendinning, of Chiswick Nursery, for Henfreya scandens, a new white-flowered climbing-plant from Sierra Leone; and to Mr. Mason, gardener to Sir John Kennaway, Bart., Escott, Devon, for three Queen Pine-Apples, weighing respectively 3 lbs. 14 oz., 3 lbs. 7 oz., and 3 lbs.

Certificate of Merit to Mr. Nicholson, gardener to the Earl of Orkney, Taplow, Bucks, for a seedling Camellia, named "Countess of Orkney," a large fine flower, with a white ground, striped with rosy pink.

NOVELTIES FROM THE SOCIETY'S GARDEN. Spiranthes cerina, a singular terrestrial Orchid, sent from Guatemala by Mr. Hartweg; a new variety of Cyrtochilum maculatum, with larger and much handsomer flowers than those of the original, half the lip being yellow; Epidendrum Skinneri, with flowers which had been open ever since the end of October last; the hardy little Himalayan Primula (P. denticulata); Mr. Fortune's Azalea obtusa; and his double-flowered Spiræa prunifolia. It was intimated that packets of White Silesian Beet and Quinoa seeds would be ready in a few days for delivery to all Fellows not in arrear of their Annual Subscriptions.

Books Presented.

Journal of the Royal Agricultural Society of England, Vol. 7, Part 2. From the Society.
The Agricultural Magazine and Farmer's Journal for March. From the Editor.
The Floricultural Cabinet for March. From Mr. Jos. Harrison.
Comptes rendus hebdomadaires des Séances de l'Académie des Sciences à Paris. 2me. Semestre, 1846.
Mémoires de l'Institut de France, Vol. 19.
Mémoires présentés par divers Savants à l'Académie des Sciences de l'Institut de France, tom. 9. From the Academy.
The Athenæum for the months of January and February. From the Editor.
Rapport sur les Moyens de suppléer au Déficit des Produits de la Pomme de Terre. From M. Vilmorin.

April 6, 1847. (Regent Street.)

Elections. Major-General William Morison, C.B., M.P., 16, Savile Row; T. W. Usherwood Robinson, Esq., Houghton-le-Spring, Durham; and Mrs. Park, Ince Hall, Chester.

Awards. *Knightian Medal* to Messrs. Loddiges, of Hackney, for a collection of Orchids, including Aërides virens; Dendrobium anosmum, a handsome Philippine species; D. pulchellum; a large variety of D. Pierardi, Oncidium phymatochilum, Scuticaria Steelii, and Broughtonia sanguinea.

Banksian Medals: To Messrs. Henderson, of Pine Apple Place, for Boronia triphylla, a handsome new species of good colour; B. anemonefolia; and the scarce Eriostemon scabrum; "all remarkably free flowering plants, both young and old, requiring scarcely any fire-heat." To Messrs. Rollisson, of Tooting, for a specimen of Puya Altensteinii, a Brazilian plant nearly related to Pitcairnia, and a collection of Orchids, comprising Miltonia cuneata, Houlletia Brockelhurstiana, Burlingtonia rigida, Trichopilia tortilis, and others. To Mr. Donald, gardener to Mrs. Lawrence, for Dendrobium densiflorum and Enkianthus reticulatus, a greenhouse-shrub.

Certificates of Merit: To Mr. Glendinning, of Chiswick Nursery, for a variety of Chorozema cordifolium. To Messrs. Rollisson, for a fine specimen of Erica Willmoreana. To Messrs. Davies and Co., of Wavertree, for flowers of a red-coloured seedling Camellia, named Daviesii. To Mr. Barton, gardener to J. Tharp, Esq., Chippenham Park, Suffolk, for a collection of Apples and Pears in good condition, consisting of Chippenham Pippin, Winter Pearmain, London Pippin Apples, and well-coloured specimens of Uvedale's St. Germain Pears. To D. B. Meek, Esq., of Nutfield, for a dish of Alice Maude Strawberries, which had been grown in his Polmaise Stove. They were sent with a view to prove that the atmosphere of a house heated on this system is not deleterious to vegetation, as has been

hinted by some; but quite the contrary, as indeed all evidence goes to prove. The fruit in question was well coloured; and the leaves, some of which accompanied the fruit, were large, clean, and very healthy.

NOVELTIES FROM THE SOCIETY'S GARDEN. Echeveria retusa, a Mexican species, lately received from Mr. Hartweg; and Trymalium odoratissimum, a graceful Swan River shrub, covered with drooping panicles of small white blossoms, which are scented like a hawthorn.

BOOKS PRESENTED.

"Sanatory Tracts," No. 1 (Water and Air). From the Author, Dr. A. Booth.
Niederösterreichisches Landwirthschaftliches Wochen-Blatt, Nos. 1 to 52, 1845.
Verhandlungen der K. K. Landwirthschafts-Gesellschaft in Wien, Vol. 3, Parts 1 and 2, N. S. From the Agricultural Society of Vienna.
Discours sur les Fleurs Nationales de Belgique, et sur l'Utilité de créer des Jardins Historiques, destinés à l'enseignement de l'Histoire de la Patrie. Par Chas. Morren. From the Author. 8vo. Brussels, 1846.
Journal of the Agricultural and Horticultural Society of India. Vol. V., Part 2. From the Society.
Mémoire sur les Plantes sarclées à Racines Alimentaires. (8vo. Rouen, 1843.)
Enquête sur le Cidre faite à St. Pierre-sur-Dives, le 6 Oct. 1845. (8vo. Caen, 1846.)
Des Assolements et de leur Application à la Culture du Département de la Seine Inférieure. (8vo. Rouen, 1842.)
Des Principales Améliorations à apporter dans le Mode de Culture et les Instruments employés dans l'Arrondissement de Rouen. (1845.)
} From M. Alph. du Breuil.
Transactions of the Zoological Society of London, Vol. 3, Part 4, and Proceedings of the Society, Nos. 161 to 166 inclusive. From the Society.

April 20, 1847. (REGENT STREET.)

ELECTIONS. Sir John Cathcart, Bart., Cooper's Hill, Englefield Green, Surrey; Lancelot Dent, Esq., 8, Fitzroy Square; John Jardine, Esq., Turnham Green; Joseph Sandars, Esq., Taplow House, Maidenhead; and Edward Osborne Smith, F.S.A. and F.G.S., 24A, Bryanstone Square.

AWARDS. *Knightian Medal* to Messrs. Loddiges, of Hackney, for Acineta Humboldti, Oncidium cornigerum, Comparettia rosea, Zygopetalum tricolor, Vanda peduncularis, Bolbophyllum barbigerum, and other Orchids.

Banksian Medals: To Messrs. Henderson, of Pine Apple Place, for a collection of Hyacinths, and three specimen Azaleas, named Phœnicea Herberti, Triumphans, and Magnifica. To Mr. Davis, of Oak Hill, East Barnet, for "New Dutch Sweetwater" and "Black Hamburgh" Grapes; very fine bunches for the season.

Certificates of Merit: To Mr. C. Ewing, gardener to O. F. Meyrick, Esq., F.H.S., for a dish of forced Chinese Cherries, the fruit of Prunus pseudo-cerasus, a tree introduced into this country by the Society many years ago. The fruit is about as large as a sparrow's egg, of a reddish amber colour, and furnished at its point with a tumour. Mr. Ewing

stated, "As far as my judgment goes, I think the tree perfectly hardy; and should it be so, it will be a very great acquisition as an ornamental plant, for early in February it produces a profusion of beautiful pinkish flowers without any forcing whatever. It strikes most readily by cuttings; and if grown in a moist place, sends out roots over its branches similar to a vine in such a situation. The flavour of the fruit is about the same as that of the May Duke." To Messrs. Loddiges, for a seedling Camellia named Aulica, a flower novel in colour, and possessing good properties.

Novelties from the Society's Garden. Specimens of the true Cattleya intermedia; Cestrum roseum, a dingy, red-flowered plant that has been sold for the beautiful Habrothamnus fasciculatus; and a remarkably handsome Azalea, one of Mr. Fortune's importations, with large salmon-coloured flowers, spotted in the upper petals with purple.

Notice was suspended in the meeting-room that the annual accounts were ready for distribution to the Fellows.

Books Presented.

Journal of the Royal Asiatic Society, Vol. 10, Part 2. From the Society.
Three Years' Wanderings in the Northern Provinces of China. From the Author, Mr. Robert Fortune.
The Athenæum for the month of March. From the Editor.
Transactions of the American Philosophical Society held at Philadelphia, Vol. 9, N.S., Part 3. Proceedings of the Society, Nos. 34 and 35, &c. From the Society.
Portrait in Lithography of the late E. Rudge, Esq., F.H.S. From Mrs. Rudge.
Address delivered at the Anniversary Meeting of the Zoological Society of London, Feb. 19, 1847, by Leonard Horner, Esq., President. From the Society.
Seventy-third Annual Report of the Royal Humane Society, 1847. From the Society.

May 1, 1847. (Regent Street—Anniversary.)

A Report from the Auditors was read, stating the income and expenditure, the balance in hand, debt and liabilities of the Society for the year preceding; after which, copies were distributed among the Fellows.

A Report from the Council was then read upon the present and past condition of the Society, &c. (See p. 161.)

Resolved, That the thanks of the Society be given to the Vice-Secretary for his valuable assistance in carrying out the improvements in the education of the men in the Garden, and to the several donors of books to the Garden Library.

The Society then proceeded to ballot for officers for the ensuing year, when the following Fellows of the Society, viz.—

His Grace the Duke of Northumberland,
J. J. Blandy, Esq., and
R. W. Eyles, Esq.,

were elected new Members of the Council, in the room of—

Sir W. Middleton, Bart.,
S. Rucker, Esq., and
H. Pownall, Esq.;

and the following Fellows of the Society were elected Officers for the ensuing year, viz.—

The Duke of Devonshire, President,
Thomas Edgar, Esq., Treasurer, and
J. R. Gowen, Esq., Secretary.

The Report of the Auditors above alluded to was as follows:—

"The Auditors on this the thirty-eighth Anniversary have to report to the General Meeting of the Horticultural Society of London, that they have examined the Accounts of the Receipts and Payments for the past year with the vouchers, and find them to be satisfactory and correct.

"Geo. Bain.
"R. W. Eyles.
"H. Groom.

"21, *Regent Street, April 8th*, 1847."

[*Turn over.*

Abstract of Receipts and Payments, &c. between the 1st of April, 1846, and 31st of March, 1847.

RECEIPTS.

	£.	s.	d.
To admission fees from Fellows, 47 at 6 Guineas each	296	2	0
To compositions for life from ditto, 7 at 40 Guineas each	294	0	0
To subscriptions received from ditto	3102	15	0
To amount of Transactions and Fruit Catalogue sold	45	18	3
Ditto Quarterly Journal ditto	39	7	4
To rent of apartments let off in Regent Street	120	0	0
To garden produce sold	11	17	2
To charges to Fellows for packing plants, &c.	50	7	7
To miscellaneous receipts	11	4	6
To Garden Exhibitions account, 1846: viz.			
Amount of Receipts £5346 3 6			
Deduct:			
Cost of Medals awarded £1284 0 0			
General Expenses of the Exhibitions 1580 5 3			
2864 5 3			
	2481	18	3
To Garden Exhibitions, 1847—			
Received for tickets issued 130 0 0			
Deduct preliminary expenses paid 32 1 3			
	97	18	9
	6551	8	10
To Balance at Banker's, April 1, 1846	182	15	8
To ditto in hands of Vice-Secretary ditto	8	1	2
	190	16	10
	6742	5	8

PAYMENTS AND LIABILITIES.

		Payments. £.	s.	d.	Liabilities. £.	s.	d.
By rents, rates, taxes, &c. Regent Street and Chiswick		257	13	3	392	16	7
By repairs, &c., of house in Regent Street		53	9	0			
By housekeeping expenses, Regent Street		41	19	2			
By salaries and collector's poundage		985	12	8	155	8	4
By interest on loan notes		304	0	0			
By cost of Publishing Transactions		24	17	9			
By cost of Publishing Quarterly Journal		345	15	3	99	12	0
By library charges, for books, binding, &c.		8	11	9			
By printing and stationery		90	16	9			
By medals and rewards at Ordinary Meetings in Regent-st.		26	0	0	52	5	0
By cost of foreign missions and importations		620	17	3	138	15	4
By expenses of meetings, postage, &c.		122	16	0			
By miscellaneous expenses in Regent Street		39	14	8			
By ditto at the Garden for seeds, plants, &c.		143	17	3	25	4	6
By implements, mats, &c.		92	5	9	55	10	6
By garden tan, dung, mould, &c.		23	7	5	25	4	0
By expenses of Distribution department		151	8	0	34	15	11
By garden current labour		1137	0	2			
By coals and coke for Garden		95	9	6	48	0	0
By sundry repairs at Garden		157	10	4	24	8	6
By new works and alterations at ditto		147	6	8	24	0	0
By Law and Parliamentary expenses in opposing London and Windsor Railway					70	7	6
		4870	8	7	1146	8	2
By Debt on open accounts due April 1, 1846 £2406 11 6							
Less discount, &c. upon payments 0 13 0							
	£2405 18 6	1733	14	4	672	4	2
		6604	2	11	1818	1	4
By Balance at Banker's, April 1, 1847	£124 19 0						
By ditto in hands of Vice-Secretary ditto	13 3 9						
		138	2	9			
		6742	5	8			

April 8, 1847.

This account has been examined, and being compared with the Vouchers found correct.

GEO. BAIN.
R. W. EYLES.
H. GROOM.

Amount of Debt, April 1, 1846		£10,006 11 6
Ditto, April 1, 1847, viz.—		
Liabilities as above	£1818 12 4	
Debt on loan notes	7600 0 0	
		9,418 12 4
Reduction in debt since April 1, 1846		£587 19 2

May 4, 1847. (REGENT STREET.)

ELECTIONS. Misses Emma and Eliza Elliotson, Clapham; Sebastian Nash, Esq., 11, St. John's Wood Road; and Henry Villebois, Esq., Marham House, Downham, Norfolk.

AWARDS. *Banksian Medals*: To Mr. James Rigby, of Old Brompton, for a very handsome specimen of Eriostemon neriifolium; and to Messrs. Weeks, King's Road, Chelsea, for a fine Torenia asiatica.

Certificates of Merit to Mr. Glendinning, Chiswick Nursery, for a Daviesia, an odd-looking plant from the coast of New Holland, with flowers handsome enough; but with a singular foliage, if it may be so called, for it was rather an extension of the stem. This last operated in some measure as a drawback on the beauty of the plant, giving it a bare appearance. To Mr. Donald, gardener to Mrs. Lawrence, of Ealing Park, for Vanda cristata, Dendrobium secundum, and other Orchids; and to Mr. Eyre, gardener to R. W. Barchard, Esq., of Wandsworth, for a dish of large and well-coloured Keens' seedling Strawberries.

NOVELTIES FROM THE SOCIETY'S GARDEN. A double yellow-flowered Cape Oxalis, a var. of Caprina; and a plant of Tropæolum edule, an orange-yellow flowered species, whose roots form an indifferent kind of food to the natives of the west coast of America. The latter deserve notice on account of the manner in which it was trained. It was scrambling over a branch of a larch, whose lateral twigs had been left unpruned—a mode of training attended with little or no trouble, and rendering the plant much more natural in appearance than the artificial contrivances usually adopted for exhibiting the beauty of such things.

BOOKS PRESENTED.

Annals of the Lyceum of Natural History of New York, Nos. 6 and 7, Vol. 4. From the Lyceum.
The Potato Disease and Bad Ventilation. By Franklin Coxworthy, Esq. From the Author.
The Botanical Register for May. From the Publishers.
Jardin de St. Pétersbourg, 1846. From the Author, Dr. Fischer.

May 8, 1847. (GARDEN EXHIBITION.)

This exhibition had the misfortune to fall on a most unfavourable day. The dawn was wet, the morning damp, the forenoon gloomy, midday cheerless, and the afternoon a deluge. This was the more unfortunate, for the show was excellent; indeed, if anything could have increased respect for the unrivalled skill of

English gardeners, it would have been this exhibition, which, with two or three exceptions, consisted wholly of plants displaying the most admirable cultivation. Fruit was scarce; but what was produced was good and well ripened. Out of 11,580 tickets which had been issued, only 1479 were presented, the whole number of visitors and Fellows of the Society having been 1644. The number of Medals awarded was 24 gold, and 85 silver, their value being 409*l.* 15*s.*

The AWARD was as follows:—

Certificate of Honour: 1. To Mr. Frazer, of Leyton, Essex, for a collection of thirty stove and greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Large Gold Medal: 1. To Mr. Hunt, gardener to Miss Traill, of Hayes Place, Bromley, for a collection of thirty stove and greenhouse plants. 2. To Messrs. Veitch and Son, of Exeter, for twenty species of Exotic Orchids.

Gold Knightian Medal: 1. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of thirty stove and greenhouse plants. 2. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a collection of fifteen stove and greenhouse plants. 3. To Messrs. Rollisson, of Tooting, for twenty species of Exotic Orchids. 4. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for twelve species of the same. 5. To Mr. Hunt, gardener to Miss Traill, for fifteen varieties of Cape Heath. 6. To Messrs. Fairbairn, of Clapham, for the same.

Gold Banksian Medal: 1. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of fifteen stove and greenhouse plants. 2. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of ten stove and greenhouse plants. 3. To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for twelve species of Exotic Orchids. 4. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for six species of the same. 5. To Mr. Slowe, gardener to R. W. Baker, Esq., F.H.S., for twelve varieties of Roses in pots. 6. To Messrs. Lane, of Great Berkhampstead, for the same. 7. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for fifteen varieties of Cape Heaths. 8. To Messrs. Rollisson, of Tooting, for the same. 9. To Mr. Cock, F.H.S., for twelve new varieties of Pelargonium, in 8-inch pots. 10. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 11. To Mr. Parker, gardener to J. H. Oughton, Esq., of Roehampton, for twelve varieties of Pelargonium, in 11-inch pots. 12. To Mr.

Dobson, for the same. 13. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of Greenhouse Azaleas, in twelve varieties. 14. To the same for Tall Cacti, in flower.

Large Silver Gilt Medal: 1. To Mr. Taylor, gardener to J. Costar, Esq., of Streatham, for a collection of fifteen stove and greenhouse plants. 2. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a collection of ten stove and greenhouse plants. 3. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for twelve species of Exotic Orchids. 4. To Mr. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for six species of the same. 5. To Mr. Jack, gardener to R. G. Loraine, Esq., of Wallington, for the same. 6. To Mr. Spencer, gardener to the Marquess of Lansdowne, F.H.S., for a collection of six Amaryllids. 7. To Mr. Dawson, gardener to the Earl Cowper, at Panshanger, Herts, for twelve varieties of Roses in pots. 8. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 9. To Mr. Frazer, of Leyton, for fifteen varieties of Cape Heath. 10. To Mr. Taylor, gardener to J. Costar, Esq., for nine varieties of Cape Heath. 11. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for the same. 12. To Mr. Pawley, of the White Hart Hotel, Bromley, for the same. 13. To Mr. Gaines, of Battersea, for twelve new varieties of Pelargonium, in 8-inch pots. 14. To the same, for twelve varieties of Pelargonium, in 11-inch pots. 15. To Mr. Frazer, for a collection of Greenhouse Azaleas, in twelve varieties. 16. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for a collection of Greenhouse Azaleas, in six varieties. 17. To Mr. Smith, for a collection of Rhododendrons. 18. To Mr. James Wood, gardener to J. G. Seager, Esq., of Poole, Dorset, for Eriostemon buxifolium. 19. To Mr. Pamplin, of Walthamstow, for Epacris grandiflora. 20. To Mr. A. Parsons, gardener to A. George, Esq., of Ponder's End, for Grapes. 21. To Mr. J. Davis, of Oak Hill Gardens, East Barnet, for the same. 22. To Mr. Mason, gardener to Sir John Kennaway, Bart., of Escott, near Honiton, for two Queen Pine Apples. 23. To Mr. E. Davis, gardener to Lord Boston, F.H.S., for three Providence Pines.

Certificate of Excellence: 1. To Mr. Malyon, gardener to T. Brandram, Esq., for a collection of ten stove and greenhouse plants. 2. To A. Rowland, Esq., F.H.S., for twelve varieties of Roses in pots. 3. To Mr. Francis, of Hertford, for the same. 4. To Mr. Plumbley, gardener to C. J.

Dimsdale, Esq., F.H.S., for nine varieties of Cape Heath. 5. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of Greenhouse Azaleas, in twelve varieties. 6. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of Greenhouse Azaleas, in six varieties. 7. To Mr. Spencer, gardener to the Marquess of Lansdowne, F.H.S., for Pimelea spectabilis. 8. To Messrs. Veitch and Son, for Eriostemon buxifolium. 9. To Mr. R. Turnbull, gardener to His Grace the Duke of Marlborough, F.H.S., for Grapes. 10. To Mr. Mitchell, of Kemp Town, Brighton, for the same. 11. To Mr. Patteson, gardener to the Earl of Chesterfield, for a Black Jamaica and a Blood-Red Pine Apple.

Large Silver Medal: 1. To Mr. R. Poole, of Leyton, Essex, for a collection of ten Stove and Greenhouse plants. 2. To Mr. W. Clark, gardener to W. Block, Esq., of Muswell Hill, for the same. 3. To Mr. P. N. Don, gardener to F. G. Cox, Esq., F.H.S., for twelve species of Exotic Orchids. 4. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for six species of the same. 5. To Mr. Hunt, gardener to Miss Traill, for a specimen Cape Heath. 6. To Mr. Malyon, gardener to Thomas Brandram, Esq., of Lee Grove, Blackheath, for the same. 7. To Mr. Frazer, of Leyton, for the same. 8. To Mr. Gaines, of Battersea, for six fancy Pelargoniums. 9. To the same, for six varieties of Calceolaria, in 11-inch pots. 10. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a collection of Greenhouse Azaleas, in six varieties. 11. To Mr. Jack, gardener to R. G. Loraine, Esq., for Torenia Asiatica. 12. To Mr. Frazer, for Chorozema Henchmanni. 13. To Messrs. Veitch and Son, of Exeter, for Hoya campanulata. 14. To Mr. Toy, gardener to Colonel Challoner, F.H.S., for Grapes.

Silver Knightian Medal: 1. To Mr. Catleugh, of Hans Place, Chelsea, for a collection of fifteen Stove and Greenhouse plants. 2. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for a collection of ten Stove and Greenhouse plants. 3. To Mr. Bruce, gardener to Boyd Miller, Esq., for a specimen Cape Heath. 4. To Mr. G. Wiltshire, gardener to J. G. Reynell, Esq., of East Sheen, for twelve new varieties of Pelargonium, in 8-inch pots. 5. To Mr. Ivery, of Peckham, for eighteen varieties of Cineraria. 6. To Mr. Taylor, gardener to J. Costar, Esq., of Streatham, for twenty species of Hardy Ferns. 7. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for a Seedling Pelargonium, "cruentum." 8. To the same for a Seedling Pelargonium,

"Cavalier." 9. To Messrs. Veitch and Son, of Exeter, for a new species of Dendrobium. 10. To Mr. Mylam, gardener to S. Rucker, jun., Esq., F.H.S., for the best named Collection of Plants. 11. To Mr. Elphinston, gardener to the Right Hon. The Speaker, for a Moscow Queen Pine Apple. 12. To Mr. Spencer, gardener to the Marquess of Lansdowne, F.H.S., for Black Jamaica Pine Apples. 13. To Mr. Toy, for a Black Jamaica Pine Apple. 14. To Mr. Fleming, gardener to His Grace the Duke of Sutherland, F.H.S., at Trentham, for Melons. 15. To Mr. Toy, for British Queen Strawberries. 16. To Mr. Bennett, gardener to John Smith, Esq., of Dulwich, for Keens' Seedling Strawberries. 17. To Mr. Turnbull, gardener to his Grace the Duke of Marlborough, F.H.S. (at Blenheim), for May Duke Cherries.

Silver Banksian Medal: 1. To Mr. Pamplin, of Walthamstow, Essex, for a collection of fifteen Stove and Greenhouse plants. 2. To Mr. G. Stanly, gardener to H. Berens, Esq., F.H.S., for a collection of ten Stove and Greenhouse plants. 3. To Mr. Jack, gardener to R. G. Loraine, Esq., of Wallington, for the same. 4. To Mr. Plumbley, gardener to C. J. Dimsdale, Esq., F.H.S., for a specimen Cape Heath. 5. To Mr. G. Stanly, for a collection of Hardy Cypripediums. 6. To Mr. Frazer, for twelve varieties of Cineraria. 7. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for a seedling Pelargonium, "Centurion." 8. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a species of Gompholobium. 9. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for Pultenæa paleacea. 10. To Messrs. Rollisson, of Tooting, for the second-best named collection of plants. 11. To Mr. Collins, gardener to E. H. Chapman, Esq., of Haringay House, Hornsey, for Keens' seedling Strawberries. 12. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Melons. 13. To Mr. Snow, gardener to the Earl de Grey, F.H.S., for Apples and Pears.

Certificate of Merit: 1. To Mr. Miller, of Ramsgate, for a seedling Pelargonium, "Queen of Kent." 2. To Mr. Ivery, of Peckham, for a seedling Cineraria, "One in the Ring." 3. To Messrs. Veitch and Son, for a new species of Vanda. 4. To the same, for the third-best named collection of Plants. 5. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for the fourth-best named collection of Plants. 6. To Mr. Frazer, of Leyton, for the fifth-best named collection of Plants. 7. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for Citrons.

N.B.—The Judges desired on this occasion to express their opinion that the appearance of woody Plants was greatly injured by the excessive use of stakes, as employed in some collections.

June 1, 1847. (REGENT STREET.)

ELECTIONS. Lady Elizabeth Reynell, Abbotsford; Major-General Sir Adolphus Dalrymple, 129, Park Street, Grosvenor Square, and Delrew House, Aldenham, Herts; and Hamilton H. Fulton, Esq., 8, Great Queen Street, Westminster.

AWARDS. *Large Silver Medal* to Messrs. Veitch and Son, of Exeter, for Rhododendron javanicum, a new species introduced by Mr. Thomas Lobb from Java, and extremely handsome both as respects the beauty of its foliage and the brilliancy of its reddish-orange blossoms. This was the imported plant, small and weak from travelling; though beautiful in its present state, it was much inferior to the native specimens, and certainly equally inferior to what the plant may be expected to become. It was found on Mount Salak, at elevations from 2000 to 3000 feet, and in this country will possibly prove about as hardy as a Chinese Azalea. To the same, for Browallia Jamesoni, found in woods near Molitore, province of Cuenca, in Peru, at an elevation of 6000 feet. The plant exhibited was a shrub some 2½ feet in height, covered with small shining leaves, and round orange flowers about the size of a shilling. It proves to be an extremely gay-looking greenhouse shrub, quite new, and with which we have nothing of the kind at all comparable. To Messrs. Loddiges, of Hackney, for a nice collection of Orchids, containing a spotless variety of Dendrobium sanguinolentum, five species of Aerides, three Saccolabiums, and other interesting plants.

Knightian Medal to Mr. Craggs, gardener to Sir Thomas Acland, Bart., of Killerton, Devon, for a fine bundle of Asparagus, consisting of 100 heads, which weighed 14 lbs. 11 oz. This was green Asparagus, eatable almost to the very base. It was mentioned to have been grown after the manner described by Mr. Craggs at p. 39, vol. ii. A bundle of Asparagus from Mr. Errington, gardener to Sir P. G. Egerton, Bart., M.P., at Oulton Park, was also submitted to the Society's notice, and along with it the following memorandum respecting its treatment.

"The cultivation of this valuable esculent being carried out with a very considerable amount of success here, perhaps

a few remarks on the mode pursued may prove of interest. The sample has been forwarded, in order to show the character of the article ; not merely on account of extraordinary size, but of its succulence. Many persons do not succeed to their wish in its cultivation ; they heap up manures in abundance over the crown, and, although the plant is a gross feeder, they do not reach that amount of success which so liberal an application of manures would seem to ensure. This goes to show, in conjunction with other matters, that the texture of soils is not regarded as it ought to be.

" The Oulton kitchen gardens, which consist of between three and four acres, are composed of a light sandy loam, very light, but of considerable depth. The Asparagus dislikes adhesive soils, and would, I have no doubt, thrive admirably in sand and rotten manure, provided the necessary amount of moisture could be permanently supplied during the growing season.

" Most of our experienced kitchen gardeners have a course of culture founded on practice, and generally adapted to the locality where the gardens are situated. I for one have my rotation of crops ; and one principle I steadily pursue, in the cultivation of Asparagus, is to plant a new bed or beds yearly. I grow all my celery on what is termed the Scotch bed system ; and have long availed myself of the superior depth and enrichment of a plot of ground thus handled to follow with Asparagus. My earliest celery-bed then, six feet in width, receives extra preparation to this end. This preparation consists in trenching thirty inches deep, in burying much vegetable matter in the bottom of the trench, and in blending plenty of old manure near the surface.

" The Asparagus is planted in May when nearly a foot high ; it is manured over each November, and in the third spring, cutting commences. I plant only two rows in a bed, twenty-seven inches apart, the plants about ten inches distant in the row.

" One of the main features in my plan, to which I would direct special attention, is the annual digging in of much raw vegetable matter, with a trifling amount of manure in the trenches or alleys. I have found by long experience, that the Asparagus has the power of making a series of annual roots laterally, provided encouragement be afforded to their development ; and the assurance of this fact has formed the basis of my mode of alley cultivation. I apply salt also most liberally ; my beds were salted about three times during the growing season, and at least three

times during the next season: my maxim being little and often. Beds intended to wear for several years, should rest free from cutting every third or fourth year; and if Giant Asparagus is desired for the next year, the plants should be excited to reach at least seven feet in height in the present season.

"Although we do not produce such enormous Asparagus as some who make size alone a point, yet I may, I think, venture to say that we produce as much of truly good quality from a given quantity of land, as any garden in the kingdom."

Banksian Medal to Mr. Catleugh, Hans Place, Chelsea, for Clerodendron splendens, well grown and flowered; and Torenia Asiatica, a small plant, but charmingly bloomed.

Certificates of Merit to Messrs. Veitch and Son, of Exeter, for a new Fuchsia from Peru, resembling corymbiflora in habit; but producing singly from the axils of the leaves long violet-tinged, rosy pink apetalous flowers, green at the ends. It was found by Mr. William Lobb about 300 miles from Lima. To Mr. Ambrose, of Battersea, for a seedling fancy Pelargonium, named "Jenny Lind," a very pretty variety raised from Shepard's "Queen Victoria." To Mr. Kendall, gardener to W. H. P. Carew, Esq., M.P., of Antonie, Cornwall, for six Madras Citrons; and to Mr. Mills, of Gunnersbury, for a Cantaloup Melon, weighing 5 lb. 5 oz.

Novelties from the Society's Garden. Mr. Fortune's Lysimachia candida; his Rhynchospermum jasminoides, a handsome white-flowered greenhouse plant, Indigofera decora, and Campanula nobilis, together with Cereus crenatus, a white-flowered species rivalling in beauty the Night-blowing Cereus, various Orchids, and other plants.

Books Presented.

The Agricultural Magazine and Farmer's Journal for April and May. From the Editor.
The Quarterly Journal of the Geological Society, No. 10. From the Society.
The Prevention and Treatment of Disease in the Potato and other Crops. By John Parkin, M.D. From the Author.
The Botanical Register for June. From the Publishers.
Transactions of the Horticultural Society of Berlin, Vol. 18, Part 2. From the Society.

June 19, 1847. (Garden Exhibition.)

Of this exhibition as a whole, words are wanted to speak of it as it deserved. Not that any particular plants were to be regarded as superior to others which have been seen in the same gardens, but because of the entire absence of bad cultivation. It is doubtful whether the quickest eye could have detected a

specimen which would not have been looked upon as admirable if shown twenty years ago. The display of fruit also was good. The weather was delicious; and the garden itself in the best order, owing to previous rains, which had rendered the turf elastic, and the trees unusually green. The number of visitors amounted to 10,940, exclusive of exhibitors.

The AWARD was as follows:—

Certificate of Honour: 1. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of thirty Stove and Greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Large Gold Medal: 1. To Mr. Frazer, of Leyton, Essex, for a collection of thirty Stove and Greenhouse plants. 2. To Mr. Rae, gardener to J. J. Blandy, Esq., F.H.S., for twenty species of Exotic Orchids. 3. To Mr. Ingram, gardener to Her Majesty, at Frogmore, for a miscellaneous collection of Fruit.

Gold Knightian Medal: 1. To Mr. Hunt, gardener to Miss Traill, of Hayes Place, Bromley, for a collection of thirty Stove and Greenhouse plants. 2. To Mr. Green, gardener to Sir Edmund Antrobus, Bart., F.H.S., for a collection of fifteen Stove and Greenhouse plants. 3. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for twenty species of Exotic Orchids. 4. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for twelve species of the same. 5. To Mr. Hunt, for fifteen varieties of Cape Heath. 6. To Messrs. Fairbairn, of Clapham, for the same.

Gold Banksian Medal: 1. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a collection of fifteen Stove and Greenhouse plants. 2. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for a collection of ten Stove and Greenhouse plants. 3. To Mr. John Webster, gardener to Mrs. Huskisson, of Eartham, near Petworth, Sussex, for six species of Exotic Orchids. 4. To Messrs. Lane, of Great Berkhampstead, for twelve varieties of Roses in pots. 5. To Mr. May, for fifteen varieties of Cape Heath. 6. To Mr. Epps, of Maidstone, F.H.S., for the same. 7. To E. Foster, Esq , of Clewer, Windsor, for twelve new varieties of Pelargonium, in 8-inch pots. 8. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 9. To Mr. Parker, gardener to J. H. Oughton, Esq., of Roehampton, for twelve varieties of Pelargonium, in 11-inch pots. 10. To Mr. Gaines, of Battersea, for the

same. 11. To Mr. Davis, of Oak Hill, East Barnet, for a miscellaneous collection of Fruit.

Silver Gilt Medal: 1. To Mr. Taylor, gardener to J. Costar, Esq., of Streatham, for a collection of ten Stove and Greenhouse plants. 2. To Messrs. Rollisson, of Tooting, for twenty species of Exotic Orchids. 3. To Mr. George Eyles, gardener to Sir George Larpent, Bart., F.H.S., for six species of the same. 4. To Mr. Terry, gardener to Lady Giles Puller, Youngsbury, Herts, for twelve varieties of Roses in pots. 5. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 6. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for fifteen varieties of Cape Heath. 7. To Messrs. Veitch and Son, of Exeter, for the same. 8. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for nine varieties of Cape Heath. 9. To Mr. Frazer, of Leyton, for the same. 10. To Mr. Green, for a collection of Tall Cacti, in flower. 11. To Mr. Cock, F.H.S., for twelve new varieties of Pelargonium, in 8-inch pots. 12. To Mr. Gaines, of Battersea, for the same. 13. To Mr. W. Golding, gardener to Thomas Turner, Esq., of Hampstead, for twelve varieties of Pelargonium, in 11-inch pots. 14. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for six distinct species of Pelargonium, exhibiting superior cultivation. 15. To Mr. Green, for Ixora coccinea. 16. To Mr. Catleugh, of Chelsea, for Stephanotus floribundus. 17. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for Grapes. 18. To Mr. Toy, gardener to Colonel Challoner, F.H.S., for the same. 19. To Mr. Barnes, gardener to T. C. Whitmore, Esq., for the same. 20. To Mr. Busby, gardener to S. Crawley, Esq., F.H.S., for the same. 21. To Mr. Davis, of Oak Hill, East Barnet, for the same. 22. To Mr. Ingram, gardener to Her Majesty, at Frogmore, for a Queen Pine Apple, weight 5 lb. 2 oz.

Certificate of Excellence: 1. To Messrs. Paul and Son, of Cheshunt, for twelve varieties of Roses in pots. 2. To Mr. Francis, of Hertford, for the same. 3. To Mr. Jack, gardener to R. G. Loraine, Esq., of Wallington, for nine varieties of Cape Heath. 4. To Mr. Pamplin, of Walthamstow, for the same. 5. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of Greenhouse Azaleas, in six varieties. 6. To Mr. J. Robinson, gardener to J. Simpson, Esq., for twelve varieties of Pelargonium, in 8-inch pots. 7. To Mr. Whiting, gardener to H. T. Hope, Esq., F.H.S., for six distinct species of Pelargonium, exhibiting superior cultivation. 8. To Mr. George Eyles, gardener to Sir George Larpent, Bart., F.H.S., for

Stephanotus floribundus. 9. To Messrs. Henderson, of Pine Apple Place, for Hindsia longiflora alba. 10. To Messrs. Veitch and Son, of Exeter, for Tropæolum speciosum. 11. To Mr. Frost, gardener to Lady Grenville, F.H.S., for Grapes. 12. To Mr. Wortley, gardener to J. F. Maubert, Esq., F.H.S., for the same. 13. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for three Queen Pine Apples. 14. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a collection of ten Stove and Greenhouse plants. 15. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for the same.

Large Silver Medal: 1. To Mr. Malyon, gardener to T. Brandram, Esq., of Lee Grove House, Blackheath, for a collection of ten Stove and Greenhouse plants. 2. To Mr. Jack, gardener to R. G. Loraine, Esq., for the same. 3. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for the same. 4. To Mr. Plant, gardener to J. H. Schröder, Esq., of Stratford Green, for six species of Exotic Orchids. 5. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for the same. 6. To Messrs. Lane, of Great Berkhampstead, for a collection of cut Roses, in fifty varieties. 7. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for nine varieties of Cape Heath. 8. To Mr. Pawley, of Bromley, for the same. 9. To Mr. Gaines, of Battersea, for six fancy Pelargoniums. 10. To Messrs. Henderson, of Pine-Apple Place, for six Calceolarias, in 11-inch pots. 11. To Mr. Bray, for a Pelargonium, "Queen Victoria." 12. To Messrs. Veitch and Son, of Exeter, for Impatiens latifolia. 13. To the same, for a species of Dendrobium from Java. 14. To Mr. Dolby, gardener to Lord Grosvenor, for Grapes. 15. To Mr. Mitchell, gardener to E. Lawford, Esq., for the same. 16. To Mr. Mitchell, of Brighton, for the same. 17. To Mr. Bray, gardener to E. Lousada, Esq., of Peak House, Devon, for two Queen Pine Apples.

Silver Knightian Medal: 1. To Mr. Jack, gardener to R. G. Loraine, Esq., for six species of Exotic Orchids. 2. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 3. To Messrs. Paul and Son, of Cheshunt, for a collection of cut Roses, in fifty varieties. 4. To Mr. Francis, of Hertford, for the same. 5. To Mr. Blake, gardener to R. Hanbury, Esq., F.H.S., for the same, in twenty-five varieties. 6. To Messrs. Lane, for a collection of Yellow Roses, in six varieties. 7. To Mr. Coysh, gardener to R. Hudson, Esq., of Clapham Common, for twelve varieties of Pelargonium, in 8-inch pots. 8. To Mr. T. Wiggins, gardener to

S. Sanders, Esq., of London Road, Staines, for the same, in 11-inch pots. 9. To Mr. Ambrose, of Battersea, for six fancy Pelargoniums. 10. To Mr. Gaines, of Battersea, for six Calceolarias, in 11-inch pots. 11. To Mr. Turner, of Chalvey, for twenty-four varieties of Pink. 12. To Mr. Malyon, gardener to T. Brandram, Esq., for a specimen Cape Heath. 13. To Messrs. Fairbairn, of Clapham, for the same. 14. To Messrs. Veitch and Son, for Gloxinia Fyfiana. 15. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for the best-named collection, one error in 48 names, beautifully written. 16. To Mr. Elphinston, gardener to the Right Hon. The Speaker, for a Queen Pine Apple. 17. To Mr. Mason, gardener to Sir John Kennaway, Bart., of Escott, near Honiton, for Pine Apples. 18. To Mr. Elphinston, for a Providence Pine Apple. 19. To Mr. Fleming, gardener to his Grace the Duke of Sutherland, F.H.S., at Trentham, for Peaches and Nectarines. 20. To Mr. Davis, of Oak Hill, East Barnet, for the same. 21. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a Melon.

Silver Banksian Medal: 1. To Mr. Hunt, gardener to Miss Traill, for six species of Exotic Orchids. 2. To Mr. Mitchell, of Piltdown Nursery, Uckfield, Sussex, for a collection of cut Roses, in fifty varieties. 3. To Mr. Laing, of Twickenham, for the same. 4. To Mr. Terry, gardener to Lady Giles Puller, for the same, in twenty-five varieties. 5. To Mr. Ellis, of Woolwich, for twenty-four varieties of Pink. 6. To Messrs. Norman, of the same place, for the same. 7. To Mr. George Wiltshire, gardener to J. Reynell, Esq., of East Sheen, for a collection of Achimenes. 8. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for a specimen Cape Heath. 9. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for Pavetta borbonica, not in flower. 10. To Mr. Taylor, gardener to J. Costar, Esq., for twenty species of Hardy Ferns. 11. To Messrs. Veitch and Son, for Vesalia floribunda. 12. To the same, for a new species of Hoya. 13. To Messrs. Rollisson, for a new species of Odontoglossum. 14. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for a seedling Pelargonium, "Favonius." 15. To Mr. Epps, F.H.S., for the second-best named collection; no error in fifteen names; beautifully written. 16. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for the third-best named collection; no error in thirty—some writing inferior. 17. To Mr. Challis, gardener to Miss Irving, of Egham, for Grapes. 18. To Mr. Tillery, gardener to his Grace the Duke of Portland, for

Peaches and Nectarines. 19. To Mr. Turnbull, gardener to his Grace the Duke of Marlborough, for the same. 20. To Mr. Ewing, gardener to O. F. Meyrick, Esq., F.H.S., for Cherries. 21. To Mr. Cowdery, gardener to Miss Copland, of Sudbury Lodge, for a Melon. 22. To Mr. Staines, for twelve new varieties of Pelargonium, in 8-inch pots.

Certificate of Merit: 1. To Alexander Rowland, Esq., F.H.S., for a collection of cut Roses, in twenty-five varieties. 2. To Mr. Terry, gardener to Lady Giles Puller, for a collection of Yellow Roses, in six varieties. 3. To Mr. Francis, for the same. 4. To Mr. John Holliday, of Woolwich, for twenty-four varieties of Pink. 5. To Mr. Henbrey, of Croydon, for the same. 6. To Mr. G. Wiltshire, for a miscellaneous collection of Plants. 7. To Messrs. Veitch and Son, for a species of Hydrangea, near H. japonica. 8. To the same, for Cyrtoceras multiflora. 9. To Mr. Hoyle, of Guernsey, for a seedling Pelargonium of 1846, "Superlative." 10. To the same, for the same, 1847, "Crusader." 11. To Messrs. Veitch and Son, for the same, 1846, "Topping's Brilliant." 12. To Mr. Ambrose, for a fancy Pelargonium, "Jenny Lind." 13. To Mr. E. G. Henderson, of Wellington Road, St. John's Wood, for the same, "Madame Grisi." 14. To Mr. Holmes, of Sudbury, Derbyshire, for a seedling Calceolaria, "Tricolor superba." 15. To the same, for the same, "Holmesii." 16. To Mr. Willmer, of Sunbury, for a seedling Pink, "Laura." 17. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for the fourth-best named collection; one error in fifteen plants—extremely well written. 18. To Mr. Eyles, gardener to Sir E. Kerrison, Bart., F.H.S., for Peaches and Nectarines. 19. To Mr. Jones, gardener to E. B. Hartopp, Esq., of Dalby Hall, near Melton Mowbray, for Keens' seedling Strawberries. 20. To Mr. Ann, gardener to J. H. Vivian, Esq., F.H.S., for Figs. 21. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Melons. 22. To Mr. Munro, gardener to H. H. Oddie, Esq., of Colney Hatch, for a Melon. 23. To Mr. Toy, gardener to Colonel Challoner, F.H.S., for the same. 24. To Mr. Gadd, of Betchworth Castle, for six Cantaloup Melons.

*** A prize in Pelargoniums, of 7*l.*, offered by PHILO for the best six Seedlings, not less than two years old, not sent out, in pots of not less than six inches, and of any raiser, having the most novel and distinct colours, and of first-rate quality, was awarded to Mr. Beck of Isleworth.

July 6, 1847. (REGENT STREET.)

ELECTIONS. The Earl Spencer; Robert Blayney, Esq., 20, Regent Street, and Evesham, Worcestershire; Adolphus Frederick Slade, Esq., Kemnal House, Chislehurst, Kent; John Smith, Esq., Reform Club, and Welton Garth, Hull; and Arthur Vardon, Esq., Hanger Lane, Stamford Hill.

AWARDS. *Knightian Medal* to Messrs. Loddiges, of Hackney, for various Orchids, more especially Ornithidium miniatum, Oncidium Lanceanum, and its larger variety; Calanthe Masuca, and Lacæna bicolor.

NOVELTIES FROM THE SOCIETY'S GARDEN. Angelonia angustifolia sent by Mr. Hartweg from Mexico, a dwarf kind, with beautiful violet blossoms; Aquilegia Skinneri, a Guatemala species, remarkable for its green and red flowers, as well as for the country whence it comes; Mr. Fortune's Anemone-flowered Rose, a species nearly related to the Musk Rose; Calystegia pubescens; and a collection of Cape Pelargoniums, consisting of bicolor, gibbosum, alternans, ardens, fulgidum, lateripes, bipinnatum, and quinquevulnera.

After the Meeting, the Society resolved itself into a Special General Meeting for the purpose of electing a new Member of Council, when R. H. Solly, Esq., was declared to be elected in the room of F. G. Cox, Esq., deceased.

BOOKS PRESENTED.

The Botanical Register for July. From the Publishers.
The Journal of the Royal Geographical Society, Vol. 17, Part 1. From the Society.
Representation of a Gourd (weighing 196 lbs., 7 feet 3 inches in circumference). From J. F. Leathes, &c.
The Athenæum for June. From the Editor.

July 17, 1847. (GARDEN EXHIBITION.)

On this occasion the day, although ushered in with a tempest, proved enjoyable in the afternoon, and 6827 visitors, exclusive of exhibitors, found their way to the garden. The exhibition of plants, considering the season, was much above the average, and the gaiety of the scene increased by the music, the effect of which was improved by some new arrangements, and by the large area over which the movements of the bands extended; the beautiful grounds at Chiswick House, through the liberality of the noble President, being thrown open to the visitors. As regards fruit, it was scanty; and, although some of it was good, upon the whole this department of the exhibition did little honour to English gardening. No miscellaneous collections were exhibited, although for such the Society had offered three

gold medals,—a remarkable circumstance to have occurred in July, and after so much hot weather favourable for ripening fruit.

The AWARD was as follows:—

Certificate of Honour: 1. To Mr. Frazer, of Leyton, Essex, for a collection of thirty Stove and Greenhouse plants. 2. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for twenty species of Exotic Orchids.

Large Gold Medal: 1. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for a collection of thirty Stove and Greenhouse plants. 2. To Mr. Mylam, gardener to S. Rucker, Esq., jun., F.H.S., for twenty species of Exotic Orchids.

Gold Knightian Medal: 1. To Mr. Ayres, gardener to James Cook, Esq., F.H.S., for a collection of thirty Stove and Greenhouse plants. 2. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a collection of fifteen Stove and Greenhouse plants. 3. To Messrs. Rollisson, of Tooting, for twenty species of Exotic Orchids. 4. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for twelve species of Exotic Orchids. 5. To Mr. May, gardener to E. Goodheart, Esq., of Langley Park, Beckenham, for fifteen varieties of Cape Heath. 6. To Messrs. Veitch and Son, of Exeter, for the same.

Gold Banksian Medal: 1. To Mr. Malyon, gardener to Thomas Brandram, Esq., of Lee Grove, Blackheath, for a collection of fifteen Stove and Greenhouse plants. 2. To Mr. Bruce, gardener to Boyd Miller, Esq., of Collier's Wood, Mitcham, for a collection of ten Stove and Greenhouse plants. 3. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for twelve species of Exotic Orchids. 4. To Mr. Plant, gardener to J. H. Schröder, Esq., of Stratford Green, Essex, for six species of the same. 5. To Mr. Terry, gardener to Lady Giles Puller, for twelve varieties of Roses, in pots. 6. To Mr. Francis, of Hertford, for the same. 7. To Messrs. Fairbairn, of Clapham, for fifteen varieties of Cape Heath. 8. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for twelve varieties of the same. 9. To Mr. Stains, of Middlesex Place, New Road, for twelve varieties of Pelargonium, in 11-inch pots. 10. To Mr. Catleugh, of Chelsea, for the same.

Large Silver-Gilt Medal: 1. To Mr. Catleugh, of Chelsea, for a collection of ten Stove and Greenhouse plants. 2. To Mr. Redding, gardener to Mrs. Marryat, of Wimbledon, for twelve species of Exotic Orchids. 3. To Mr. Dobson,

gardener to Mr. Beck, F.H.S., for six species of the same. 4. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for twelve varieties of Roses in pots. 5. To Messrs. Lane, of Great Berkhampstead, for the same. 6. To Mr. Epps, F.H.S., for fifteen varieties of Cape Heath. 7. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for twelve varieties of the same. 8. To Mr. Bruce, gardener to Boyd Miller, Esq., for nine varieties of the same. 9. To Mr. Pamplin, of Walthamstow, for the same. 10. To Mr. Robinson, gardener to J. Simpson, Esq., of Thames Bank, Pimlico, for twelve new varieties of Pelargonium, in 8-inch pots. 11. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for the same. 12. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for Tall Cacti, in flower. 13. To Mr. Wood, gardener to J. G. Seager, Esq., of Poole, Dorsetshire, for Erica metulæflora bicolor. 14. To Mr. Frazer, of Leyton, for Astelma eximium. 15. To Messrs. Veitch and Son, of Exeter, for Medinilla speciosa. 16. To Mr. Barnes, gardener to T. C. Whitmore, Esq., for Black Hamburgh Grapes. 17. To Mr. Hamp, gardener to James Thorne, Esq., of Mawbey House, South Lambeth, for Muscat of Alexandria Grapes.

Certificate of Excellence: 1. To Mr. Taylor, gardener to J. Costar, Esq., of Streatham, for a collection of ten Stove and Greenhouse plants. 2. To Messrs. Paul and Son, of Cheshunt, for twelve varieties of Roses, in pots. 3. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for nine varieties of Cape Heath. 4. To Mr. Frazer, of Leyton, Essex, for the same. 5. To Mr. Catleugh, of Chelsea, for twelve new varieties of Pelargonium, in 8-inch pots. 6. To Mr. Glendinning, F.H.S., for a collection of Statices. 7. To Messrs. Veitch and Co., of Exeter, for Portlandia grandiflora. 8. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Allamanda cathartica. 9. To Messrs. Veitch, for a new species of Oncidium, from Brazil. 10. To Mr. Tilyard, gardener to his Grace the Duke of Buckingham, for Muscat Grapes. 11. To Mr. Frost, gardener to Lady Grenville, F.H.S., for the same.

Large Silver Medal: 1. To Mr. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for six species of Exotic Orchids. 2. To Mr. Jack, gardener to R. G. Loraine, Esq., of Wallington, for the same. 3. To Mr. Wiltshire, gardener to J. G. Reynell, Esq., of East Sheen, for six species of Achimenes. 4. To Messrs. Lane, of Great Berkhampstead, for a collection of Roses, in fifty varieties. 5. To Mr. Jack, for nine varieties of Cape Heaths. 6. To

Mr. Pawley, of the White Hart Hotel, Bromley, for the same. 7. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for Erica ampullacea. 8. To Messrs. Fairbairn, of Clapham, for Erica jasminiflora alba. 9. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for six species of Pelargonium. 10. To Mr. John Edwards, of Holloway, for twenty-four varieties of Carnations. 11. To Mr. Ward, of Woolwich, for the same. 12. To Mr. George Edmonds, of the Wandsworth Road, for twenty-four varieties of Piccotees. 13. To Messrs. Norman, of Woolwich, for the same. 14. To Mr. Catleugh, of Chelsea, for a collection of Statices. 15. To Mr. Green, gardener to Sir E. Antrobus, Bart., F.H.S., for a specimen of Lisianthus Russellianus. 16. To Mr. Frazer, of Leyton, Essex, for Crinum amabile. 17. To Messrs. Veitch and Son, of Exeter, for Dendrobium Kuhlii. 18. To Mr. Brewin, gardener to Robert Gunter, Esq., F.H.S., for Muscat Grapes. 19. To Mr. Solomons, of Peckham Rye, for Black Hamburgh Grapes. 20. To Mr. Gibbs, gardener to Baron Dimsdale, for two Queen Pine Apples. 21. To Mr. Turnbull, gardener to his Grace the Duke of Marlborough, F.H.S., for a Providence Pine Apple. 22. To Mr. Davis, gardener to Lord Boston, F.H.S., for a Cayenne épineux Pine Apple.

Silver Knightian Medal: 1. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for a collection of ten Stove and Greenhouse plants. 2. To Messrs. Paul and Son, for a collection of Roses, in fifty varieties. 3. To Mr. Terry, gardener to Lady Giles Puller, for the same, in twenty-five varieties. 4. To Messrs. Lane, for a collection of Yellow Roses, in six varieties. 5. To Mr. Bennett, gardener to J. Smith, Esq., of Dulwich, for six Calceolarias, in 11-inch pots. 6. To Mr. Ellis, of Woolwich, for twenty-four varieties of Carnations. 7. To Messrs. Norman, of the same place, for the same. 8. To Mr. Edwards, of Holloway, for twenty-four varieties of Piccotees. 9. To Mr. Turner, of Chalvey, near Windsor, for the same. 10. To Mr. W. Gregory, F.H.S., for twelve new Hardy Evergreens, in pots. 11. To Mr. Williams, gardener to C. B. Warner, Esq., F.H.S., for twenty Exotic Ferns. 12. To Mr. Taylor, gardener to J. Coster, Esq., of Streatham, for twenty species of Hardy Ferns. 13. To Mr. Ayres, gardener to J. Cook, Esq., F.H.S., for Erica ferruginea. 14. To Mr. Frazer, for Erica eximia. 15. To Messrs. Veitch and Son, for Ixora javanica. 16. To Mr. W. Gregory, F.H.S., for a collection of Conifers. 17. To Mr. Ayres, for the best-named collection of Plants—one error in thirty names. 18.

To Mr. Kemp, gardener to Mrs. Grillion, East Acton, for Muscat of Alexandria Grapes. 19. To Mr. Wright, gardener to the Hon. Mrs. Rushout, for Grapes, in pots. 20. To Mr. Mitchell, of Kemp Town, Brighton, for Black Hamburgh Grapes. 21. To Mr. Taylor, gardener to J. Coster, Esq., of Streatham, for Black Hamburgh Grapes. 22. To Mr. Elphinstone, gardener to the Right Hon. The Speaker, for Moscow and Ripley Queen Pines. 23. To Mr. Reid, gardener to Mrs. Clark, Noblethorp, Barnsley, for Moscow Queen Pines. 24. To Mr. Errington, gardener to Sir P. Egerton, Bart., F.H.S., for Peaches. 25. To Mr. Ingram, gardener to Her Majesty, at Frogmore, for Apricots. 26. To Mr. Whiting, gardener to H. T. Hope, Esq., F.H.S., for Melons. 27. To Mr. Knott, gardener to Rev. C. Pritchard, F.H.S., for a collection of Achimenes (shown contrary to regulations).

Silver Banksian Medal: 1. To Mr. Stanly, gardener to H. Berens, Esq., F.H.S., for a collection of ten Stove and Greenhouse plants. 2. To Mr. Francis, of Hertford, for a collection of Roses, in fifty varieties. 3. To Mr. Cobbett, of Horsell, near Woking, Surrey, for the same. 4. To Mr. Turner, of Chalvey, near Windsor, for twenty-four varieties of Carnations. 5. To Mr. Ellis, of Woolwich, for twenty-four varieties of Piccotees. 6. To Mr. Keynes, of Salisbury, for the same. 7. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for Erica eximia. 8. To Mr. Malyon, gardener to T. Brandram, Esq., of Blackheath, for Erica Aitoniana. 9. To Mr. Wood, gardener to J. G. G. Seager, Esq., Poole, Dorsetshire, for Erica eximia. 10. To Mr. Jack, gardener to R. G. Loraine, Esq., of Wallington, for Cyrtoceras reflexum. 11. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for Pistia stratiotes. 12. To Mr. Eyles, gardener to Sir George Larpent, Bart., F.H.S., for a new species of Plumbago from China. 13. To Mr. Dobson, gardener to Mr. Beck, F.H.S., for a seedling Pelargonium of 1846, "Honora." 14. To Mr. Mylam, gardener to S. Rucker, Esq., F.H.S., for the second best-named collection of Plants—one unnamed in twenty-six. 15. To Mr. Chapman, of South Lambeth, for Black Hamburgh Grapes. 16. To Mr. Umpleby, gardener to H. Benyon, Esq., for Black Hamburgh Grapes. 17. To Mr. Sinclair, gardener to C. J. Hambro, Esq., Bransbury House, Willesden, for the same. 18. To Mr. Aldborough, gardener to S. Gurney, Esq., for the same. 19. To Mr. Ogle, gardener to the Earl of Abergavenny, for three Queen Pine Apples. 20. To Mr. Mason, gardener

to Sir J. Kennaway, Bart., F.H.S., for a Queen Pine Apple. 21. To Mr. Thomson, gardener to Mrs. Byng, Wrotham Park, Barnet, for Peaches. 22. To Mr. Snow, gardener to the Earl de Grey, F.H.S., for the same. 23. To Mr. Wright, gardener to the Hon. Mrs. Rushout, for the same. 24. To Mr. Parker, gardener to J. H. Oughton, Esq., Roehampton, for Peaches and Nectarines. 25. To Mr. Whiting, gardener to H. T. Hope, Esq., F.H.S., for Tartarian Cherries. 26. To Mr. Lydiard, Batheaston, Bath, for Strawberries and Currants. 27. To Mr. Foster, gardener to Mr. Stains, 41, Carlisle Street, Portman Market, for Old Scarlet-fleshed Melon. 28. To Mr. Balls, gardener to H. Rogers, Esq., for Emperor Green-fleshed Melon. 29. To Mr. Slowe, gardener to W. R. Baker, Esq., F.H.S., for Green-fleshed Melons. 30. To the same, for a collection of Roses, in twenty-five varieties.

Certificate of Merit: 1. To Mr. Reynolds, for six varieties of Fuchsia. 2. To Mr. Keynes, of Salisbury, for twenty-four varieties of Carnations. 3. To Mr. Turner, of Chalvey, near Windsor, for a seedling Piccotee, "Amy." 4. To Mr. Fairbrother, of Kemp Town, Brighton, for a seedling Fuchsia, "Jenny Lind." 5. To Mr. Carson, gardener to W. F. G. Farmer, Esq., F.H.S., for Laplacea semiserrata. 6. To Mr. Epps, F.H.S., for the third-best named collection of plants—one error in fifteen names. 7. To Mr. Mason, gardener to Sir John Kennaway, Bart., F.H.S., for Nectarines. 8. To Mr. Turnbull, gardener to his Grace the Duke of Marlborough, F.H.S., for Peaches and Nectarines. 9. To Mr. M'Laurin, gardener at Renishaw Hall, for Peaches. 10. To Mr. Cornwell, of Barnet, for Raspberries. 11. To Mr. Deane, gardener to J. W. H. Powell, Esq., of Shepherd's Bush, for Bigarreau Cherries. 12. To Mr. Mason, for the same. 13. To Mr. Snow, gardener to the Earl de Grey, F.H.S., for Elton Cherries. 14. To Mr. Kemp, gardener to Mrs. Grillion, of East Acton, for Bigarreau and Black Eagle Cherries.

*** A noble collection of Palms having been exhibited by Messrs. Loddiges, the Judges, not having the power to award Gold Medals, recommended to the Council that a Gold Knightian Medal be presented to Messrs. Loddiges.

August 3, 1847. (REGENT STREET.)

ELECTIONS. George Thomas Braine, Esq., 11, Great Cumberland Place, Hyde Park; and Edward Lloyd, Esq., of Aston near Oswestry, Salop.

AWARDS. *Knightian Medal:* To Mr. Carton, gardener to his Grace the Duke of Northumberland, at Syon, for a plant of Litchi in fruit—believed to be the first ripened in England; and for a branch bearing two perfect fruit of the common Nutmeg, which is perhaps the first time this spice-tree has fruited in Europe. Mr. Carton stated that this Nutmeg-plant was sent by Dr. Wallich from the Calcutta Botanic Garden to Syon in 1835, and the Litchi in 1838; that in August last the male and female Nutmeg trees were in flower for the first time, and that the plants had been grown in Norwood loam without any mixture. "The Litchi," he added, "flowered in February, and the fruit was set in rather a cool peach-house, and afterwards removed to the hothouse." The Nutmegs were about as large as good-sized figs; when they become ripe the outside covering is burst into two halves, and displays to view a reddish purple body something like a plum, within which the true Nutmegs are enclosed. The reddish coloured portion, after a certain preparation, becomes the Mace of the shops. It was stated that a larger variety of Nutmeg was in fruit at Syon. To Messrs. Rollisson, of Tooting, for a nice collection of Orchids containing various Cattleyas, a good Calanthe Masuca, a large mass of Miltonia spectabilis, a Houlletia from Brazil, not distinct from Brockelhurstiana, several Oncidia, Aërides quinquevulnera, and other plants. To Mr. Mason, gardener to Sir John Kennaway, Bart., of Escot, Devon, for four Queen Pine Apples, weighing respectively 6 lbs. 11 oz., 5 lbs. 11 oz., 5 lbs. 5 oz., and 4 lbs. 8 oz. The heaviest, although somewhat ill formed at the base and scarcely ripe, was a very remarkable specimen of good Pine culture, as its weight will show. The others were well formed and ripe.

Banksian Medal: To Mr. Plant, gardener to J. H. Schröder, Esq., F.H.S., for Oncidium Lanceanum, a nice Cattleya citrina, and Miltonia spectabilis. To Mr. Donald, gardener to Mrs. Lawrence, F.H.S., for Cyrtoceras reflexum, Vinca rosea, Angræcum caudatum, Aërides quinquevulnera, and other plants. To Messrs. Veitch and Son, of Exeter, for Pleroma elegans, a handsome cool greenhouse Melastomad, with small shining deep-green leaves and large round violet blossoms, which were stated to remain long in beauty —a property seldom possessed by this class of plants. To Mr. Fleming, gardener to his Grace the Duke of Sutherland, at Trentham, for a Providence Pine Apple, large and handsome, weighing 8 lbs. 12 oz.

Certificate of Merit: To Mr. Stephen Hooker, of Brenchley,

F.H.S., for a most beautiful Gladiolus, named Brenchley-ensis. It was stated to be a hybrid between Psittacinus and Floribundus; but exhibited a striking improvement on both parents, the flowers being large and of a brilliant scarlet. To Mr. Turner, of Chalvey, for fine boxes of Carnations and Piccotees. To Messrs. Veitch and Son, for an erect-growing Leschenaultia, named Splendens. To Mr. Catleugh, of Chelsea, for a very large Erica ampullacea, at least 5 feet high and 4 feet through, and covered with bloom. To Mr. Northcote, gardener to Miss Wigram, of Wanstead, Essex, for six plants of Lisianthus Russellianus, skilfully grown and well flowered. To Mr. Fleming, gardener to his Grace the Duke of Sutherland, at Trentham, for two Melons, hybrids, the result of a cross between the Hoosainee and Ispahan, and also a sweet Ispahan Melon. To Mr. Ingram, gardener to the Marquess of Salisbury, F.H.S., for a Melon weighing 21¼ lbs. Mr. Ingram stated that the variety generally exceeded 20 lbs.; that it had been originally brought by the Marquess from France, and had been cultivated for several years at Hatfield. "On its first introduction," he added, "its flavour was found to be superior, but it appears to have degenerated under the cloudy skies of this country, for late examples have not been found particularly excellent." On being cut it proved to be a tender green-fleshed kind, but wanting in saccharine matter. To Mr. Brewin, gardener to R. Gunter, Esq., F.H.S., for an Enville Pine Apple weighing 6 lbs. 11 oz. To Mr. Hewitt, gardener to J. Purdey, Esq., of Bayswater, for a Providence Pine Apple grown in a pot, and only 15 months old, weighing 7 lbs. 6 oz. Also to the same, for a dish of Black Hamburgh Grapes, fair well-coloured bunches, being part of a second crop, from vines only two years old, and of which the following is some account:—The vines, though planted but little more than two years, give to the house all the appearance of a well-established vinery, and have borne in both years heavy crops. In the first year in which they were planted they grew 37 feet in length, the wood very strong and short-jointed, and as autumn approached became well ripened. In the winter pruning, which is on Roberts's plan, except that the intermediate buds are allowed to push before they are rubbed off, the rods were cut back to the tops of the rafters, which are about 20 feet in length, and thus the house not only became completely furnished the first season, but ripened off a good crop. The border, which is 49 feet long and 22 feet wide, is heated by hot water and covered with glass, a circum-

stance to which the extraordinary luxuriance of the vines is no doubt in a great measure due. The heating is effected by hot water in six rows of 4-inch pipes, which traverse a hollow chamber, closed in with flags, which form the bottom of the border. Drain-tiles are laid thickly on the flags, and the interstices between the tiles are filled with rough material, over which are placed turves so as to secure perfect drainage. On this is laid the soil, about 18 inches deep, consisting of light loam, liberally mixed with broken bones and leaf-mould, and kept very loose and porous—an excellent condition in a vine border. Small pipes communicating with the drainage are passed through the soil, by means of which the bottom of the border can be kept damp when desirable; and when surface heat is wanted, it can be obtained through pipes of a larger bore communicating between the chamber and the surface. As to the glass covering, it is a span-roofed house 9 feet high in the centre and filled with vines, which are ripening a succession crop. The partition between the glass erection over the border and the vinery is so constructed that every alternate vine in the vinery can be taken out into the cool house over the border, to be afterwards introduced for succession, or a vine in fruit can be moved without injury to the outside of the vinery if desirable.

Miscellaneous Subjects of Exhibition: Two specimens of Serpent Cucumber from Syon House—a description of fruit cultivated only for ornament: they are not eatable when ripe. When young they have been boiled and used as pickles and in curries; but the propriety of using them even then is questionable, for they are in reality poisonous, a quality indicated indeed by their unpleasant smell. From Mr. Jackson, of Kingston, an Achimenes introduced from Central America by Mr. Skinner, which, though different, had much general resemblance to A. coccinea or rather rosea; but with deeper coloured flowers than those of the latter; and finally from J. Luscombe, Esq., of Combe Royal, Kingsbridge, was a cut specimen of Bignonia Cherere, a magnificent conservatory climber, not grown as extensively as it deserves; for it produces its long gay-coloured trumpet-shaped flowers in abundance during the whole summer, and, if allowed, will cover a large amount of surface. Along with it were also cut specimens of the following half-hardy shrubs, which have for several years been growing in the open air in the pleasure-grounds at Combe Royal, viz.:—Poinciana Gilliesii; Veronica speciosa and decussata; Statice Dicksoni; Acacia dealbata, verticillata (broad-

leaved variety), and dolabriformis; a Metrosideros; Eucalyptus montana; Grevillea sulphurea and rosmarinifolia; Tasmania aromatica; Ozothamnus multiflorus; Corræa rufa; Hydrangea japonica; Viburnum odoratissimum; Edwardsia microphylla; Azalea indica phœnicea; and Rhododendron arboreum, cinnamomeum, and Rollissonii. These were exhibited as examples of the mildness of the climate of Devonshire, having all proved hardy there, except perhaps Acacia dolabriformis, which was stated to have received some slight protection in very severe weather.

Novelties from the Society's Garden. Mr. Fortune's Spathoglottis (S. Fortuni), a pretty and very useful species on account of the long time it keeps in flower; and Dolichos Catjang, a bean, whose pods are said to attain the length of 4 feet, and which is called in the East Indies the Whip Bean. It is used in the hotter parts of the East as a substitute for kidney beans.

Books Presented.

Journal of the Royal Agricultural Society of England. Vol. 8, Part 1. From the Society.
Botanical Register for August. From the Publishers.
The Athenæum for July. From the Editor.