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THE
ORCHID MANUAL

BY
THOMAS APPLEBY.

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THE ORCHID MANUAL,
FOR THE
CULTIVATION
OF
STOVE, GREENHOUSE, AND HARDY ORCHIDS,
WITH A
CALENDAR OF MONTHLY OPERATIONS,
AND
CLASSIFIED LISTS OF SPECIES.

—o—

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STOVE ORCHIDS.

Good collections of Orchids requiring stove treatment are now very numerous in this country, and such is their beauty that the number of cultivators is annually increasing. The skill necessary to grow them displayed by English gardeners, shows to no small extent what perseverance can accomplish in overcoming difficulties that at first seemed almost insuperable. Fifty years ago exotic Orchids in this country were almost unknown to gardeners, and it was only by studying their native habitats and peculiar circumstances as to their mode of growing in exotic climes, that has led to their successful culture. If any plant is brought from foreign climes, where it grows in a dense, moist forest, and is potted in any chance soil that may be handy, and placed on a shelf in a dry stove exposed to the burning summer's sun, it must soon languish and die. Such, no doubt, was the fate of many of the orchideous plants collected and sent home without, perhaps, a line to say under what peculiarities of climate or soil it enjoyed in its native wild. However, some few flowered, and their extreme elegance, curious forms, and singular appearance, led to inquiries, which, when given faithfully by collectors, soon led to a different mode of culture, and, finally, to that perfection we now see displayed in our stoves and exhibitions. This success has been the cause of a greater demand for them; so much so, that hundreds of species have been introduced, and the numbers are increasing annually.

As a natural consequence, information on their management is in request, and one or two manuals have been published on the subject. The first was published by T. C. Lyons, Esq., a

zealous amateur and grower, at Ladiston, in Ireland. He first wrote a small book on the subject, printed it, and bound the first edition with his own hands, and generously gave the first edition away to his friends, and all the cultivators of Orchids that he knew of. That small work was so well thought of, that he was induced to write a considerably enlarged edition, much improved both in form and matter. This was published in 1845, in London, by Mr. J. Ridgway, and by Messrs. Hodge and Smith, of Dublin, and is now, I believe, out of print. Another somewhat larger work on the culture of these lovely plants is from the pen of Mr. B. Williams, formerly gardener to J. Warner, Esq., of Broxbourne, Herts. I may venture to mention also that I wrote a few essays on their culture in the earlier volumes of *THE COTTAGE GARDENER*. Notwithstanding all these publications, it seems that a few concise instructions in a simpler form and in less compass are needed, and will be useful to young gardeners, amateurs, and others, that may be desirous of growing Orchids, and wish to know the best way to set about their culture.

On each point of culture I shall endeavour to give plain instructions in such language that the veriest tyro can understand; and if he will, or can, put them in practice as far as his means extend, I have no doubt by careful attention he will succeed in growing his plants in a satisfactory manner.

THE ORCHID-HOUSE.—Let not the amateur be alarmed about the expense of a house suitable for Orchids. If his collection at first is small, any kind or form of house, if sufficiently heated, will, with judicious care, grow them on till a larger house is needed; but where expense is no object, then a proper house should be put up for them. Experience has proved that a span-roofed house is the best form. Now, as these plants mostly grow on trees in their native country, there they enjoy a large amount of light. Hence we should study to give them as much light as we possibly can in our, comparatively speaking, dark climate. The span-roof does so, as everybody knows; much more than a mere lean-to; and in order that every part of the house

may have an equal share of light at all hours of the day, the position of the house should be placed to run from east to west. The morning sun will then send its beams on the east side at noon, when its strong power might be injurious, the rays will be slanting on the plants; and the afternoon sun will enlighten the western side to the latest hour.

This house should have a division—one part to be devoted to East Indian species, and the other to such as are from the more temperate climes of the western hemisphere. Generally speaking, this latter house should be 10° or 15° cooler than the first. When the Indian species are in bloom, the flowering season may be prolonged by bringing them into the cooler house.

HEATING.—When orchideous plants are making their annual growth they require the greatest amount of heat. To economise fuel, then, the season of growth should be during the last month in spring and the summer. The best mode of heating and most easy to manage, is by hot-water pipes, with a tank on the top of the ascending pipe. This mode of heating suits Orchids the best of any, it can be so easily regulated. Apply it then in sufficient power to give the most heat when the plants are growing. Some may object that the season of growth does not come uniformly to all species of Orchids. True; but that propensity to grow in autumn or winter may, by judicious and persevering care, be altered and changed just as easy as forcing Roses at Christmas, or Grapes in May; and, as is well known, when once the habits of a plant are once changed, that change becomes every season more fixed on the plant, till at last its season of growth is completely altered, and remains so as long as the cultivator pleases. These facts are well known to the forcing-gardener, and hence the plant-grower may by the same means set all his plants their season of growth, and compel them, as it were, to continue to keep that season year by year; only let him have power over his means of heating, which he may have by a boiler and hot-water pipes, and plenty of them. I observed above, that the pipes should have a tank upon them; that tank should be, during the

growing season, kept full of water. The pipe when warm heats the water, and causes a gentle moisture to rise amongst the plants, which is highly beneficial to them, especially to those growing on blocks or such as root from the stems in the air. The degree of heat Orchids require is by some growers set too high, and by others too low. I have found, from the experience of a quarter of a century, that the following table, drawn up for my use, and corrected to the state it appears below, is amply sufficient for them:—

EAST INDIAN HOUSE.			SOUTH AMERICAN HOUSE.		
	Day.	Night.		Day.	Night.
Summer.....	75° to 90°...	70°	Summer.....	60° to 65°...	60°
Winter	65°	60°	Winter	55°	50°

These are average heats, inasmuch as on very hot days the heat will be a few degrees higher, and in very cold weather it may be a few degrees lower without any injury to the plants.

SHADING.—The house for Orchids being put up, the next thing to think of is how to shade the plants from the burning beams of a summer's sun. At that season of the year the leaves are young and tender; and if a drop of water is on any one leaf and the sun strikes it, the lens formed by the water becomes a focus, and on that place a burn or scald will take place. To prevent such a mishap the glass should be shaded. Some put on it a covering of whitewash or some other daub, which is certainly effective and saves trouble; but the objection to this mode is, that the shading being permanent, on dark days the plants suffer from want of light to ripen the pseudo-bulbs: this is a great evil.

Undoubtedly the best shade is one that can easily be drawn off whenever the sun is clouded. Perhaps the best material for this purpose is the one named Shaw's tiffany; it is quite stout enough to intercept the rays of the hottest sun. To apply it so as to save trouble, procure a pole, about two inches diameter, rather longer than the length of the house. At one end fix a wheel six inches diameter. On each side of this wheel nail

round boards projecting two or three inches beyond it. When this is done a kind of groove is formed; and in this the cord to let down and draw up the shade is coiled, one end being nailed to it. The shading material is then nailed to the pole, it having been first sewed together the size of the roof. The pole with the canvass nailed to it should then be laid on the roof. A flat, long, narrow piece of wood should be nailed firm to the highest point of the roof; then stretch the canvass, and nail the loose side to this flat piece of wood. Use some kind of binding to this edge, and nail through that binding. Then take hold of the other end of the cord, pull at it, and the wheel will turn round, and, of course, the pole turn round also, wrapping up the canvass neatly as it rolls up to the top or apex of the house. The rope may be wrapped round a kind of fixed button in a handy place, and tied there till shade is needed; then loosen the end of the cord, and let down the shade gently to the lowest part of the glass, where a few stops of iron or wood should be firmly fixed to prevent the pole rolling off the house and tearing off the canvass from the flat piece of wood. To make this canvass last longer, let a weatherboard be fixed on the top of the house; and when the shade with its pole is drawn up, it will be under this weatherboard and be protected from wet. In winter, when no shade is required, the canvass may be unfixed and put away in a dry shed till spring.

MODE OF GIVING AIR.—When the thermometer indicates a temperature too high it may be lowered by giving air. In spring the external air will be too cold to be admitted direct to the plants: hence it is desirable to let in the fresh air just over hot-water pipes. To accomplish this make openings in the wall, and fix to these opening sliding shutters. When these are opened the air rushes in, and becomes not only warmed but also charged with moisture arising from the tanks placed on the ascending pipes, and is then highly beneficial to the health of plants. To allow of the escape of the heated air, a few openings should be contrived at the highest part of the roof. In summer,

when there is no heat in the pipes, the outward atmospheric air is so warm that the air when admitted will not injure the plants in the least.

ARRANGEMENT OF THE PLANTS.—The central stage may either be a succession of steps or one broad platform. In either case it is desirable to make each into a shallow watertight cistern, to be filled with small pebbles ; or, if kept empty, place in them broad pans just high enough to be above the level of the sides. These cisterns are intended to hold water during the growing months, and thereby supply moisture to the air, and also protect the plants from the destructive cockroaches.

Around this central stage runs the walk, and on the side next the wall a platform may very conveniently be placed. The surface of this platform may be formed exactly like the central stage ; and on it many smaller plants may stand, and also any that may go earlier to rest than the general collection.

SUSPENDING PLANTS.—These require hooks, or large-headed nails, driven into the rafters to hang them to ; or a strong iron rod kept well painted may be suspended over the walks, and at proper intervals hooks made in the shape of the letter **S** placed upon the rod, and to each of these hooks a basket or a block containing a plant is suspended. There is this advantage of having these plants hanging over the walk—namely, that when watered or syringed, the surplus water falls into the walk and not on the plants.

UTENSILS.—*A Cistern.*—The rain water that falls on the roof should run into spouts placed just under the ends of the glass frames, and conducted from them by a pipe into a large cistern. This utensil is almost indispensable to the Orchid grower. The water in it should be kept milk-warm. If placed upon the flue the water will be kept sufficiently warm. It is highly useful in that state for syringing with, and also to dip the baskets and logs with plants on them in. Just before the plants in baskets begin to grow, the peat from having been dry during the season of rest will be found hard ; and then, if the plants require new

ORCHIDS IN SUSPENDED POTS.

baskets, the roots will be so firmly fixed to the lumps of dry peat, that, if these lumps are not softened by steeping them in the water, the roots will be broken and otherwise greatly injured; but if steeped for two or three hours the peat then is easily separated from the roots without injury to the latter.

Baskets.—The grower will soon find that baskets are necessary, and for this reason—that some species, especially of *Stanhopea*, *Acinetas*, and a few *Peristerias*, send their flower-stems down through the soil. Now, if these are grown in pots, it is evident that the greater part of the flower-stems will perish. The baskets should be of a size in proportion to the size of the plants. The smallest may be six inches square, the next twelve, and the largest eighteen inches. To make these baskets, iron, brass, and copper, have been used. I object to the first, because it rusts so soon in the damp Orchid-house, and the other two are too expensive. Earthenware also has been converted into baskets for Orchids; but its great weight and liability to break renders it undesirable. After having tried all these, I have come to the conclusion that the best material for baskets for Orchids is long Hazel rods; the smallest, for small baskets, about the thickness of one's middle finger, and the largest as thick as one's wrist, with proportionate intermediate sizes. Saw them into proper lengths, and with a sharp-pointed iron borer made red hot, bore a hole through each end. Then have ready some copper wire cut into the right lengths; lay down for small baskets two rods six inches long, and upon these at right angles three rods at equal distance. Nail these to the two first with small copper flat-headed nails, then turn over this first layer and place two more to form the other two sides of the baskets. Then take four pieces of the wire, make a loop at one end of each, and then draw the other ends through the holes at the four corners of the basket. Slip over two more at opposite sides, and then two more to fit upon them at the other two sides. For the smallest three rods deep will be sufficient. Wedge the wires with small wooden wedges at each corner, and then the

basket is ready for the plant. The next size may have four rods on each side, and the size larger five on each side. There is no advantage gained in making those baskets deeper.

Pots.—The kind of pot that I have found best for Orchids is a wide shallow one, the proportions of which are as two, three, and five—that is, two inches wide at the bottom, three inches deep, and five inches wide at the top, all inside measure. Larger pots to be in the same proportions. The roots of Orchids are generally near the surface; and besides, a larger surface is exposed by this form to the beneficial effects of the moist air of the interior. These wide pots may be ordered at the manufactory, and will cost no more than the ordinary-shaped pots. When these pots are ordered, I would recommend the grower to order also about a dozen large, upright pots, without holes at the bottom. These are to be kept filled with water, and placed at regular distances close to and touching the pipes. So placed, the cultivator will find them exceedingly handy in syringing, saving the trouble of carrying and shifting the common garden pot filled with water for the same purpose. Sometimes I found it necessary to procure wide, shallow pans for such plants as *Miltonia spectabilis* and some others. In deep pots I found the leaves and pseudo-bulbs turned yellow, especially if too much exposed to the sun. I also found pots with holes at the sides very useful for many of the Indian Orchids—such, for instance, as the *Ærides*, *Saccolabiums* and *Vandas*.

Syringe.—Read's or Warner's, either of these is good. There should be three roses—one with very fine holes, one with medium sized, and one with wider holes. The first is useful to form a gentle shower—like dew, the second for general use, and the coarse one to force a heavy shower on the soils in baskets, and to wash off insects, previously lying the plants on one side. All these the amateur will find highly useful.

Watering-pots.—A large one to carry water and a small one with a long spout for watering plants at a distance.

Lastly, a convenient *potting-bench* of a good size, with a narrow

ORCHID ON BLOCK (*Cattleya labiata alba*).

board at the back and ends, placed in a warmed shed or potting-room, handy to the Orchid-house, and if possible with a door opening into the house, so that the plants when removed to be potted will not be exposed to a sudden change of temperature, will complete the list of necessary apparatus for the Orchid-grower.

ORCHIDS ON BLOCKS.—There are many of the most rare and very lovely Orchids that do not thrive well in either pots or baskets. In their native habitats they are found growing on branches of trees, the roots clinging to the branches or swinging in the air, from which they appear to draw their nutriment. We imitate this mode of natural growth by placing such plants on logs of wood suspended from the roof of the Orchid-house. I have used various kinds of wood for this purpose, and from many years of experience I have come to the conclusion that the branches of the *Robinia pseudo-acacia* are the best for them. It is the common hardy *Acacia*, commonly so called, a tree now well known. I use it without the bark, which easily peels off when the branches have been cut off for a year or so. The next best, when the *Acacia* cannot be procured, are branches of the Cork tree, then of the Oak, and lastly, of the Elder tree, any of which will answer the purpose. The Cork branches I have used with the bark on, because the bark of that tree does not so easily decay. The objection to logs with bark on is, that when the bark decays woodlice and other insects secrete themselves behind the bark, and issue thence at night to prey upon the young roots, shoots, or flower-stems.

The way to fasten the plants to the logs is easy enough. The log being ready, with a piece of wire fastened to it to suspend it by, then have ready some small wire and some green moss. Hold the plant with the hand close to the log, and also some moss, then wind the wire round the log, catching hold of the plant at the same time, but be careful not to let the wire press too tightly on the plant. The part best to lay the wire upon is that named the rhizoma, or root-stock, which generally is of a hard woody

texture, and, consequently will bear a gentle pressure. At the same time place a thin layer of green moss on the log, and some on each side of the plant. If it should happen that the root-stock is soft and fleshy, a little moss should then be put under the wire to prevent it from cutting the root-stock. The plant will, when it begins to grow, put forth new roots, and even the old living roots will send out branchlets of new roots. Some of these will catch hold of the log and wrap round it. Then if the root-stock swells, and the wire appears to strangle it, let the wire be cut in pieces to prevent further mischief. Some delicate species are better without any moss excepting a bit under the wire. These species I shall give a list of in the group below.

Size of the Blocks.—When the plant is large it should be placed upon a large block, but in order to lessen its weight it may be split in two. Such large blocks should have a stronger wire, which should be fastened to each end and suspended from the centre. Small plants, on the contrary, should have small logs, and the wire fastened to one end only, and a loop twisted at the other end to suspend it by.

I have been rather minute in describing the different operations of potting, basketing, and blocking, which if carefully and rightly performed at the proper season will leave the plants ready for the next equally important operations of watering and syringing—operations that require particular and constant attention during the whole period of growth.

WATERING.—Plants in pots and baskets, when newly placed in fresh compost and just beginning to grow, sending forth new roots and shoots, should have very moderate supplies of water, and that should be given round the edges of the pots or baskets, so as not to wet the plant at all. I use for this purpose at that season a small pot, with a long small spout without a rose. The operator has with such a pot a greater power over the quantity of water he ought to give to each plant. When the young shoots have half formed their new pseudo-bulbs, and the days have become longer and the sun more powerful, more water may be

given, and it may be extended close up to the plant. As a general rule, let the operator observe never to water an Orchid till it requires it, and let the quantity given be in proportion to the size of the plant and its state of growth. At the base of each new pseudo-bulb there is a kind of sheath. This sheath holds water; and when that bulb is young this water, lodging in the sheath in dark cloudy days, will have a tendency to rot the young shoot. In such a case the sheaths had better be carefully torn open to let the water escape. As the pseudo-bulbs increase in size and maturity the sheaths decay, and may then be removed entirely. When the pseudo-bulbs have reached this stage the greatest quantity of water should be given. Many of the *Dendrobiums* may be deluged with water daily; for upon the free application of water at that state of growth depends the full development of the growths. In their native climates there is, as is well known, a rainy season—that is, it rains heavily almost every day for many weeks: therefore it behoves the cultivator to give abundance of water, in order to get his plants well grown when the growing season takes place, more especially if the summer should be hot and dry. When the pseudo-bulbs have attained what the grower may judge their full size, then gradually reduce the quantity of water till the dark days of autumn arrive, and then no more should be given than will prevent the shoots from shrivelling too much. Frequently in winter once a-month a small supply of water will be necessary.

SYRINGING.—The same precautions must be used in syringing as I have described above for watering with the garden-pot. It may be freely used during the summer morning and evening; but in spring and autumn the syringing should be done only in the morning, when the sun is likely to break forth clear during the day. To create a moisture in the air in the evenings of such days syringe the pipes and paths only. In all cases be careful not to syringe over the flowers, for the least drop of water will injure their beauty.

SOILS.—The soils necessary to grow Orchids with consist of turfy peat, fibry loam, sphagnum moss, leaf mould, cowdung pressed in cakes, charcoal, silver sand, and for drainage a large supply of crocks—that is, broken pots in at least three sizes.

Turfy Peat.—The best of all comes from the neighbourhood of Exeter, but very good may be obtained in various parts of the kingdom. It must be sought for where dwarf shrubs, grass and Ferns grow on it—the roots of these form the most useful part of it. It should be carted home and laid on a heap. When the potting season approaches a sufficient quantity for present use should be brought into the potting-shed; and when nearly dry should be chopped into pieces, and then the pieces pulled asunder with the hand. After that, pass it through a fine sieve to take out the finer particles; and what remains in the sieve is the part to be used for the Orchids. The finer parts may be used for young Azaleas or Heaths, or to mix with loam and sand for any young plants.

Fibry Loam will be needed for terrestrial Orchids. It will only require to be chopped into small pieces and used in that state. The surface of an old pasture taken off an inch or two thick forms the very best loam for this purpose. Like the peat, it should be brought into the shed to become dry and aired some time previous to being used.

Sphagnum Moss.—This is found in wet, boggy marshes, in some places very abundantly. It is collected with a long-toothed rake in dry weather, and laid up in a dry shed till wanted. In order to make it work easily and mix readily with the peat, it should be chopped pretty fine with a sharp, small hatchet, taking the dust out of it through a fine sieve: it is then ready for use.

Leaf Mould—This, as is well known, is formed with the leaves that fall in the autumn. It forms a large part of the compost for terrestrial species, such as Bletias, Anæctochiluses, Cypripediums, &c., and should not be too much decayed. Oak and Beech yield the best leaves for this purpose.

Cowdung.—I prefer this article best when it is collected par-

tially dried out of the cow-pasture. It should be laid on a floor rather thin, and patted down with the back of a spade, and lie long enough to become dry, and then be gathered up and put in a dry place till wanted.

Charcoal is a very useful ingredient to mix with the peat, loam, and moss, and also to lie upon the crocks used for drainage. It should be broken into pieces the size of a hen's egg or walnut, and be kept dry till required for use. A small quantity of silver sand should also be procured, it is used for some species.

Drainage.—For this purpose there is nothing better than broken garden pots. On breaking, separate them into three sizes, the largest to cover the hole at the bottom of the pot, and a thin layer upon them; then a second size, rather less, to lay upon the larger size; the third size should be not much larger than horse Beans. The greater part of a collection of Orchids grown in pots requires to be well drained—so much so, that the pot should be half filled with it. Stagnant water will certainly destroy the roots: therefore the cultivator must pay particular attention to this important point.

CULTURE.—The grower of these interesting and singularly beautiful plants having put up the house for them properly heated, the shading and arranging parts of the interior completed, utensils and soils in order, and a fair collection of plants procured, will then commence cultural operations, the most important of which is

POTTING.—The best season for potting will generally be in the early months of the year. The rule to know when a plant should be potted is whenever the buds at the base of the pseudo-bulbs begin to grow;—then the plant should be potted. Now, if too much heat has been given during the autumn, these buds may be prematurely started; but if the resting season has been properly managed, and moderate heat given during that season, no growth will take place till the turn of the year. Such being the case, then at the proper time remove such plants as have begun to grow into the potting-shed. Take a plant in hand, turn it

ORCHID IN POT (*Vanda suavis*).

out of the pot very carefully, taking great care not to break or bruise the roots. Very likely some roots will be found adhering to the sides of the pots so closely that they will not leave them without breaking. In such a case I used to thrust a thin-bladed knife, such as painters use to work their colours on the palette, down between the roots so fixed and the pots. With care and dexterity this may be done without injuring the roots. I have met with some bad cases where the roots were numerous and too firmly fixed to the pots to be got off with the knife. In such instances I have broken the pot very gently, removing as much of it as I could, and leaving the rest with the roots fastened to the pieces as I found them. Having by these means got the plant clear of the pot, then shake off all the old compost and examine the roots—all that are dead cut clean away to the living parts. Then, whilst the plant is in hand, look out for and clean away all insects, such as brown and white scale, black thrips, &c. If the white scale (the worst of all) abounds, wash the plant with strong soap water or Gishurst Compound, and cleanse the leaves also of any dirt or dust that may be on them. This washing being done, lay the plant down—the leaves will be drying whilst the pot for it is prepared. Let it be of a size in proportion to the size of the plant. Orchids, however, require larger pots than most other plants, because they have mostly larger and longer roots. The fresh pot should be quite clean inside and out. Begin to drain it by laying a large piece of broken pot over the hole or holes (for large pots should have three holes), prop this crock up with a small piece on one side, place other large pieces upon this central one, then the next size, and, lastly, the small-sized potsherds. Upon them place a thin layer of pieces of charcoal, and then put in sufficient of the right kind of compost to raise the plant a little above the rim of the pot. Small plants may be raised one inch, middling-sized two inches, and large ones from three to four inches. Each plant should stand as if on a little hillock in the centre of the pot. Make the compost firm, working it in amongst the roots. Then,

if the plant does not stand firm of itself, thrust in some sticks and tie the pseudo-bulbs to them in a neat and tidy manner; set the plant down on the floor, and take the syringe with the coarsest rose on it, fill it with milkwarm water, and, holding it very near to the compost in the pot, force the water out all over it, being careful not to wet the plant. This settles the compost, giving it a neat, even appearance, and finishes the operation. Carry the plant into the house and take the next plant in hand, repot it in a similar way, and so proceed till all are potted that require it at that time. The above directions refer to the epiphytal species. Terrestrial species require a somewhat different mode.

TERRESTRIAL SPECIES.

POTTING.—The earth-growing stove Orchids are found mostly in thickets and open glades of forests in tropical regions, growing in a continually increasing decomposing vegetable soil, rich, unctuous and moist. In order to succeed well we must imitate this soil. I can give an instance of successful culture of one of the most beautiful of terrestrial Orchids—I mean *Calanthe vestita*, which I saw in the stove at Summerfield H. Micholls, Esq., near Manchester. This successful hit was achieved by Mr. T. Baines, the gardener there, a most zealous and persevering cultivator of Orchids. He grows this species in a rich, strong compost of fibrous lumps of loam, leaf mould not too much decayed, and flakes of dried, cakey cowdung, the whole mixed with small pieces of charcoal. He selects the strongest and nearly equal-sized pseudo-bulbs, eight or ten in number, when they are starting to grow, and plants them in his compost in a large pot, just covering the lower part of the bulbs. Very great was the success that attended this mode. They grew strong and flowered magnificently. The pseudo-bulbs were the largest I ever saw. The same method has been adopted for several years with the same success. The small tubers are potted in small

pots and grown on till they are large enough to be put into a large pot to form a good specimen. There are several species that may be grown in the same way and in the same compost, but others will not bear so rich a compost. *Cypripediums*, for instance, thrive better in fibrous peat and leaf mould mixed with sand and charcoal.

In potting there is this difference between epiphytal and terrestrial Orchids—whilst the first thrive best if raised on a small hillock in the centre of the pot, the latter should be potted like other plants, level or just below the rim of the pot. The same season for this work, however, is suitable for terrestrials—namely, the spring of the year, and also the same attention is requisite in having the fresh pots clean, and draining well, and in cleaning the leaves of such as are evergreen. In the grouped list below, the different composts for each genus are described. To that list I refer the reader.

BASKETING. — A considerable number of epiphytal, and a few terrestrial Orchids, require to be grown in baskets, inasmuch as they have the peculiarity of sending their flower-stems almost perpendicularly downwards, showing evidently that they either grow on branches of trees or in crevices of rocks. If such are grown in pots, it is evident that the flower-stem growing downwards and being confined amongst the soil in the pot must rot, and thus render the care and attention of the cultivator, so far as the blooms are concerned, abortive. To prevent this misfortune, the attentive growers long ago adopted baskets, or placed the plants that had this peculiar habit in piled-up square pieces of peat, through which some of the flower-stems pushed and flowered well. I once had a large plant of *Stanhopea oculata* so grown, which produced no less than seventeen long flower-stems, with from six to seven large flowers on each. This plant happened to bloom when there was an exhibition in the Botanic Gardens at Liverpool. I took it there and was awarded the first prize for it. Notwithstanding this success, I do not recommend the growing of *Stanhopeas* in pots ; because in such

ORCHID IN BASKET (*Dendrobium formosum*).

a case the water runs off the hillock, and, consequently, does not feed the plant sufficiently to keep it strong continually.

The way to put these peculiar plants in baskets, and to renew the soil and basket as they require it, is as follows:—Having the baskets ready made of different sizes, then fix upon one of a suitable size in proportion to the size of the plant, and line the bottom and sides with a thin layer of long moss—sphagnum unchopped is the best. This moss is to prevent the compost from dropping through the bars of the basket, and also to keep in moisture. Upon the moss place a layer of the compost; after that take the plant out of the old basket or pot and examine the roots and leaves, cutting off all the dead ones from the former, and cleansing the latter from dirt and insects; also, removing as much of the old compost as you can without injuring the roots. Perhaps this old compost may be in lumps dry and hard, and the living roots are so firmly attached to them that to remove them from the lumps in that state would simply be impossible without breaking, and, consequently, destroying them. In such a case place the ball in warm water for a sufficient time to thoroughly soak through and soften the clods, then set the plant to dry, and when in the right state the old lumps may be removed easily enough from amongst the roots without injuring or breaking them. Having accomplished this point, then place the plant in the centre of the basket and fill in the compost all round it till the basket is full, keeping the pseudo-bulbs clear above the soil. That being done, then place the basket with the plant in it on a large pot, take the syringe with the coarsest rose fixed on it, fill the syringe with tepid water, and, holding the end pretty close to the soil, force the water strongly through the rose on to the soil, going round the basket all the while. This watering in this manner will settle the compost effectually, and will leave the surface smooth and even. Then with a pair of scissors trim off any loose pieces of moss that may have protruded through the bottom or sides. This gives a neat finished appearance, always desirable to any plants.

Young plants of such as eventually require baskets may, whilst they are small, be advantageously placed on blocks of wood; and when such have made pseudo-bulbs that are likely to flower, they may for a year or two be placed in a proportionate-sized basket without being taken off the log. The plant will grow much better than if it was torn off the block at once on transferring it to the basket. As the block will in time decay, the plant can then be easily detached from it when it needs a new basket, and will have done much better with the log in the basket than without it.

SUMMER TREATMENT.

In describing the summer treatment of these beautiful plants there will necessarily occur some slight repetitions of operations already alluded to. I allude more particularly to the modes of potting, basketing, and blocking, and also to watering and syringing (for full directions on these important points see former instructions). I consider the summer months in the Orchid-house to be April, May, June, July, and August, and I think it will be most useful if I give the heads of the operations for each month separately.

APRIL.—The days will now be of nearly equal length with the nights. The sun will frequently be powerful during the middle of the day. When that is the case shading should be resorted to. The blinds should be let down by ten o'clock in the forenoon on the eastern side (if the house is a span-roofed one), drawn up at noon, and let down on the western side till three o'clock. Syringe the plants lightly, especially those on blocks, every fine morning. Keep the air of the house moist, and increase the heat from 5° to 10° more than last month, especially during bright sunshine. Finish potting all plants that are growing. Stanhopeas and other species that flower downwards through the soil should not be potted or put in new baskets till the bloom is over, for fear of injuring the flower-stems. To

encourage the flowering of such plants let them be steeped in tepid water once or twice during the month.

Some *Denbrobiums* will now be in bloom, remove such into a cooler house to prolong their bloom.

MAY.—Attend to shading as directed for last month. Give an hour's longer shade at each end of the day. Continue to repot all the plants not done last month. This is the month for repotting the plants growing in the cooler house—such, for instance, as *Cattleyas*, *Oncidiums*, *Lælias*, and *Epidendrums*. The drooping-flowering varieties as they go out of bloom should be put into fresh baskets and fresh soil. Should it not be thought advisable to repot or rebasket any plants, such should have the pots clean-washed and the top part of the old compost removed without injuring the roots, then put on a surfacing of fresh compost, and give an ample watering.

The quantity of water given to the plants may be increased during this month. The Indian species—such as *Ærides*, *Vandas*, and their allies, should have abundance of water now to encourage growth in both roots and shoots. The temperature during this month should reach the highest point.

Use the syringe freely morning and evening, avoiding the flowers as much as possible. During this month slugs and cockroaches will be numerous; see to their destruction most diligently. Visit the house with a candle or bull's-eye lantern after dark, and kill all those enemies you can find.

Observe the flowers as they open, and remove them either into a cooler house, or to the cooler and most airy part of the house where there is but one devoted to these plants.

JUNE.—South American plants during this month will be growing rapidly, *Catesetums* and *Cyrtopodiums* especially. Such should be regularly watered, increasing the quantity as the shoots advance in size—taking care, however, that no water lodges in the hollows formed by the young leaves. I have used beneficially to *Cyrtopodiums* a weak liquid manure just at the period when they were growing most freely. This enriched

water caused the plants to make very strong pseudo-bulbs, which flowered freely the following year. Shade during this month most particularly, for the leaves being young they are more liable to be scorched. Air should be given freely, but let it pass over the warm pipes in entering the house.

Cattleyas and Lælias should be grouped together, for they never require so much moisture as the Indian species. All Orchids, however, should be allowed to become dry once in the twenty-four hours. Should any plants have made their full growth towards the end of the month, give them less water to induce a gradual going to rest.

JULY.—When weeds appear let them be plucked up whilst young. If allowed to attain any size the roots when drawn up will bring away portions of the compost. Amongst the peat there will often appear young Heaths. These are not ugly and may be left to grow to a certain extent. When they droop the soil is dry; hence they serve as hydrometers, and are, as such, useful to show when the soil requires water. I have thought, also, they take up noxious matters that otherwise would injure the delicate young roots of the Orchids. Continue the same attentions as directed for June. The days will now be long, and often dry and sultry. During such weather the floors, walls, stages, &c., should be kept flooded with water during the day, and the syringe should be used for all growing plants, morning and evening. Let the plants in baskets be dipped in the cistern twice a-week, and watered freely on intervening days. The growths of most kinds will be progressing rapidly, and should be encouraged to the utmost, more especially such species as are found under the names of *Ærides*, *Vanda*, *Saccolabium*, *Angræcum*, *Renanthera*, and *Phalænopsis*.

As recommended for May, all blooming plants should be placed in a cooler and drier atmosphere to keep the flowers longer in perfection. Let the shading continue to receive attention, but use it only when the sun shines, either in this month or any other. Let attention be given to all plants that

have fully made their year's growth, give such but little water and very slight syringing, and that only in the morning. Remove such into a cooler and drier house. Let the grower bear constantly in mind that all Orchids with pseudo-bulbs require a decided rest for several months, and let him try to put his Orchids into that state during the dark days of winter. On the contrary, Orchids that have simple ordinary stems with evergreen leaves should be kept just slowly growing all the winter.

AUGUST.—This, like July, is often a warm month. Hence the shading should be continued on bright, sunny days, but it may be removed by four o'clock in the afternoon. Keep up a supply of moisture to plants that are growing, both in the air and at the roots. In this month the beautiful *Cattleya labiata* is in great beauty of bloom. Be careful not to wet these splendid flowers. The texture of the floral leaves is so delicate that every drop of water leaves a disfiguring mark behind it. In this month such species as flower when at rest should be removed into a more temperate place, have plenty of air, and scarcely any water for two or three months. Then when the flower-buds show prominently remove them into a rather warmer but no moister place. The following are instances of the kinds of Orchids alluded to—*Dendrobium nobile*, *cœrulescens*, *Cambridgeanum*, &c. Others that require a warm, dry treatment when in flower require only to be kept drier in this month. Such flower just before they begin to grow—as, for instance, *Dendrobium aggregatum*, *formosum*, and *densiflorum*. They should be kept in a moderately warm but dry part of the house till the flowers begin to open. Most of the terrestrial Orchids will now begin to show symptoms of requiring rest, by their leaves turning yellow and stems dying. Set such at once in a cool, dry house. The genus *Cœlogyne* flowers just when the pseudo-bulbs are fully formed: hence they should be kept growing till then. The blooming season for some of the best is January and February, though some bloom in summer. Observe their

different seasons and treat them accordingly. During these summer months wage a constant warfare with insects, and, if possible, destroy them before they lay their eggs. By doing that the next year's production of these enemies will be greatly reduced.

WINTER TREATMENT.

APPLICATION OF WATER.—*Syringing.*—During this season most of the Orchids should be at rest, or preparing for that state, and, therefore, do not require syringing, especially such species as have pseudo-bulbs. Some few, however, that are of an herbaceous habit, as, for instance, the genus *Huntleya*, require the constant use of the syringe all the year, because in their native habitats they grow near the spray of waterfalls. Also, such of the Indian species as have no pseudo-bulbs should on the mornings when the sun shines have a gentle dewing from the syringe. This class of plants, of which *Ærides* is the type, if exposed for a long time to a high, dry heat, will be apt to shrivel, showing that they are perishing, or at least starving for want of moisture. Whenever this is perceived let them have such a syringing as may renew their strength. It is a good plan to place all such plants together in the house, in order that in wetting them others that do not need so much, or any in winter, may be kept dry. Plants that are grown on logs need more water from the syringe than such as are grown in pots: therefore, continue to moisten such even when at rest occasionally, to keep them fresh and healthy.

Watering with the Garden-pot.—In winter this implement will be very little required. Keep the compost just moist enough to prevent the leaves from drying up too much. The terrestrial species with bulbs should be placed on a shelf where no water can reach them when at rest. Others that are herbaceous and evergreen should have enough water to keep them gently growing. The genus *Cypripedium*, and similar genera, require watering all the year, but of course less in winter than

in summer. This partial cessation of moisture in dark, ungenial weather gives a kind of rest even to such species, enabling them to start into vigorous growth in spring, and flower more abundantly. The grower must be content with these general instructions on this important subject of watering in winter. Experience and observation must guide him as to the particular time to cease giving water to the plants when going to rest. With these few preliminary remarks on watering, I now proceed as I did on summer treatment, to give a calendarial monthly account of work to be done in the Orchid-house in winter, commencing with

SEPTEMBER.—In this month we have often cold nights : hence it is necessary to look in the early part of the month and see that the fireplace and hot-water pipes are in good order. When the thermometer out of doors indicates 45° in the morning, light the fire and raise the internal heat to 60° without sun, and 65° with sun. Let the fire die out at night, so that the heat may be lowest during the night. Shading may now be dispensed with. Let the blinds be taken down and stored away in a dry room. Give air only when the sun shines, and attend to syringing and watering as directed above.

OCTOBER.—The general stock of plants should now have perfected their annual growth. Many of the *Dendrobii* will be shedding their leaves on the perfected bulbs. These leaves should be removed as they ripen and decay to prevent mouldiness. All plants in that state should be removed to a cooler house to induce perfect rest. *Calanthe vestita* and some others will be in flower, and such ought to be kept dry on the foliage and flowers, but moist at the roots. See that the roots of *Cynoches* and allied genera are in a dry state, or they will perish and thus weaken the next year's growth. In this month collect soils, such as fibry peat, both with and without sand, sphagnum moss, cowdung, turfy loam, dried leaves, &c.; also, break pots, make hooked pegs, and order new pots if needed, so that when all these articles are wanted they may be ready at

28 WINTER TREATMENT—NOVEMBER, DECEMBER, AND JANUARY.

hand. Keep the fires going in cold weather as directed for last month.

NOVEMBER.—Proverbial for being dull, dark, and dreary. Such weather has its influence even upon plants in an artificial climate. The Orchid-grower will find it necessary to keep up a moderate dry atmosphere, and fires almost night and day. Should sunny days occur give a little air and raise a moisture by wetting the warm flues or pipes in the mornings only. Cold nights will now happen, and if moisture settles upon the leaves they will not be benefited but injured thereby. Keep down growths now, for shoots made now are sure to be weak if they manage to exist through the winter. Should any dust or green confervæ appear on the leaves or surface of the composts let them be removed, the first by washing the leaves with a soft piece of leather or sponge (I prefer the first), and the others with the finger and thumb, or a short, flat-pointed stick, always being mindful not to injure the roots. Look to the fires and keep up a drier atmosphere.

DECEMBER.—In this month we have often clear, bright, sunny days. If not very frosty admit air over the warm pipes, and steam the houses whenever such a bright day is likely to occur. Some *Dendrobiums* will now be showing their flower-buds. If desired to bloom early such should be removed to a warm part of the house, and others kept back by being cool. By this method the season of blooming may be greatly extended. Many of the American species, such as *Cattleya*, *Lælia*, &c., will now be making fresh roots, but let not the amateur be tempted thereby to increase watering them. The moist air of the house with slight syringing just on the roots, will be sufficient for them. Too much moisture would only induce premature, weak, non-blooming shoots. Use the fires just to raise the heat enough to keep the plants from suffering from cold. This is a good season to destroy insects, for the methods of doing which see *Insects*.

JANUARY.—Some plants during this month will be beginning to grow. The old but handsome *Phaius grandifolius* is an

example. Such should be freely watered and otherwise encouraged to grow on to flower. In this month the genus *Cyrtopodium* should be potted and gradually induced to grow, in order that its large pseudo-bulbs may be fully developed. Should the weather be very severe, and it can be managed, cover the roof with some light substance that will keep off the frost. This will be much better than forcing up a great fire heat. Give moisture in the mornings only, and air on all favourable occasions.

FEBRUARY.—As the days lengthen vegetation in the Orchid-house will begin: hence a little more water may be given as directed above. In this month the baskets containing Stanhopeas, Gongoras, and similar plants with drooping flowers should have a good soaking by dipping in the cistern. Let them sink gradually in the water, and keep a good look out for woodlice and other insects that will come to the surface out of the compost. Let them be caught and destroyed. Increase the heat 5° and give air on sunny days.

MARCH.—Many species may be potted in this month, provided a decided growing of the young shoots is observed. Plants on blocks should be looked over and retied, and fresh moss added. Some will require large blocks, let such be attended to at once. Dendrobiums will also be showing signs of vegetation, attend to them and give them fresh food in the shape of new compost. If the spring is early, a great part of the work instructed to be done in April may be done in this month.

INSECTS.

Every attention to grow Orchids well may be bestowed upon them in a proper manner; but if insects are allowed to increase to an injurious extent all the labour will be thrown away: hence Mr. Bateman, of Knypersly, says in his large work most emphatically, *Beware of noxious insects*. Frequently, when collections of Orchids arrive from abroad they are covered with white scale; and if they are sent in boxes, that destructive insect the cockroach will be found in great force. Such being the fact,

the importer will, or at least should, try to destroy every one before he places such plants in the house. In addition to these two, the following insects are too frequently found in Orchid-houses—namely, woodlice, thrips, large black and small white slugs, red spider, and sometimes, though rarely, the green fly. As such insects when they abound (which they will soon do if neglected), are so injurious to these my favourite plants, I shall lay before my readers the methods I have employed to destroy them.

WHITE SCALE.—This is the most pernicious of all the tribes of insects to Orchids. It first appears like a white speck on the leaves. It grows larger, lays eggs, which when hatched, by some means which I never could discover, the young creep away and fix themselves in clusters, and there increase again, and so on till the whole plant is covered with them. Feeding upon the leaf, they eventually destroy it, and finally the whole plant. I saw a plant that was much infested with this pest: the gardener washed them over with a weak solution of Gishurst Compound, and it completely killed them. I, however, have destroyed them years before Gishurst was heard of by a mixture of sulphur, Scotch snuff, and pepper in equal parts, dusted over them when steam was in the house. This mixture appeared to stick to them, and its pungent qualities killed them without injuring the leaf. No doubt with great care Gishurst would answer.

COCKROACHES are the next worst enemy, and are more difficult to come at. They secrete themselves in cracks of the walls, and also amongst the drainage of the pots, or any out-of-the-way corner during the day. I have captured great numbers by inverting a bell-glass and half filling it with sweetened liquor, taking care that a pathway for them was made to enable them to get to the brink of the vessel. Into it they fall, attracted by the sweet fluid; and there they are prisoners, being unable to travel up the smooth glass: this is an excellent trap for them. They are also trapped by laying slices of Turnips or Potatoes on the surface of the pots, and then taking a light at night, and

with a piece of wood, like the handle of a small painter's brush, stuck full of pointed wires, spearing them whilst feeding ; but the spearman must strike very quickly and suddenly, or they will be too nimble for him. Poison may be laid for them also. I have used lard and boiled Carrots crushed into a paste, both mixed with arsenic, and made into small balls and stuck upon short sticks. These baits may be stuck into the pots, baskets, &c., at night, and removed in the morning if any fear is entertained of the poison being eaten by domestic animals. All these methods to get rid of these pests should be diligently resorted to and followed till not one is left alive.

WOODLICE.—In old houses more especially these devourers will abound. They also, like the last-named insects, secrete themselves during the day. I have found them in the drainage and in baskets. The poison recommended for cockroaches will kill these also. I have got rid of great numbers by the following plan:—When the compost in the baskets is dry I take them down, and gradually force the basket down into the cistern. The insects do not like wet : hence, as the basket descends, they creep upwards and finally appear on the surface. They are then easily caught and killed. I have found that two or three toads will devour great numbers of woodlice. It is a curious sight to witness the toad catch his dainty morsel ; but the spectator must be very sharp, for the toad darts out his tongue and draws in the insect as quick as lightning.

THRIPS.—These tiny enemies feed on the under side of the leaves. They only abound in cases of great neglect. The sponge is the best remedy for them. By washing the leaves with it, using tepid water, the plant may be cleansed ; but the operation should be performed in a warm shed, or some of the insects will escape. I have killed them also by filling the house with tobacco smoke.

LARGE BLACK SLUGS.—If one or two of these voracious enemies find their way amongst the Orchids, they do a serious mischief by feeding upon the young roots, leaves, or flower-stems

32 SMALL WHITE SLUGS, RED SPIDER, AND GREEN FLY.

when just starting. They may be easily traced to their concealment by the slime they leave behind them.

SMALL WHITE SLUGS frequently abound, especially after repotting. Most probably they are brought in amongst the new compost. As they are so small they are not as easily found as the larger species. The only way I could ever find out to catch them was by laying slices of Potatoes, Cabbage and Lettuce leaves, in the places they resort to, turning these traps over every morning or in the night, and destroying them directly.

RED SPIDER.—Though this formidable tiny enemy seldom abounds amongst Orchids on account of the moisture, yet, when the plants are at rest and little water used, they do appear; and by feeding upon the foliage of such plants as are of a thin and delicate texture, they turn them yellow and cause them to be sickly. Like the thrips, the best and most effectual remedy is washing the affected leaves with a sponge dipped in warm water. Sulphur laid on the warm pipes like paint is a good preventive. Should a plant be much pestered with them, it is a good plan some warm day to lay it on one side on grass, and give the under side of the leaves a severe syringing. Do this in the morning, and then the leaves will become dry before night.

THE GREEN FLY is, as every gardener knows, effectually killed with tobacco smoke; but it must be carefully used, never allowing it to break out into a flame.

In conclusion, I would press upon the cultivator never to tire in keeping these tiny enemies in complete subjection. Use all the above means, if necessary, for their destruction. Whenever a root is observed to be bitten off at the end, or a leaf spotted, look diligently out for the spoiler and destroy it. It is much easier to keep a collection of plants clear from insects by destroying them before they begin to breed than if they are neglected.

DISEASES.

Happily Orchidaceous plants are not subject to many diseases. **THE SPOT** is the most common and the worst, and is most

prevalent on the Indian species, such as *Ærides*, *Saccolabiums*, and the like. It is brought on by excessively forcing the plants to grow, thus extending and stretching the cellular tissues, till in one or more parts they rupture; and the part so torn rots and thus causes a black spot, which spreads and eventually destroys the leaf, and too often all the young leaves at the top of a shoot. The only remedy is to cut off all the affected leaves, and place the plant in a lower and drier temperature, till fresh healthy shoots and leaves are produced. It is a bad practice to force young plants to grow too rapidly, for the sake of quickly making a large plant. Keeping them in a high, moist temperature all the year will almost be certain to bring on this disease.

MILDEW also will occur, but it is brought on by a cold damp atmosphere. The genus *Anectochilus* is very subject to this, owing to being kept under a bell-glass in winter. The stagnant moist air brings on black mildew, the beautiful leaves perish, and the cultivator asks, Why? The reason is plain enough—the cold damp air has caused the mischief. The remedy is, Keep the plants drier, give more air, and, when the warm long days arrive, fresh shoots will spring up as healthy as could be wished for.

EXTRA POINTS OF CULTIVATION.

Under this head I have to describe some peculiar methods of growing a few species which I would not notice in the general instructions before given.

ÆRIDES, *SACCOLABIUM* AND *VANDA*.—These plants have no pseudo-bulbs, but only a rather woody stem clothed more or less densely with leaves; and these stems generally, if not always, send out strong roots. Bearing these facts in mind, the cultivator will at once perceive that they require more moisture than such species as have those reservoirs of life which are technically named pseudo-bulbs.

CAMAROTIS PURPUREA.—A most beautiful species, introduced

CAMAROTIS PURPUREA.

by Mr. Gibson from the foot of the Khoseea Hills in India. The best way to grow it is to procure a straight, thick branch of Oak, and tie round it a thick covering of long moss, and then tie several shoots of the *Camarotis* round it. The shoots send out roots, which soon lay hold of the moss, and root into it prodigiously. During the growing season the plant should be kept very moist with the syringe: it will grow stronger by this treatment than by any other. It should then have a period of rest, and will flower in the spring most profusely.

CATTLEYA CITRINA.—Here, again, is a lovely fragrant flower: the plant that produces it requires a peculiar treatment, which if not given the plant will die. That treatment is in accordance with the habit of the plant in its mode of growth. The generality of even Orchids send their shoots upwards; but this species sends them downwards: hence it is necessary to humour it by fastening it on a log with the last-made pseudo-bulb underneath. So placed on the log, the plant appears to the uninitiated to be, as it were, turned topsy-turvy, or upside down. I have proved, however, repeatedly that grown in any other way the plant will not long survive such wrong treatment. In every other point of culture treat it the same as its congeners.

EPIDENDRUM BICORNUTUM.—This fine species when well grown is almost as handsome as a *Phalænopsis*; but it is a rather delicate plant. The only way I could succeed with it was to place it on the upper end of a thickish, round, short branch cut level, and fasten it to the block with fine wire, on a thin bed of moss. When grown in a pot or on a log in the ordinary way the young shoots invariably perished, and in time the plant died, as a matter of course; but when planted on the top of a branch the young shoots grew and perfected pseudo-bulbs, which in due season flowered well. The branch was not suspended, but placed upon a shelf not far from the glass.

EPIDENDRUM RHIZOPHORUM.—This species has very long, slender shoots, and the brilliant flowers are produced near the top. To bring them within view the plants should be grown in

a wide, shallow basket lined with moss, and filled with the usual compost. Then every shoot should be bent down, and coiled round and round within the basket, which should be suspended near the glass. In time there will be a dense mass of shoots, the ends of which will just turn up a few inches, and thus when in flower there will be a large number of umbels of scarlet flowers truly splendid. It is a hardy species, and will bear a low temperature in winter when at rest.

LÆLIA SUPERBIENS. — Another odd-growing species. The peculiar treatment that it needs is simple enough. It neither requires a pot, a basket, or a log. All that is needful is to suspend it from the roof without anything at all but the wire to hang by. In that way the large splendid specimen lately in the gardens at Chiswick was cultivated, and no plant ever grew better, or produced finer flowers and new pseudo-bulbs annually. Whoever procures a plant of this fine species should profit by this example, and treat his plant in that peculiar way.

PAPHINIA CRISTATA. — A West Indian plant, producing large and beautiful flowers. It requires a peculiar treatment to grow it well. Take a wide, shallow pot, drain it well; then have ready a number of square-cut pieces of fibrous peat; with these form a wall, as it were, on the margin of the pot, and fill in the inside with rough peat and sphagnum moss; then place round a second layer of the square pieces, drawing them a little inwards, and fill up again with the compost. Proceed so till the space at the top is just large enough to hold the plant; then place it on it, and fix it there with more square blocks of peat. It will then stand upon, as it were, a pyramid of peat, and will soon grow quickly and flower freely. So placed it will bear a free supply of water, which it needs to grow satisfactorily. It is a lovely species, worthy of all care.

RENANTHERA COCCINEA. — An old, well-known plant, and very splendid when in flower, in which state, through mismanagement, it is rarely seen. It may, however, be flowered annually if the following culture is adopted. I suppose the reader has

a large plant that seldom, if ever, blooms. In April procure a large wide-mouthed pot, and also three or five long branches of Oak, or the common Acacia, or branches of Cork—any of these will answer. If the plant is small, three branches will do; if large, five may be necessary. These branches should be six or eight feet long. Fix them in the pot firmly by packing round them broken pots mingled with sphagnum moss; tie them together fast with some strong wire at the top; then take the plant with all its roots entire, cut into lengths, and place them round the branches at equal distances, fastening each to each corresponding branch. Do this just at the commencement of the growing season. Place the pot then in a situation where it will not be knocked over, and where it will have plenty of light and air. Keep it freely syringed, and in a warm temperature—say from 70° to 80°. It will grow freely, and produce short joints and large healthy foliage. Towards the end of summer reduce the heat, and give less water, in order to check growth, and give a degree of rest. It may not flower the following season, but by giving liberal treatment that year, and a rest in the winter, it will almost be certain to bloom every year afterwards. *Renanthera* blooms generally in the autumn.

SCUTICARIA STEELII.—In order to grow and flower this fine plant it should be fastened to a thick, short log, and that log placed just with a pot filled with moss. Its long leaves grow downwards, hence it is necessary to suspend the pot and log from the roof of the Orchid-house. The stems are short, and on them the large cream-coloured flowers, blotched with crimson, are produced. It is a native of Demerara in the hottest part: hence it requires a hot damp atmosphere when growing, and should be liberally syringed when in that state. It, however, should be kept drier, and cooler during the resting season.

VANDA TERES.—This species has round leaves placed on an upright, slender stem, from which, towards the top, the large, handsome flowers are produced. In order to form a bushy plant the long shoots should be shortened into lengths, and

trained upwards, either to an upright round trellis or to a stout branch. The shoots should be placed round the support at equal distances. The lower parts of the shoot will soon break buds, and form new shoots. By doing this you will have a low, dense bush; each shoot of it will produce several flowers, and thus the plant will form a handsome specimen. Like the rest of the genus, it requires a high temperature and plenty of moisture when growing; but less heat and moisture after the growth is perfected. It flowers during the dry season in India, and, therefore, will flower here just before it is put into a state of rest.

VANILLA PLANIFOLIA.—This is the plant that produces the far-famed perfume named, par excellence, Vanilla. In its native country, the West Indies, it climbs up the tallest trees, adhering to the stem and branches like our common Ivy, only its roots are ten times longer and stronger. I have cultivated it by first planting a young plant in a pot in the usual compost, and then nailing the long straggling shoots to the back wall of the Orchid-house, and keeping the wall moist during the growing season by syringing it and the plant every day. It grew very fast and sent forth numerous roots, which clung very tenaciously to the moist wall. In a year or two the shoots reached the top of the wall; I then trained them down the rafters, where they soon flowered and produced large bunches of their perfume-bearing pods. The same method of culture I found practised several years ago at Sion House, and with still more success, because the walls of the large tropical-house there were much loftier than the house I had under my care. The flowers themselves are large and handsome, of a yellowish-white colour, and the foliage is also large and of a rich dark green colour. I found the shade produced by the foliage was, during hot weather, beneficial to the plants underneath. As this plant is cheap enough it is worthy of culture, taking up no room and covering a naked wall with its large glossy leaves, and when old enough producing its fine flowers followed by clusters of its curious pods.

Notwithstanding this peculiarity, these Orchids require a season of growth, a season of rest, and a season to flower. The season of growth should be from May to August; the season of rest from September to February; and the season of flowering from March to June. During the season of growth a strong heat should be kept up, and the air kept saturated with moisture day and night. When the days begin to shorten fast, then induce a period of rest by reducing the heat and giving only just enough moisture to prevent the leaves from flagging. Growth will in consequence be in a great measure stopped, and the fluids condensed, and buds for flowering will be formed. Then, when the days begin to lengthen increase the heat, but with a very small amount of humidity. It is then the dry season of the tropics imitated; and by following this, as it were, thrice-divided treatment, the plants will flourish and flower abundantly. Too often Orchids are treated as if they required all the year a uniform condition of heat and moisture. When so treated they, it is true, grow constantly, but rarely produce flowers, because they are not allowed a season to form and perfect their flower-buds; and, besides that they are kept too moist when the flowers are produced. Let the young cultivator then think what his plants require, and give them the treatment that is right, and I venture to predict he will succeed both in growing and also obtain that which is the object of growth—abundance of flowers.

TREATMENT OF NEWLY-IMPORTED ORCHIDS.

There are many noblemen and gentlemen that have connections abroad, in countries where Orchids abound, and those friends send home large cases of Orchids. Collectors, also, for public gardens, and nurserymen when they meet with them, gather them and dispatch them to the parties who have sent them out for that purpose. I have seen, I might say, almost cartloads arrive and in a fair condition, but owing to mismanagement the greater part perished. I saw large patches of *Oncidium*, *Odontoglossum*,

Catesetum, Epidendra, &c., arrive in good health sufficient to stock a Crystal Palace. In a very few months the whole, or nearly the whole, except a few miserable bits, were dead. They were laid on a platform kept very wet and in great heat—great mistakes, indeed, in my opinion.

Now, if any of our readers should be fortunate enough to import a lot of Orchids, the first thing they should do should be to cut away all and every part that is dead, then examine every part for insects, and use the proper methods to destroy them. Then for the upright-blooming species procure a number of flat logs and fasten the plants to them. Do not cut up the large specimens—fasten them on blocks just as they have arrived. If there are a number of small bits that are alive, I advise them all, or as many of them as may be convenient, to be tied to a round log of a considerable length. Stanhopeas when they are imported require a different treatment. I once received a large mass just as it had been torn off its native bed. I cleansed it and placed it upon a simple raft of rods large enough to hold it. I put no moss or compost about the pseudo-bulbs, only fixing a wire at each corner, and, drawing them together, I then formed a loop, and thereby suspended the mass and raft to the roof. A great number of new shoots soon made their appearance, and the year after several flowers were produced. It proved to be one of the best varieties of *Stanhopea tigrina*.

Till shoots and roots are produced, very little water should be given, and the heat should be rather below that given to established plants. It is a great mistake to give stimulants in liberal quantities to Orchids that have had a long journey, perhaps shut up in boxes or Wardian Cases, and arriving in a shrivelled-up condition. The treatment should be analogous to that given to a sick or half-starved animal—just enough at first to revive the dormant living power, and to induce, as it were, a gradual return to a healthy and growing state.

When fresh roots and new shoots are produced, then the im-

ported plants may be potted, or put into baskets, or kept on the blocks just as the different species require.

GROUPED LISTS OF SELECTED SPECIES.

IN the following catalogue I have given the names of such species only as have either large, showy flowers, or flowers produced so numerously as to make a good display in the mass. In a botanical point of view, all Orchids, however small their flowers may be, are worthy of culture, but for general purposes or ornament, or for exhibition, the greater number of species are almost useless. Fortunately there are handsome-flowering species enough to fill any houses that may be devoted to them, especially if they are well grown into moderately-sized plants. I venture to say that there are not a dozen collections in all Britain that contain all the species in my selected list. I shall place them in groups according to the modes of culture they require.

1. STOVE ORCHIDS THAT SHOULD BE GROWN IN POTS in a compost of fibry peat, sphagnum moss chopped fine and sifted, the dust thrown away, and the whole mixed with small pieces of charcoal.

Ærides affine
 roseum
 crispum
 Fieldingii
 Larpentæ
 maculosum
 odoratum
 purpuratum
 quinquevulnerum
 Schæderii
 suavissimum
 virens major
Angræcum eburneum
 caudatum
Anguloa Clowesiana
 uniflora
Ansellia africana
Bulbophyllum Henshallii
 Lobbii
Brassia caudata
 maculata
 verrucosa
 Wrayii

Burlingtonia fragrans
 venusta
Catasetum atratum
 callosum
 citrinum
 cristatum
 laminatum
 Russellianum
Cattleya Aclandiæ
 amethystina
 bicolor
 candida
 crispa
 superba
 elegans
 granulosa
 Harrisoniæ (new)
 guttata
 Harrisonii
 intermedia
 labiata
 lobata
 Leopoldii

<i>Cattleya Loddigesii</i>	<i>Epidendrum macrochilum</i>
<i>maxima</i>	<i>album</i>
<i>Mossiae</i>	<i>roseum</i>
<i>superba</i>	<i>phoeniceum</i>
<i>Pinelliana</i>	<i>Schomburgkii</i>
<i>Regnellii</i> (new)	<i>vitellinum</i>
<i>Russelliana</i>	<i>Galeandra Devoniana</i>
<i>Schilleriana concolor</i> (new)	<i>Grammatophyllum multiflorum</i>
<i>Skinneri</i>	<i>tigrinum</i>
<i>Coclogyne cristata</i>	<i>speciosum</i>
<i>fuliginosa</i>	<i>Houlletia Brocklehurstiana</i>
<i>Gardneriana</i>	<i>Huntleya meleagris</i>
<i>speciosa</i>	<i>violacea</i>
<i>Cymbidium aloifolium</i>	<i>Leptotes bicolor</i>
<i>eburneum</i>	<i>Lælia acuminata</i>
<i>giganteum</i>	<i>albida</i>
<i>pendulum</i>	<i>anceps</i>
<i>Cynoches chlorochilum</i>	<i>autumnalis</i>
<i>Loddigesii leucochilum</i>	<i>Bryslana</i>
<i>pentadactylon</i>	<i>cinnabarina</i>
<i>Cyrtorchilum flavescens</i>	<i>flava</i>
<i>hastatum</i>	<i>Perrinii</i>
<i>maculatum</i>	<i>purpurata</i>
<i>mystacinum</i>	<i>Lycaste aromatica</i>
<i>stellatum</i>	<i>cruenta</i>
<i>Dendrobium aduncum</i>	<i>Skinneri</i>
<i>aggregatum</i>	<i>Maxillaria tenuifolia</i>
<i>albosanguineum</i>	<i>Miltonia atro-rubens</i>
<i>Blandyanum</i>	<i>bicolor</i>
<i>cærulescens</i>	<i>candida</i>
<i>calceolaria</i>	<i>Clowesiana</i>
<i>chrysanthum</i>	<i>Morelliana</i>
<i>chrysotoxum</i>	<i>spectabilis</i>
<i>clavatum</i>	<i>Odontoglossum Cervantesii</i>
<i>Dalhousianum</i>	<i>citrosium</i>
<i>densiflorum</i>	<i>grande</i>
<i>roseum</i>	<i>hastilabium</i>
<i>Falconerii</i>	<i>Insleayi</i>
<i>Farmerii</i>	<i>membranaceum</i>
<i>fimbriatum</i>	<i>Pescatorei</i>
<i>formosum</i>	<i>pulchellum</i>
<i>Gibsonii</i>	<i>Rossii</i>
<i>moniliforme</i>	<i>Warczewiczii</i>
<i>moschatum</i>	<i>Oncidium ampliatus major</i>
<i>nobile</i>	<i>Barkeri</i>
<i>majus</i>	<i>bicallosum</i>
<i>Paxtonii</i>	<i>Cavendishianum</i>
<i>sanguinolentum</i>	<i>divaricatum</i>
<i>secundum</i>	<i>flexuosum</i>
<i>taurinum</i>	<i>lanceanum</i>
<i>transparens</i>	<i>leucochilum</i>
<i>triadenium</i>	<i>luridum guttatum</i>
<i>Veitchianum</i>	<i>microchilum</i>
<i>Wallichianum</i>	<i>ornithorhyncum</i>
<i>Dendrochilum filifolium</i>	<i>papilio</i>
<i>Epidendrum aurantiacum</i>	<i>major</i>
<i>cinnabarinum</i>	<i>phymatochilum</i>
<i>Hanburii</i>	<i>pubes</i>

Oncidium pulvinatum
sphacelatum major
unguiculatum
Saccolabium ampullaceum
Blumei
majus
curvifolium
guttatum
miniaturum
retusum
Schomburgkia crispa
marginata
tibicinis
Trichopilia coccinea
candida
suavis

Trichopilia tortilis
Vanda Batemanniana
cœrulea
cristata
gigantea
insignis
Roxburghii
cœrulea
suavis
tricolor
Warrea tricolor
Zygopetalum cochleare
crinitum
Makayi
maxillare
stenochilum

2. STOVE ORCHIDS THAT THRIVE BEST IN BASKETS lined with moss, and filled with the same compost as described above for those in pots.

Acineta Barkeri
Humboldtii
Barkeria elegans
Skinneri
spectabilis
Brassavola Digbyana
glaucia
Perrinii
Chysis aurea
bractescens
lævis
Limminghii
Coryanthes macrantha
maculata
Cymbidium Devonianum
pendulum
Dendrobium amœnum
Cambridgeanum
Devonianum
macranthum
macrophyllum
onosmum
Pierardi

Dendrobium Pierardi majus
pulchellum
Epidendrum rhizophorum
Gongora atro-purpurea
bufonia
maculata
tricolor
lcnischi
nigrita
speciosa
truncata
Stanhopea aurea
bucephalus
Devoniensis
eburnea
graveolens
insignis
Martiana
oculata
quadricornis
saccata
tigrina
Wardii

3. STOVE ORCHIDS THAT THRIVE BEST ON BLOCKS OF WOOD, with a little moss tied over the roots.

Aganisia pulchella
Barkeria Skinneri
Broughtonia coccinea
Comparettia coccinea
Cattleya citrina
marginata
pumila

Cattleya superba
Lælia acuminata
majalis
Oncidium crispum
ciliatum
Oncidium bifolium
Forbesii

Oncidium Inseleyanum
 pectorale
 pulchellum
 tricolor
 triquetrum

Sophronitis cernua
 grandiflora
 pterocarpa
 violacea

4. STOVE ORCHIDS THAT THRIVE BEST ON LOGS OF WOOD
 half buried in moss in pots.

Phalænopsis amabilis
 grandiflora

Scuticaria Steelii

5. STOVE ORCHIDS THAT REQUIRE TO BE KEPT UNDER
 BELL-GLASSES, and to be grown in moss, sand, fibry peat, and
 leaf mould.

Anæctochilus argenteus
 pictus
 El Dorado
 Lobbii
 Lowii
 virescens

Anæctochilus Roxburghii
 setaceus
 cordatus
 intermedius
 striatus
 Veitchii

6. STOVE ORCHIDS, TERRESTRIAL SPECIES, requiring a com-
 post of fibry loam, sandy fibrous peat, leaf mould, and caked
 cowdung in equal parts, with a liberal addition of silver sand.

Bletia Guineënsis
 Parkinsonii
 Shepherdii
 verecunda
Calanthe curculigoides
 Masuca
 vestita aurea
 sanguinea
 veratrifolia
Cypripedium barbatum
 majus
 caudatum
 Fairrieianum
 hirsutissimum
 insignis

Cypripedium Lowii
 purpuratum
 venustum
 villosum
Peristeria elata
Phaius albus
 grandiflorus
 maculatus
 Wallichii
Pleione humilis
 maculata
 lagenaria
 Wallichiana
Uropedium Lindenii

ACANTHOPHIPPIUM JAVANICUM.

BRASSAVOLA CUCULLATA.

REPRODUCED BY THE UNIVERSITY OF CALIFORNIA

CYPRIPEDIUM CAUDATUM.

THE UNIVERSITY OF CALIFORNIA

CYPRIPEDIUM LOWII.

ODONTOGLOSSUM INSLEAYI.

ONCIDIUM LURIDUM.

VANDA SUAVIS.

VANDA CÆRULEA.

GREENHOUSE ORCHIDS.

THERE are many lovers of plants that would very much like to grow Orchids, but object to them because the notion is presented to their minds that they all require a great heat and peculiar treatment very difficult to understand and put into practice. It is quite true that Orchids from the West and East Indies, or at least the greater part of them, will not thrive well without a high temperature well saturated with moisture when growing; but it is no less equally true that there are a considerable number from more temperate climes that will thrive well in an ordinary greenhouse—that is, in a temperature averaging in winter from 40° to 45° , and in summer from 55° to 65° —a temperature easily attained during the last-named season without any artificial heat whatever.

Any amateur, then, in possession of a greenhouse may, without any doubt of success, begin to collect and cultivate these most singular and beautiful plants; and in order that such cultivators may have some idea how to proceed, I have thought it advisable to write a few papers on their culture, and shall give a list of the species that will bear what I call a greenhouse treatment.

In order to be better understood, I shall describe the right kind of house for them, then the soils they require, then potting, putting some on blocks, others in baskets, watering, summer treatment, winter treatment, insects; and, lastly, an alphabetical list of genera in groups that I know will grow in such a house.

THE HOUSE.—Any one having a common greenhouse may begin to collect a few species and grow them amongst the ordinary plants—such as Camellias, Azaleas, Pelargoniums, and New Holland plants; but when the collection has become extensive, then I would recommend them to be cultivated in a house of the same temperature, entirely by themselves. The best cultivators who have the means, always grow every large tribe of plants separately—such, for instance, as Heaths, Roses, Camellias, &c., and thus succeed much better than by mixing them indiscriminately together. This is a good method, and holds true also about Orchids from mild climates. Therefore, I recommend a house devoted to them alone where it is convenient or possible. The form of the house does not much signify, though in order to thoroughly enjoy every plant, a span-roof is the most suitable form. I would let it run from east to west, so that the one side will have all the morning sun, and the other all the afternoon sun. Glass sides are not indispensable, provided the angle is rather sharp—say 33° or 35° . A flattish roof is objectionable on account of drip. A stage of corresponding form to the roof should be in the centre, and a broad shelf next the front will be useful for low-growing plants, or for such that are deciduous. This shelf will be a suitable habitation when they are at rest. The house may either be heated with an ordinary flue covered in with dished tiles or flags, or, with what is better, hot-water pipes, with troughs to hold water fixed upon them.

Contrivances for giving air should be provided abundantly, both for letting in large supplies of fresh air, and for letting the over-heated air escape out at the highest part of the roof. That part may be made with a board a foot or more broad. At intervals of a foot apart, the board should be cut into long squares, and each of these hinged at one side, and a rack at the other. A long iron rod connected by a lever with each of those hinged pieces, should be so contrived as to turn round by a wheel and pinion at one end. By turning this each hinged piece will rise and thus give air and let out the heated air when necessary. To

admit fresh air at the bottom or lower part of the house, I have always found sliding panels in the wall the most convenient. These are made by first fixing a frame of wood in the bricks, and allowing it to project out sufficiently to allow the panel or shutter to slide in a groove cut in the frame outside the wall. The openings in the wall opposite the panels should be level with the pipes or flue. The air then becomes warm in passing over the heated surface, and is more beneficial to the plants. These contrivances of course apply to a house devoted entirely to temperate-loving Orchids, and approximating means should be adopted where possible to a greenhouse where other kinds of plants besides Orchids are grown. In such a house Orchids will do well, if every other point of culture is properly attended to.

SOIL.—There are two classes of Orchids distinguished by the terms *epiphytal* and *terrestrial*—that is, the first class grows on trees, and the second in the ground.

Epiphytal Orchids require a compost of moss, fibry peat, charcoal, and broken pots. The best sort of moss is sphagnum, a white kind that grows in swampy places. Fibry peat may be got from a dry common where Heath and the common Brake abound. The moss should be chopped small, and the peat broken into small pieces, and the fine particles sifted out; what remains in the sieve is that which must be used for Orchids. The moss and peat in equal parts, two of each, and one of broken charcoal, and one of broken pots, the whole well mixed together in a moderately dry state.

For ground or terrestrial Orchids, chalky loam, sandy peat, and leaf mould, in equal parts, are a good compost, though some thrive well in strong loam; and for others an addition of caky, dry cowdung should be used. In my list, I shall mention such as require these peculiar soils. The different materials for the various composts ought to be obtained in the summer months, and laid up ready for use in some place sheltered from excessive rains.

POTTING.—The season for this operation is later than for stove Orchids, because they do not start so early into growth. That

CYPRIPEDIUM SPECTABILE.

is the criterion to guide the cultivator. He must observe when the plants are beginning to grow and then pot them. A wide rather shallow pot for epiphytal Orchids is the best, and if ordered at the pottery costs no more than an ordinary pot. For ground Orchids, the common-shaped pot is the best. If old pots are used they should be scrubbed quite clean, and allowed to become dry before using. New pots fresh from the pottery should be put into water for an hour or two, then allowed to become dry before using. For Orchids that grow on trees, the pots should be thoroughly drained with broken pots. In fact, the pots should be half filled with drainage. Over the drainage place a layer of moss and charcoal. Let the size of the pots be in proportion to the size of the plants. Having got ready the pot, then take the plant and turn it out of its pot, and pick away all the old stuff and drainage. If it does not come out easily, it is very likely prevented doing so by the roots adhering to the side. If so, pass a thin, long-bladed knife carefully between the root and the pot. If that cannot be done without injuring the root, then break the pot in pieces very gently, and such pieces of the pot as hold the roots let them remain so, and put them altogether into the new pot. Hold the plant in one hand and work in the fresh compost with the other. Let the centre of the compost be raised a little above the rim of the fresh pot, so that the plant will stand as it were on a little hillock. Most likely it will be rather loose in the compost at first; and, therefore, to keep it steady, put in some short sticks close to the pseudo-bulbs.

The potting season is a good time to cleanse the leaves of the plants, and to clear off any scaly insects that may be on the leaves and pseudo-bulbs. The best implement for this purpose is a piece of thickish soft leather tied to a stick. This, when used, does not injure the tenderest leaves.

Proceed thus with every plant till all that are beginning to grow are finished. Then with a syringe wet the compost by forcing the water on it strongly, which will press down the compost, rendering the surface compact and smooth.

ON BLOCKS.—To the uninitiated nothing in culture seems more strange than that flowering plants should grow and bloom on dead logs of wood; and it is one of the amateur's pleasures to show his friends his plants on such blocks, and to explain to them that such plants grow in their native wilds on branches of trees. I was in company only this week with a traveller who had been in Demerara, and, speaking of Orchids, he told me that when a colony of white ants attack a tree they gnaw away the lower part of the bark, which of course kills the tree, and on that dead tree the Orchids immediately appear, and soon clothe it with their foliage and blossom. He had seen many instances of this remarkable fact when pushing through the uncultivated forests of that part of the world. This fact is confirmed by the state in which Orchids arrive in this country that have been collected by botanists, and sent home.

The branches the Orchids are attached to are always in a dead, dried-up state, showing that the Orchids are not true parasites like our Mistletoe, which live and thrive *in* the tree, but true epiphytes, which grow *on* the tree, drawing their nourishment from the moist air and the dead leaves and twigs collected together in the forks of the branches: hence the ingenious cultivator places his Orchids, or at least such as have been proved to thrive best that way, upon blocks of dead wood.

Various kinds of wood have been tried for this purpose—such, for instance, as the hardy Acacia (*Robinia pseudo-acacia*), Cork branches cut into suitable lengths, Oak branches also, and large branches or stems of the common Elder tree. I have placed the various kinds in rotation according to what my experience as a grower of Orchids for thirty years has proved their merits. Excepting the Cork branches, I prefer the blocks naked—that is, without their bark, chiefly for the reason that the bark as it decays is a harbour for woodlice, cockroaches, and other root-eating insects. Having, then, procured the branches, cut them into suitable lengths and thickness, according to the size of the plants; then procure some copper wire of a moderate strength.

Cut it into lengths, make a small loop at each end, and drive a copper nail into the block at each end through the loops. The block is then ready for the plant. Have ready some nice green moss; fix the plant on the upper part of the branch; hold it there, and place some of the moss around it, and then tie the moss and the roots of the plants firmly to the branch with some fine copper wire. With a pair of scissors clip off any loose moss, leaving the plant in a neat tidy state. Then suspend it from the roof, either on a long iron rod well painted, or on large-headed copper nails driven into the rafters. The logs should hang down at least eighteen inches from the glass, so that none of the leaves will be close to it. Here they require no further care, excepting syringing, on which point I shall speak more fully hereafter.

IN BASKETS.—There are not many species that will thrive in a greenhouse temperature that require baskets; but as there are some which the reader will find grouped together hereafter, I must briefly describe the kind of basket that will grow them best, and the mode of making those baskets. Rods of Hazel about the thickness of a man's finger are as good as any, and most easily procured. The baskets should be made of a size suitable to the size of the plants: one four inches square is suitable for the smallest plants, and two inches increase of size will answer for the next size of plant, and so on as the plants are or become larger.

I prefer baskets made of rods of Hazel, or any other wood most easily procured, to any other material. Rods well dried are better than green ones, because they are not so liable to split. Cut the rods into suitable lengths; pare the ends smooth, and bore holes with a wire borer through each end of the rods. Then cut some copper wire into four suitable lengths, make a loop at one end of each so that it will not slip through the holes; then lay two rods parallel to each other, and upon them lay three others. Nail these to the two rods, and then you have the bottom of the basket in a form something like the bottom of a raft. Turn this over, and then lay two other rods, to form the other two sides. Draw the four wires through the holes at the

four corners, and then slip rods alternately down the wires till a sufficient number are laid to form the basket. Then bring the wires together at the top, give them a twist or two, and the basket is finished. Four inches are a sufficient depth for the smallest size, and add more in proportion as the greater size is required, making the rods at the sides and bottom thicker and longer in proportion to the size.

In putting the plants in the basket follow this plan:—Cover the bottom with moss, then put in a layer of the rougher part of the compost, and then place the plant in the middle, and fill round it with the compost exactly the same as for those in pots. Practice will make all this easy enough—much easier than it is for me to describe it. As soon as the plant is placed in the basket give it a good watering, and hang it up in its place.

WATERING.—There is no point of Orchid culture that is so important as due supplies of water. Two implements are necessary—viz., the garden-pot and the syringe, and I may add a third, a cistern. The first is to be used for plants in pots, the second for blocks, and the third for both blocks and more especially baskets. In applying this necessary element, due regard must be given to the state of the growth of the plants. In pots, water should be given in small quantities at first, and always with the chill off. When the growths are young give water round the edges of the pots so as not to wet the young shoots. Afterwards when the pseudo-bulbs are half swollen, give water more freely, and when they are nearly full grown, give water abundantly to cause large and free growth. Then, when the pseudo-bulbs are fully grown, begin to reduce the quantity of water, and gradually lessen it till symptoms of rest are perceptible. After that only give sufficient to keep them from shrivelling. Let the same ideas guide the cultivator in using the syringe. Plants on blocks when growing should be syringed morning and evening; but when the growths are young, and the days short and dull, syringe only in the morning. When the plants on logs are at rest, once a-week will be sufficient to keep them from shrivelling.

Plants in baskets should be taken down, when growing, every other day, and dipped in the cistern; and many plants on logs will be benefited by a bath in water occasionally in addition to the daily syringing.

In dry, dusty, hot weather, a due supply of atmospheric moisture should be attended to constantly. This may be attained by wetting the floor and walls. In such weather the plants will be greatly benefited by washing the leaves once a-week with a wet sponge. This cleanses the surface and clears the pores of the leaves, also keeps down various insects—such as red spider, scale, and thrips, and also gives a freshness and tidy appearance to the plants. Nothing looks more untidy and careless than seeing leaves covered with dust, green moss, or any other kind of dirt. This sponging is beneficial at any time of the year; only in winter, or when the plants are at rest, squeeze the sponge very hard before using, in order that no water may lodge in the hollows of the leaves. When the plants are in bloom, then the syringing must be dispensed with, as the flowers are easily spoiled by the application of water over them.

SUMMER TREATMENT.—During this period these plants should be encouraged by a liberal supply of moisture and heat, in order to make their growths. Those on blocks of wood should be well syringed on the evenings after a sunny day. In dull weather a slight sprinkling in the morning only should be given. If severely syringed in such weather, there is great danger of damping off the young shoots and leaves. On this point, therefore, the amateur must exercise his best judgment; for though, on the one hand, Orchids require plenty of moisture when in a growing state, yet if, as is often the case in our climate, there succeed several days in succession that are of a rainy damp character, the giving water then is not needed—at least not in abundance. Water at the roots of such as are grown in pots and baskets should be regulated by a similar rule—that is, water most freely in hot dry weather, but more gently in dark dull weather. The proper application of water is of the greatest consequence to these

plants. In watering, when the growths are very young, pour the water on out of a very small spout round the edge of the pot, only avoiding to wet the plants in the centre. When the new pseudo-bulbs are swelling freely, then water may be given more plentifully.

Air-giving.—In summer air should be given to these hardy Orchids freely. In fact, day and night in warm weather the temperature of the open air will generally be amply sufficient for them during June, July and August. In cold nights in the early and later months, the heat of the day may be economised by shutting up the house early in the afternoon, and not giving air so soon in the morning. In fact, the same heat as will suit a common Geranium or Fuchsia in a growing state will be amply sufficient for the Orchids comprised in the list below.

Orchids in baskets should be often examined; and if found dry in the centre they should be dipped in tepid water till the soil is thoroughly saturated. Weeds and insects during this season abound most, and should be extirpated diligently. The entire area of the house should also be kept sweet and clean—no decaying vegetable matter should be left in any corner or out-of-the-way place in the house. The above points of culture during summer are such as apply to such species as grow on blocks, in baskets, and in pots, and belong to the grand division named *epiphytal*—growing on trees. The other division—*terrestrial*, require during summer a similar treatment as to air-giving and syringing; but in watering, when they are growing freely, an addition of an occasional watering with liquid manure will add largely to the size of the foliage and bulbs: therefore let that be given to them say once a-week.

Towards the end of the summer, less water from any source must be given, gradually reducing the quantity. The end to be aimed at is, to get them to rest by the time the leaves begin to fall from the trees out of doors. I have sometimes and with some sorts, placed them out of doors in dry weather, in order to induce a state of inaction, placing them near a south wall on

boards or slates. By this plan I have caused the *Dendrobium speciosum* to flower, but this must be done with caution and care before the heavy rains set in.

WINTER TREATMENT.—This season commences about the middle of October, and continues till the end of March. During all this time the plants must be carefully watched. Should any appear to shrivel very much, they must have a small quantity of tepid water to just keep them, both roots and stems, in a fresh state. Terrestrial Orchids should have their decayed leaves removed, and be placed where no water can reach the soil in the pots. The earth though apparently dry will be moist enough to keep the bulbs alive and fresh. As soon as the spring arrives, then get ready all the necessary soils, and, when required, fresh blocks and baskets, and proceed to repot, reblock, and rebasket the whole collection as soon as the symptoms of fresh growth are perceptible. Give the interior a good cleansing, and also sponge the leaves and stems quite clean. This will end the winter treatment, and then commence the summer season.

As I intimated in the commencement of these papers, I shall now give a list of such Orchids as will grow in a greenhouse temperature. My space will not allow descriptions of the species, I can only give their names. If the amateur desires to see that, he must consult larger works on that point. I may here observe, that most of the Orchids that are found in Guatemala, New Holland, China, and other temperate climes, are proper denizens of our greenhouses.

EPIPHYTAL ORCHIDS FOR POTS IN THE GREENHOUSE.

Aspasia epidendroides,	Guatemala	Cynoches	ventricosum,	Guatemala
Batemanian Colleyi	do.			mala.
Bifrenaria aurantiaca	do.	Cymbidium	Finlaysonianum,	
Brassia brachiata	do.		China	
macrostachya	do.	Cypripedium	insigne,	Nepaul
Cattleya Skinneri	do.	Cyrtorchilum	maculatum	Russel-
Cynoches chlorochilum	do.		lianum,	Guatemala

<i>Dendrobium moniliforme</i> , China	<i>Epidendrum Stamfordianum</i> ,
<i>chrysanthum</i> , Nepaul	Guatemala
<i>densiflorum</i> ,* Nepaul	<i>Lælia acuminata</i> do.
<i>elongatum</i> , N. Hol.	<i>majalis</i> , Oaxaca
<i>linguæforme</i> do.	<i>Lycaste cruenta</i> , Guatemala
<i>secundum</i> , var. China	<i>Skinneri</i> do.
<i>speciosum</i> , N. Hol.	<i>Maxillaria Macclaii</i> do.
<i>tetragonum</i> , More. Bay	<i>Odontoglossum grande</i> do.
<i>Epidendrum aurantiacum</i> , Guatemala	<i>Oncidium leucochilum</i> do.
<i>macrochilum roseum</i> do.	<i>microchilum</i> do.
	<i>sphacelatum</i> do.
	<i>Renanthera coccinea</i> , China†

TERRESTRIAL ORCHIDS FOR GREENHOUSES.

To be grown in pots in loam, sandy peat, and lumps of cow-dung.

<i>Acianthus caudatus</i> , N. Holland	<i>Diseris aurea</i> , New Holland
<i>Bletia acutipetala</i> , S. Carolina	<i>caudata</i> do.
<i>hyacinthina</i> , China	<i>elongata</i> do.
<i>Calochilus campestris</i> , N. Hol.	<i>maculata</i> do.
<i>paludosus</i> do.	<i>Disa grandiflora</i> , C. of G. Hope
<i>Cymbidium sinensis</i> , China	<i>cornuta</i> do.
<i>xiphiifolium</i> do.	<i>graminifolia</i> do.
<i>Calophogon pulchellus</i> , N. Amer.	<i>Disperis cucullata</i> do.
<i>Caladenia alba</i> , New Holland	<i>Capensis</i> do.
<i>alata</i> do.	<i>secunda</i> , C. of G. Hope
<i>cœrulea</i> do.	<i>Eriochilus autumnalis</i> , N. Hol.
<i>testacea</i> do.	<i>Eulophia barbata</i> , C. of G. Hope
<i>Corysanthes bicalcarata</i> , do.	<i>streptopetala</i> , S. Amer.
<i>fimbriatus</i> do.	<i>longicornis</i> , Cape of G.
<i>Dipodium punctatum</i> do.	<i>ensata</i> [Hope]

* I have seen this species growing well in a greenhouse at Stratford.

† I have no doubt this Chinese Orchid will grow well, and flower better and more freely in a warm greenhouse than in a higher temperature.

Glossodia major and minor,	Pterostylis grandiflora,	N. Hol.
New Holland.	gibbosa	do.
Lyperanthus suaveolens do.	longifolia	do.
Neottia plantaginea, Nepaul	ophioglossa	do.
Pogonia ophioglossoides, North	reflexa	do.
America	Thelymitra angustifolia	do.
Prasophyllum elatum, N. Holland	Forsterii, N. Zealand	
flavum do.	media, New Holland	
striatum do.	venosa do.	
Pterostylis concinna do.		

GREENHOUSE ORCHIDS.—To be grown in baskets.

Barkeria spectabilis, Guatemala	Marmodes lineata, Guatemala
Catesetum deltoideum do.	Oncidium stramineum, Mexico
longifolium do.	Suttonii, Guatemala
Russellianum do.	Peristeria pendula maculata,
Cynoches ventricosum do.	Demerara
Epidendrum rhizophorum do.	Sarcanthus paniculatus, China
Gongora maculata, Demerara	rostratus do.
truncata, Guatemala	Stanhopea aurea, Guatemala

GREENHOUSE ORCHIDS THAT GROW BEST ON BLOCKS.

Cirrhopetalum Chinensis, China	Dinema paleaceum, Guatemala
Cyrtochilum filipes, Guatemala	Lælia peduncularis do.
maculatum, var. Rus-	Oncidium nebulosum do.
sellianum, Guatemala	Pleurothallis marginata do.
Dendrobium cucumerinum,	Rodriguezia maculata do.
New Holland	Sarcochilus falcatus, New
teretifolium do.	Holland

INSECTS.—In a cool moderate temperature Orchids are not generally infested with insects. Sometimes, however, they appear, and should be instantly destroyed in order to prevent their increase. The insects that prevail most on them are the black

thrips, the white scale, the cockroach, the slug, and red spider—all bad enough when they prevail to any extent.

The thrips not only feeds upon the leaves, but exudes a glutinous liquor, which stops up the pores of the leaves; which, together with the swelling out of the sap, causes the leaves to become blotched, gangrenous, and finally to perish. Frequent smokings with tobacco will destroy the living insects, also a dredging with Scotch snuff is a good agent for destroying them; but keeping the plants healthy and frequent spongings will generally banish this pest.

White Scale.—This insect is often found in large numbers on imported Orchids. The far-famed Gishurst Compound is the best destroying agent I have seen yet applied. I have, however, cleared plants of the scale by a mixture of sulphur, soft soap, and tobacco water.

Cockroaches arrive in this country amongst imported Orchids, both in the egg state and alive. There are many remedies advertised. Chase's Beetle Poison is as good as any. I have thinned the numbers of them by placing a glass vessel half full of sweetened beer in their tracks, and by searching for them in dark nights with a bull's-eye lantern, and with a pronged fork impaling them, or killing them with a flat piece of wood. I have been dreadfully annoyed in some mornings to find a nice young root eaten away, or a promising flower-shoot half gnawed through, by these insects; and so will every grower of Orchids, unless he wages war with them continually. So also with the white slug, or any other species of that ilk. In moist houses they can travel about easily; but with a little watchful care they may be traced to their hiding-places and destroyed.

The *Red Spider* is a tiny enemy, feeding upon the young leaves and turning them yellow. It may be kept under by washing the flues or hot-water pipes with sulphur water. Frequent sponging is also a preventive, and also a free use of the syringe on affected plants.

These are all the insects that I need mention as being destruc-

tive to orchideous plants, though sometimes the green fly will attack the young leaves and flowering-shoots. They are, however, easily got rid of by tobacco smoke; only be careful in burning it that it never burst out into a flame.

PROPAGATION.—My essay on the points of culture would scarcely be complete without a few words on how to propagate them. The epiphytal species may be increased by passing a knife through the rhizoma, or rootstock. At the base of each leaf or pseudo-bulb there is generally an incipient bud; this bud, when the rhizoma is cut in two, will swell, and finally produce a shoot. The cut may be left where it is till the first pseudo-bulb is perfected; then, at the time of potting, the cut part with its new young shoot may be separated from the parent plant and potted in the usual way. Terrestrial Orchids are of two kinds—namely, such as are herbaceous, as, for instance, the *Cypripediums*, and such as are bulbous like the *Bletia*. The first may be divided into moderate-sized sections, and thus make good plants at once. When potted, the second may be increased by detaching at potting time one or more small tubers, potting these into small pots for a season, and increasing the size of the pots year by year as they advance in size.

DENDROBIUM SPECIOSUM.

HARDY ORCHIDEOUS PLANTS.

IF any enterprising cultivator is desirous of making himself famous in the gardening world he should try to cultivate these elegant plants: if successful he would be doing a great service to his brethren by making known the means he has employed to succeed. Many have tried and failed, I verily believe, for want of perseverance. The means hitherto used for most of the British kinds has been to take them up with balls when in flower, and transplant them to the flower-border, where they soon die; or to put them in pots, and keep them in a cold frame, where they languish for a year or two, and then appear no more. On the other hand, some growers have been successful in growing some North American species very well. I remember my friend, Mr. Wm. Barnes, now a nurseryman at Peckham, exhibiting, some years ago, a large pot of *Cypripedium spectabile* as well grown as need to be wished, with nearly twenty fine blossoms expanded at once. This instance shows that hardy Orchids can be grown if only due pains be taken. I remember, also, when I was a youth, obtaining a large plant of our English Lady's Slipper, gathered near Settle, in Yorkshire; it had upwards of a score of what is technically called "rises" on it—that is, shoots; and every shoot I made into a plant by division, and every one grew and flourished as long as I had the care of them. The secret of this success arose from the fact, that I took heed to plant the

divisions in a similar soil to that in which the plant had grown in its native habitat, and planting them also in a similar situation to that in which they grew wild. This method must be adopted with every species in order to succeed in growing and keeping them. But then, again, they must be removed when perfectly dormant; for their fleshy, tuberous, or fibrous roots are so fragile when in a state of excitement, that to move them then is almost certain and early destruction. It may be asked, How are we to find them when no leaves are visible to show where the roots are? In answer I say, Look for them when in flower or foliage; mark the place securely, by driving a stake by their side, and then search for and remove them when they are in a dormant state. They are well worth this extra trouble.

Many of the species seed freely. Now, if the seed is gathered when ripe, and sown in a similar soil and situation to that where the parent plant grows, the seedlings will thrive well also. This is not an untried plan, for I have raised them so, and bloomed them too when they had acquired the proper age and strength.

By these two methods—namely, collecting the roots when at rest, and packing them in moist soil, and by gathering the ripe seeds, a great number of foreign hardy Orchids might be sent home by collectors; but then the collector should also send us some account of the localities each species was found in, and what sort of soil the plants grew in. Some are found on dry, chalky hills; others in loamy pastures; some in low thickets, and others under lofty trees in forest land; some in strong soil, others among decayed leaf mould, and others in sandy peat.

Now, if we receive plants from these different soils and localities of growth, and subject them to one uniform soil, is it likely that they will thrive and bloom well? Every experienced cultivator of any kind of plants would immediately answer in the negative. What, then? Are we to give up the attempt to grow these singular and beautiful plants? I say, Most certainly not. Let us try again and again, till success crowns our efforts. A partial success has been achieved, as I have mentioned above, and it only needs a

determined spirit to make that success more complete. But, says the reader, "Though I am quite willing, nay, desirous to try my hand at growing them, how am I to proceed, and where am I to procure the plants? Is there any work on this particular branch of horticulture?" In answer to these reasonable queries I reply, that in the following pages I will give the best instruction I can on their culture, giving a description of the different soils they require, the season and mode of potting or planting, watering, shelter, summer and winter treatment, diseases, insects, and a grouped list. Then, as to where they may be procured, the answer is, by collecting the British species, and by purchasing exotic species of nurserymen. If the demand for them should be great, enterprising dealers would be ready enough to send out orders to collectors, in Europe and America, to look out for and send home both roots and seeds; and, lastly, the cultural information about these plants is exceedingly meagre and scattered through large botanical works, not likely to fall into the hands of amateurs. There is no work or portion of a work on the subject that I know of, excepting Sowerby's "English Botany," and the "Botanical Magazine."

THE SOILS, OR COMPOSTS.—*Chalky Loam.*—This can only be obtained from places where chalk forms the substratum. The top spit will have sufficient chalk amongst it to serve the purpose. If that sort of soil is at a considerable distance, some lumps of chalk may be procured, and some fibry loam, the chalk be broken into small pieces and well mixed with the loam. Let it lay up in a heap for twelve months, and let be frequently turned over to incorporate them well together.

Loam.—Any pasture-ground will furnish suitable loam for the kinds requiring it. A thin spit from the surface, laid up and turned over till it is mellow, will suit such species as are found in meadow pastures. Some few species are found in boggy marshes: hence such a soil should be obtained and laid up in a shady place till it is wanted.

Loam and Sandy Peat in equal quantities will be wanted for

a large number of species. Let a sufficient quantity be procured and mixed together, and frequently turned to become amalgamated, mellowed, and fit for use.

Loam, Sandy Peat, and Leaf Mould.—This compost will be found necessary for most of the North American species, and also for such as are found in English woods, and for some European species. I have this compost prepared, mixed together and turned over for a few months to mellow.

Excepting the boggy peat, which I think is best to be kept in a shady place, all the other soils and composts should be placed in an open part of the garden fully exposed to the sun, which has a very beneficial effect upon them. There cannot be a greater mistake made than that of placing soils for delicate plants under trees, or behind a wall on the north side. Air and light are great mollifiers of soils; and the frequent turnings over of composts have the beneficial effect of exposing every particle of the soil to the air, heat, and light. I cannot press this part of the subject too strongly. I believe great mischief has been done to plants by using soils that have been laid up in improper places. Let the composts, then, be placed on a plot of ground fully exposed to the beneficial effects of the elements.

IN POTS.—The advantages of growing hardy Orchids in pots, are:—1st. The more complete command over the season of growth and the season of rest. If they are in pots they may be watered just as they require that element, giving them when first starting into growth a moderate quantity, just sufficient to moisten the soil, and gradually increasing it as the roots and foliage advance in action; and when the bloom is over and the foliage begins to decay, the water can be withheld and gradually reduced till the plants are completely dormant. Then the soil should be as nearly dry as possible, and kept so till the growing season returns. 2ndly. When in pots they can be easily and safely removed, and placed under shelter in severe weather; for although they are quite hardy, yet, being in pots, the frost would enter through the sides of the pots and endanger the safety of the fleshy

tubers. In the meadows or thickets the turf or the fallen leaves protect them sufficiently. The situation for the pots in summer should be on the warm east border, and the pots should always be plunged up to the rim. When at rest remove them into a cold frame or pit, and shelter them by a covering on the glass in hard frost. Keep the glass on in wet weather, but draw it quite off on dry, fine days.

IN BORDERS.—Some of the stronger-growing species, however, will thrive well in a border prepared for them, with the proper soil for each species. This border should be formed with boards or slates at the sides, raised six or eight inches above the general level of the ground; and the bed of soil should be well drained and kept an inch or two below the edgings. Then when the leaves are decayed, the border may be covered either with boards or hoops, and oiled canvas, to throw off the heavy autumn and winter rains; for heavy rain, and consequently saturated soil, are certain death to these lovely plants.

Potting and Planting.—As will be easily surmised, the best season for repotting is just when the buds begin to swell. As soon as that is perceived, prepare the different soils for them by placing a sufficient quantity under cover to dry and become moderately aired. Prepare also larger clean pots and plenty of drainage. Broken unburnt limestone makes a good drainage for kinds that require chalky loams. For others, broken garden-pots will be better. Such as are in pots should be brought from their winter quarters and placed handy near the potting-bench, then drain several sized pots to be ready, and then carefully turn the balls out of the pots. Pick away quite as carefully the old drainage and part of the soil, being careful not to wound the tubers or fibres. All dead roots, of course, should be removed. Then place some rougher parts of the compost over the drainage, and upon that a sufficient quantity of soil to bring the ball nearly level with the rim of the pot. If the plant is strong, and evidently larger than it was at the last shifting, then give it a larger pot; but if not, one of the same size, but a fresh one, will

answer. Fill the fresh compost in round the ball, cover the top of it about half an inch, or in proportion to the size of the plant; but beware of deep potting, for that is injurious to the plant. When the pot is full press the new soil down gently and give the pot a smart rap or two on the bench. Level the soil, and then that plant is finished potting; place it on one side, and take the next in hand; and so proceed till all are finished. Then replace them in the frame, or plunge them in the raised border; but give no water for several days till the buds begin to push through the soil. Then water in such proportion as the plants require.

The management of such as are grown in borders in respect to removing the soil is rather difficult, for the tubers are so tender that if once bruised the plant is irrecoverably injured. The only way is to open a trench at one end, and with a small fork gradually pick away the soil till a plant is undermined, then carefully lift it up and place it in a box as gently as possible, keeping it covered till replanted, and so proceed till there is a sufficient space emptied of plants. Let then the old soil, or at least a part of it, be taken away, and a sufficient quantity of fresh compost put in to fill up the space. Then take up more plants, and fill up the new portion of the bed and replant immediately. By so doing the roots will be but a short time exposed to the air; the least shrivelling by being exposed injures the succeeding year's growth. Proceed in this manner till the whole collection is replanted, filling up the end of the bed with the plants reserved in the box for that purpose. Then give a gentle watering to settle the soil about the plants. They will require no further care, excepting keeping clear of weeds and a constant look-out for insects to destroy them.

PROPAGATION.—By Seeds.—Many species of these hardy Orchids seed freely, and ripen it perfectly. Save the seed as soon as it is ripe, and fill some wide shallow pans with the proper compost. Scatter the seed upon the surface, and cover it with a very thin layer of moss. Keep this just moist constantly by

sprinklings of tepid water, given either by the syringe or a fine-rose water-pot. Gentle showers will do no harm. If the seed ripens as early as June it should be sown immediately; but if it is perfected later, gather it and sow it in March following. Place the pans in a cold frame to protect them from heavy showers, and shade them from bright sunshine till the seedlings have made some progress; then inure them gradually to bear the open air and full light. Keep them in those pans through the first winter and second summer, protecting them from hard frost, and allow them to rest in winter the same as older plants. In the spring of the second year they should be separated and planted singly, either in small pots, or, which is better, in a border prepared as described above. With care bestowed upon them they will flower the third or fourth year. If the grower is successful in raising a quantity of the best species, he will be enabled to sell the surplus, or exchange them with others for such species as he does not possess.

By Division.—The tuberous-rooted species when they thrive send forth side-shoots, and these become plants. At the time of repotting or replanting these young tubers may be parted from the old plants, but they must be handled very carefully, so as not to bruise them in the least; for, as I observed before, a wound, be it ever so slight, is fatal. Observe, also, to pot each species in the same kind of soil as the old plants grow in; also take care to expose the tubers as short a time as possible to the open air, for these small tubers suffer more from being dried even than the larger ones. Pot them carefully, and label every one with its proper name; so that, if you wish to exchange with your neighbours, you can always do so safely, though your plants may be at rest and dormant. Some kinds—the *Cypripedium*, for instance—have bundles or fascicles of long fleshy roots; and the buds are placed in a cluster, with these roots radiating from them. To propagate such rooted plants is a nice operation. A sharp knife must be used, and the blade put between the buds without bruising them. Let it pass through

the connecting part, or rhizoma, and no lower, or the roots will be cut also. Then with the hand gently separate the parts cut off, and the roots will divide away from each other without injury. Repot both the parent and the offspring immediately in proportionate-sized pots, and cultivate afterwards in the usual way.

SUMMER TREATMENT.—This period of the culture of those interesting plants commences as soon as they begin to grow, and ends when they go to rest. The summer operations consist of watering, sheltering, tying up the flowers, weeding, and stirring the surface of the soil when that becomes hardened and grown over with lichens. On each of those points I shall briefly write, in order to show the amateur the proper way to conduct them.

Watering.—This necessary operation, especially for such as are grown in pots, I have already adverted to; but I may remark in addition that the quantity required should be given according to the need of plants. In the early months of the year, whilst the vegetation is slow and young, very small supplies of water will be required, and that at wide intervals. If kept in this early stage of growth very wet, the young roots, and probably the young shoots also, will damp off, and the plants will perish: therefore, let the surface of the soil become dry before water is given, and then only just sufficient to wet the soil. Let this water be absorbed before the next is given. As the foliage advances in growth more water may be given; and when the leaves are fully expanded and the blooms beginning to open, then a liberal supply must be given. If gentle showers are falling let the plants have the benefit of them; but at all seasons shelter them from heavy continuous rains. Some strong-growing species will thrive better with a watering now and then of weak liquid manure, to which add a handful of quicklime to every gallon. This destroys worms and slugs in both a young and full-grown state.

Shelter.—If the plants are in pots and in a cold frame, the

appropriate shelters are glazed lights. These should be put on during heavy falls of rain or hail, or even strong gales of wind ; but, then, air should be given by tilting the lights behind—closed frames in wet weather being very unhealthful to these somewhat tender plants.

Tying.—As the flower-stems advance in height neat sticks should be carefully thrust into the soil, keeping a sufficient distance off the fleshy tubers. Tie with soft bast mat, and tie it loosely, so that the stems will not be strangled, and spread out the flower-stems when numerous that each may stand clear by itself. Nothing looks so slovenly as flower-stems huddled together in bundles like a birch broom, and, besides being ill-looking, the plants sustain a serious injury when the stems are tied so closely together. The leaves do not obtain light, and, consequently, turn yellow and drop off—a misfortune that prevents the increase in size of the plant.

Weeding and Stirring the Soil.—The best management of weeds is never to allow them to advance beyond the seed-leaf. The labour of weeding is lessened thereby, and the nutriment of the soil saved for its legitimate purpose—the support of the cultivated plants, and more especially the benefit will be felt by plants that have to draw their support from the limited pasture of soil contained in pots. The soil in pots by frequent waterings becomes crusted on the surface, closing it against the admission of air and heat to the roots ; hence it is benefited largely by stirring the surface whenever it becomes hard. A small stick is as good an implement as any for this purpose, care being taken not to disturb or injure the roots or stems in performing this operation. Besides opening the soil to the kindly influences of the atmosphere, it gives a freshness and neatness to the collection, and prevents the growth of mosses and lichens. In the autumn this stirring of the surface by admitting air to the interior of the soil assists the ripening of the tubers and fibrous fleshy roots, and thus hastens the period of rest.

Let all the points of summer daily culture be duly attended

to, and it will be found that the plants will perform their functions, and will abundantly reward the cultivator for his trouble and attention.

If any of these hardy Orchids are cultivated in a bed or border, the summer culture in regard to the above particulars of culture is nearly the same. The only difference will be the kind of shelter to give them. The best shelter is that formed with bended hoops and either garden mats or oiled canvass, the latter being the best for keeping off heavy rains. A shelter from the burning rays of the sun acting too powerfully upon the soil may be necessary; and the best shelter for that purpose, as I have repeatedly proved, is green moss. A bed covered with that non-conductor gives it a fresh and lively appearance, and adds largely to the health of the plants.

WINTER CULTURE.—The operations for winter culture are few and easily done and attended to. The plants in pots should be placed under the shelter of a pit or frame, and the lights should be kept on in wet weather to keep off the rain, and thus keep the plants in a quiescent state. I should recommend the plunging the pots up to the rim in coal ashes or sand, and in very hard frost the glass should be covered with mats; but on all fine days the lights should be drawn off entirely, and, in wet muggy weather, propped up behind, to allow the escape of damp air. Of course, all the decayed leaves must be cleared away, and any other substances that would give out foul smells. Such as may be growing in a bed or border should be protected from slushing rains and frost, by covering each plant with a small hillock of dry ashes, to be removed when the growing season commences. If a bed has been formed as I recommended above, the plants in it when at rest will be all the better if sheltered from heavy rains, frost, and snow, by covering the bed with hoops and oiled canvass. Let it be remembered that these rare plants are well worthy of every care.

DISEASES.—The only disease that I know of that attacks hardy Orchids is a kind of dry rot. The same disease is found

in the solid bulbs of the Tulip and the Crocus, and it is equally fatal in all: there is no remedy for it. If the leaves stop growing the disease has begun. Pull up the plants attacked with it and expel them from the premises. I do not know that it is contagious, but I would rather be without such dangerous subjects.

INSECTS.—The most noxious are the red spider, grubs, slugs, and worms. The first thrives best in hot dry weather: therefore the opposite is preventive. If they are found on the leaves of the plants and such are in pots, lay the pots on one side and give the leaves a very severe syringing, which will wash off the insects, webs, eggs and all, and effectually relieve the plants. To prevent their return dust the leaves with flowers of sulphur.

Grubs in new soils are often rather numerous, and they feed on the young stems just beneath the surface of the soil. There they must be sought for, and, when found, destroyed.

Slugs may be traced by the slime they leave to their retreats, and extracted from thence and put to death. Lime water is certain death to them if their concealment cannot be found.

Worms do not feed upon the plants, but they disarrange the soil, and render it unfit for food for the plants. Lime water, again, is the agent that will destroy these intruders. The best time to apply it is in mild dewy evenings, so congenial to the migrations of slugs and worms. All these insects must be constantly warred with to prevent them injuring the leaves of the plants; for if the leaves are not kept healthy, and thus able to perform their proper functions, the plants will soon fade away and perish.

It now only remains to me to complete my essay on Hardy Orchids to give a list of them; and I shall group them under the different soils that each group requires to grow them in.

CHALKY SOIL.

Aceras anthropophora (man bearing)

Herminium monorchis (one-bulbed)

Orchis fusca (brown)

- Orchis hircina* (goat)
- Smithii* (Smith's)
- simia* (ape)
- tephrosanthos* (ash-coloured-leaved)
- Ophrys arachnoidea* (cobweb)
- aranifera* (spider-bearing)
- ciliata* (fringed)
- cornuta* (horned)
- exaltata* (lofty)
- fucifera* (drone-bee-bearing)
- grandiflora* (large-flowering)
- muscifera* (fly-bearing)
- tabanifera* (dun-fly-bearing)

TURFY LOAM.

- Gymnadenia albida* (whitish)
- conopsea* (gnat-bearing)
- viridis* (green)
- Listera cordata* (heart-leaved)
- Neottia nidus-avis* (birds'-nest)
- spiralis* (ladies' traces)
- Orchis latifolia* (broad-leaved)
- morio* (buffoon)
- ustulata* (scorched)

CHALKY LOAM AND SANDY PEAT.

- Anacamptis pyramidalis* (pyramidal)
- Epipactus latifolia* (broad-leaved)
- palustris* (marsh)
- Gymnadenia conopsea alba* (white gnat)
- cucullata* (hooded)
- odoratissima* (most fragrant)
- Habenaria hyperborea* (northern)
- bracteata* (bracted)
- Neottia cernua* (drooping)
- Nigritella angustifolia* (narrow-leaved)
- Orchis acuminata* (sharp-pointed)
- globosa* (globose)
- longicornis* (long-horned)
- militaris* (military)
- papilionacea* (butterfly-winged)
- sulphurea* (sulphur-coloured)

- Orchis undulata* (waved)
Platanthera bifolia (two-flowered)
Pogonia divaricata (straggling)
 pendula (drooping)

TURFY LOAM, SANDY PEAT, AND LEAF MOULD.

- Calypso borealis* (northern)
 americana (American)
Corallorrhiza innata (inborn)
 multiflora (many-flowered)
 odontorrhiza (tooth-rooted)
Cypripedium spectabile (showy)
 spectabile album (white-flowered)
 spectabile incarnatum (flesh-coloured)
Liparis liliifolia (Lily-leaved)
Habenaria ciliata (fringed)
 cristata (crested)
 fimbriata (fringed)
 lacera (torn)
 orbiculata (orbiculate)
 psychodes (cold)
 spectabilis (showy)
Neottia æstivalis (summer)
 autumnalis (autumnal)
Ophrys apifera (bee-bearing)
Orchis ciliata (fringed)
 coriophora (bug-bearing)
 Cyrillii (Cyrill's)
 globosa (globose)
 latifolia alba (broad-leaved white)
 laxiflora (loose-flowering)
 maculata (spotted)
 mascula (male)
 Nicodemi (Nicodemus's)
 palustris (marsh)
 parviflora (small-flowered)
 provincialis (province)
 quadripunctata (four-spotted)
 Rivenii (Riven's)
 saccata (pouched)
 sambucina (Elder-scented)
 undulata (waved-leaved)
 variegata (striped)

LISTS OF ORCHIDS.

SANDY FIBREY PEAT.

- Cypripedium acaule* (stemless)
arietinum (ram's-head-formed)
calceolus (ladies' slipper)
candidum (white-flowered)
guttatum (spotted)
macranthum (largest)
parviflorum (small-flowered)
pubescens (downy)
purpuratum (purple)
ventricosum (bellied)
Habenaria blephariglottis (eyelash-tongued)

TURFY BOGGY PEAT.

- Cephalanthera ensifolia* (sword-leaved)
rubra (red-flowered)
Liparis Læsellii (Læsell's)
Correana (Correa's)
cordata (heart-leaved)
ovata (ovate-leaved)
Malaxis ophioglossoides (Ophioglossis-like)

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