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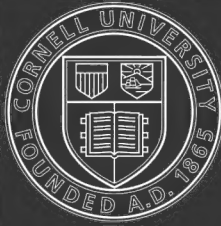
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Present-Day Gardening

EDITED BY
R. HOOPER PEARSON
MANAGING EDITOR
OF THE *GARDENERS'*
CHRONICLE.

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Present-Day Gardening

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PLATE I (*Frontispiece*)
CYPRIPIEDIUM INSIGNE SANDERÆ



Orebiads

By James O'Brien

With Eight Coloured
Plates



1911

London: J. C. & E. C. Jack
16 Henrietta St., w.c., & Edinburgh

PREFACE

IN the early days of Orchid cultivation the idea was commonly entertained that these interesting plants could never become popular with the general public, for the reason that their culture involves a great initial outlay and permanent expense. That such an idea is incompatible with the facts is now admitted by all those who are most familiar with the subject. There is no department of "Present-Day" gardening that exhibits such wonderful progress as is shown in the Orchid gardens and nurseries that are to be found in every portion of these Isles.

At the same time, the popularisation of Orchid culture is only now in its very commencement. Amateurs are but just beginning to realise that Orchids, like other plants, are capable of being understood by any one who really desires to understand them ; and, when once understood, the cool species, at any rate, are not less tractable than common greenhouse plants. So much is this the case that the author of the present volume declares that even the householders in suburban districts who have but one conservatory may, if they choose, keep that structure furnished with Orchids at a less expenditure of time and money than is

necessary for the Palms, Ferns, and other species usually employed for the purpose.

Orchid-growing in the past has been looked upon too much as a craze. Ruinously high prices have been asked for novelties, and "collectors" have been ready enough to pay them in the hope of obtaining unique varieties. This fact alone has frightened off average people.

It is hoped that the present volume will induce thousands to commence the culture of the cooler species, as it clearly indicates the simplicity of the cultural principles whilst explaining in full all the principal details.

Thanks to the experiments of former workers, we are no longer dependent entirely on the introduction of plants from other countries. Seedling Orchids are raised as freely as seedling Fuchsias, and home-raised seedlings, as a rule, thrive better than introduced species in the artificial cultivation we have to offer them. Readers will find the details of cross-breeding and seed-raising set out in the following pages at considerable length.

The author is one of the greatest Orchid specialists the world has known. As a practical cultivator in the old Pine Apple Nurseries of Messrs. Henderson, he had the good fortune to flower many species for the first time after their introduction, and ever since those early days he has continued to specialise in these plants. He is secretary of the Orchid Committee of the Royal Horticultural Society, and in 1897 he was included in the first sixty horticulturists who were selected to receive

the Victoria Medal of honour in commemoration of Queen Victoria's Jubilee.

Our grateful acknowledgments are made to Lieut.-Col. Sir G. L. Holford, K.C.V.O., for his kindness in affording us facilities for getting the illustrations. Every plant illustrated is a first-rate specimen of its kind, and all have been photographed in Sir George Holford's collection at Westonbirt, which is so well cultivated by his grower, Mr. H. G. Alexander.

THE EDITOR.

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ORCHIDS

INTRODUCTION

IT is not necessary here to trace the history of Orchid cultivation since its commencement a century and a half or so ago. The earlier introductions were few and infrequent, but they probably attracted as much attention as the subjects in our gardens obtain to-day. It may be said of Orchids that no class of plants has so well and consistently sustained the interest of cultivators, which partly because few, if any, plants have flowers that exhibit such diversity of form, size, and colouring. But another reason for their popularity may be found in the fact that few plants are so easy to cultivate, if placed in the care of a careful and earnest cultivator who applies the best methods which his own experience indicates and is willing to avail himself of the help which the experience of others has placed within his reach.

Upwards of fifty years' continuous experience with Orchids have necessarily presented to us much evidence as to the right or the wrong methods of carrying out the numerous operations connected with their culture. Nevertheless, it may be said that common sense is one of the most important factors in cultivation, and the grower who

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carefully thinks over the various problems as they arise, and, profiting by experience, does his best to avoid former failures, will obtain a measure of success far exceeding his expectations. To those who know anything about the ordinary processes of growth and flower the plants tell their own tale. They show when actively growing the period when a reasonable amount of heat and moisture is required, and, on the completion of growth of the deciduous species and the turning yellow of the leaves, they tell just as plainly when the resting period has arrived. It is so in all the important stages of their existence.

The extent of the present work having been determined by others in the same series, the object has been to get as much useful information into it as possible, to confine the matter to practical subjects and to avoid repetition. It has therefore been arranged in a series of chapters, each dealing with an important matter, and available for reference when any question on the subject crops up in another portion of the book. Short notes follow on the principal genera known in gardens, but the cultural remarks may be supplemented by reference to the cultural chapters. Anything like an enumeration of the more important species could not be attempted. So also in the matter of hybrid Orchids, the question is discussed in two chapters dealing with the practical question of raising seedlings, but only slight reference could be made to the species used in hybridising or to the numerous hybrids themselves.¹ The amateur who engages in Orchid culture and in the raising of seedlings will find that "practice makes master."

¹ Readers may be referred to *List of Orchid Hybrids*, published by F. Sander and Sons.

RISE OF ORCHID CULTURE 3

It is in indicating the lines on which the practice may be best pursued that, it is hoped, this book may serve a useful purpose.

CHAPTER I

THE RISE AND PROGRESS OF ORCHID CULTURE

THE first tropical Orchid to flower in the British Isles appears to have been *Bletia verecunda* (*Helleborine americana*), figured in *Historia Plantarum Rariorum*, 1728-1735. It bloomed in 1732 on a plant received by Peter Collinson from the Bahamas in the previous year. In succession to this appeared *Cypripedium spectabile* and one or two other North American *Cypripediums*; *Vanilla aromatica*, and a few other species, chiefly terrestrial Orchids. In 1789 Aiton's *Hortus Kewensis* enumerated fifteen species of exotic Orchids as being in cultivation at Kew, the tropical species being *Bletia verecunda*, *Epidendrum fragrans*, *Epidendrum cochleatum*, and *Phaius grandifolius*. At the end of the eighteenth century about fifty exotic species were recorded. At that time most of the Orchids were imported only to perish as a consequence of the unsuitable conditions in which they were grown. The plants were potted in the most unlikely materials, such as decayed wood, sawdust, loam, tanner's bark, or any other material which the cultivator thought would be useful in preventing the excessive mortality among his plants; but in all cases the chances of success were discounted by

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the plants being placed near hot flues, or plunged in tan or bark beds. It was thought that a great success had been attained if a plant bloomed once before it died.

The year 1800 may be said to be the real starting-point of rational Orchid culture, although, even in the earlier part of the nineteenth century, the old traditions still hindered progress. In 1800 *Aërides odoratum* was introduced, this being the first East Indian Orchid cultivated in this country. In 1817 Sir Joseph Banks brought about the cultivation of epiphytal Orchids in light, wicker baskets which were suspended in the Orchid house or stove; this is one of the most noteworthy events in the early history of Orchid cultivation.

In 1818 *Cattleya labiata* appeared, and about the same time *Cypripedium insigne*, which has now two or three hundred varieties that enthusiasts consider sufficiently distinct to bear varietal names. *Disa grandiflora* and *Oncidium Papilio* appeared in 1825, when about 180 species of tropical Orchids were in cultivation in the Horticultural Society's Gardens. This Society gave a great impetus to Orchid culture by sending out collectors into distant lands, and Dr. Lindley, whilst Editor of the *Gardeners' Chronicle*, played a no less important part in studying and recording the species as they were received in this country. The interest in Orchid importing gradually spread, and from the time when Alan Cunningham sent home Australian Orchids in 1835 the interest has never flagged, the famous Orchid collectors, Lobb, Gardner, Skinner, Hartweg, Gibson, and others, sending consignments from time to time from various parts of the world.

The first attempts to grow Orchids in a reasonably low

PROGRESS OF ORCHID CULTURE 5

temperature were made in the first half of the nineteenth century, one of the first to grasp the truth in this direction being Joseph Cooper, who was gardener to Earl Fitzwilliam at Wentworth. But a considerable time elapsed before the more rational treatment, which meant less artificial heat and more ventilation, became general. The culture was further improved by the introduction of the hot-water system of heating Orchid houses, a method which is now almost perfect and has done more to further Orchid-growing than anything else.

The spread of information respecting the climatic conditions of the countries in which the plants were collected also helped cultivators in this country, and the articles published in the *Gardeners' Chronicle* in 1851 by the late B. S. Williams, and subsequent articles by other experts, were of great service.

The latter half of the nineteenth century was the most important era in the development of Orchid cultivation. A remarkable feature was the beginning of that industry which has now attained such widespread popularity, namely, the raising of hybrid Orchids from seed. The first hybrid Orchid, *Calanthe* × *Dominyi* (obtained from a cross between *C. furcata* and *C. Masuca*), flowered with Messrs. James Veitch & Sons in October 1856. The same firm subsequently produced many fine hybrid *Calanthes*, *Phalænopsis*, *Cattleyas*, *Lælias*, and *Læliocattleyas*. Many of these are now standard garden plants, whilst the work of hybridising and raising hybrid Orchids has become general.

Another notable event in Orchid culture during the period mentioned was the commencement of the Cool-house or *Odontoglossum* Section of Orchid Culture. In 1863,

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Weir, Blunt, and Schlim went to New Granada in search of *Odontoglossums*, and they were successful in introducing plants of *Odontoglossum crispum* (Alexandræ), collected above Bogota. These collectors also contributed to our knowledge of the proper methods of cultivating cool Orchids.

So things have gone on until our own days. Orchids hold one of the most important places in gardens, and such genera as *Odontoglossums* and *Cypripediums* are so popular that they are cultivated on an extensive scale even by many who do not care to grow a general collection of Orchids.

CHAPTER II

STRUCTURE OF ORCHID FLOWERS

MOST people are familiar with the regular arrangement of the segments of the flowers of *Amaryllids* and *Lilies*, with their prominent pistils and anthers. The first stage in the advance of the Orchid family is shown in the *Apostasiæ*, comprising *Apostasia*, *Neuwiedia* and *Adactylus*, in which the perianth segments are more or less regular and the anthers in some degree prominent, *Neuwiedia*, with its free stamens and prominent style, appearing at first sight nearer to some of the *Amaryllids* than to the *Orchideæ* commonly seen in gardens.

The *Cypripediæ*, although so widely separated from other sections as to suggest that in the operations of nature a vast number of connecting types must have become

extinct, is the next step, the labellum being formed into a pouch with infolded side lobes. The column has a prominent staminode with two fertile anthers below it, one on each side of the column and behind the stigmatic plate. The upper sepal is frequently the showiest feature in the flower; the lower sepals are joined and arranged behind the lip, whilst the petals extend on each side and vary much in form.

In gardens, the whole of the genus is known as *Cypripedium*, although the South American species (*Selenipedium*), having a three-celled ovary, differ widely from the one-celled East Indian and Malayan species, and other sections have such marked and consistent botanical differences as to warrant the botanist in separating them under different sub-generic names. The third section of *Orchidæ*, the largest family of the *Monocotyledons*, forms the chief class of *Orchids* as they are known in gardens. In this class the stamens and style unite into a column, and at the top of the column the pollen masses are situated; these are covered by the anther-cap, and in a cavity is the stigma with its viscid surface to receive the pollen grains.

So diverse and intricate are the forms of the flowers, and especially labellums, that there is little doubt that insect aid is necessary in their natural habitats to bring about pollination. It has been proved by the operations carried out in cross-fertilisation in gardens that no class of plants can be so readily crossed under artificial conditions. It is not necessary here to go further into structural details, as the peculiarities of each section will be remarked on under their different headings. But it may be said that in what are called abnormal flowers, which have perfect stamens

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and style, can be seen instances suggesting the evolutionary process; these would be more common but for the number of connecting links which have dropped out in the great struggle for existence.

CHAPTER III

DÍFFICULTIES TO OVERCOME

SOME of the difficulties which the cultivator of Orchids has to contend against arise from the fact that his houses have to accommodate plants which have been brought from widely separated countries, or from different altitudes in the same region. They therefore require very different cultural conditions, especially in the matter of temperature.

Consideration of the climatic conditions under which the plants are found growing in their native habitats is very helpful to all engaged in Orchid culture. Many problems have already been worked out by the experience of cultivators, but some of the conclusions have been arrived at only after costly failures. In the early days of Orchid culture, before the advent of the modern Orchid house with its improved methods of ventilation and means for the promotion of humidity, the great mortality among cultivated Orchids was caused by excessive heat and drought. Even at the present day more mischief is done by excessive heat than by cold treatment.

CHAPTER IV

STRUCTURE OF THE ORCHID HOUSE

So far as the improvements in present-day Orchid houses are concerned, these are not due to the imagination of the horticultural builder, but to the experience of the Orchid grower. It is owing to him that the old-time glass sides, with their hinged ventilators on a level with the plants, and many other harmful arrangements, have been abandoned. Moderately low, span-roofed houses, extending north and south for preference—although the aspect does not seem to be of vital importance—are the best, the sides being wholly of brick, and also the ends of all but the large houses, in which the upper part may be formed of wood and glass.

The top ventilation should be admitted through ventilators placed at the highest point of the ridge, and they are usually worked by a continuous system manipulated at one end. The lower ventilators should be small ones fixed in the brick-work at the sides of the house, and they may be arranged to be regulated from the outside, or by means of rods attached to the flaps on the inside and reaching to the path, being carried beneath the staging. The natural earth is the best base for an Orchid house, and open wood-work trellises placed on the natural earth are far preferable to tiled paths, therefore their use is strongly recommended. Beneath the central stage, from end to end, deep tanks with cemented interior should be provided, because rain-water

is essential for watering the plants. To create a good appearance, narrow, ornamental rockeries may be arranged at the edge of the side staging and beneath it, and in any part of the basement available. These should be planted with Begonias, Tradescantias, such ferns as are not likely to be attacked by thrips, Selaginellas, Fittonias, and *Ficus repens*, which are not liable to attacks from insects, whilst their presence tends to preserve a healthy atmosphere in the house.

The rockeries beneath the staging should not be built high enough to obstruct the passage of the heat from the hot-water piping, a rise of one foot from the ground level being sufficient.

In the warm-house, *Eucharis grandiflora* and other species of *Eucharis*; *Hymenocallis* and *Panocratiums*, thrive and bloom well beneath the staging. The inside of the roof should be wired for suspending baskets containing Orchids, and this should be done before the plants are placed in the house.

As regards the form of structure, comparatively low, span-roofed houses, with brick sides reaching to the eaves, and no side glass, are the best, the ends being of brick up to the height of the side walls, the remaining part running up to the ridge, in all but very small houses, being formed of wood and glass. If several houses are built, spaces should be left between each house, and no two or more houses should be built with partition walls, for these prevent the necessary side ventilation. A house of 100 feet or so in length should have a division midway in its length, which for some purposes gives the advantages of two houses. Pitch-pine or teak, being durable, are good woods for the wood-work, and, in any case, the use of cheap, soft

STRUCTURE OF ORCHID HOUSE 11

timber should be avoided. In glazing, only a thin bedding of putty should be used, and the glass should be bradded on the upper side, as top putty when decaying or on becoming loose is worse than useless, and tends seriously to foul the water in the cisterns. Span-roofed houses 12 feet to 15 feet wide, and of proportionate elevation, are suitable for ordinary Orchids, but if specimen plants are desired a loftier house will be necessary.

A range of houses should, if possible, be connected at the end which is most exposed to the north and north-east winds by a corridor or covered structure, in which the potting-shed stores and entrance to the boiler hold should be arranged. The greatest care must be taken that no fumes from the heating apparatus can find their way into either the corridor, potting-sheds, or plant-houses, or the plants will suffer the worst consequences. Safety can easily be assured by thoroughly ventilating the stoke-hold and making the partition between the corridor or offices and the stoke-hold as air-tight as possible.

The wood-work, when of pitch-pine or other hard wood planed smooth, may be oiled or varnished, painting being undesirable for new houses. In course of time, however, painting has to be resorted to, and it is one of the most trying operations about the Orchid houses. Great care has to be taken to obtain a reliable quality of paint that will not harm the plants, and to keep the house vacant for as long a time as possible for the gases from the paint to escape. After the plants are returned to the house some ventilation must be maintained day and night for a time. Tar should not be used inside an Orchid house for any purpose.

THE STAGING

The staging must be arranged according to the width of the house. Narrow houses may be provided with a stage on each side and a path through the centre. Other structures of sufficient width should be furnished with a side stage measuring 4 feet to 4 feet 6 inches in width, and a central stage on a somewhat higher level, and rising in steps to the middle and highest point.

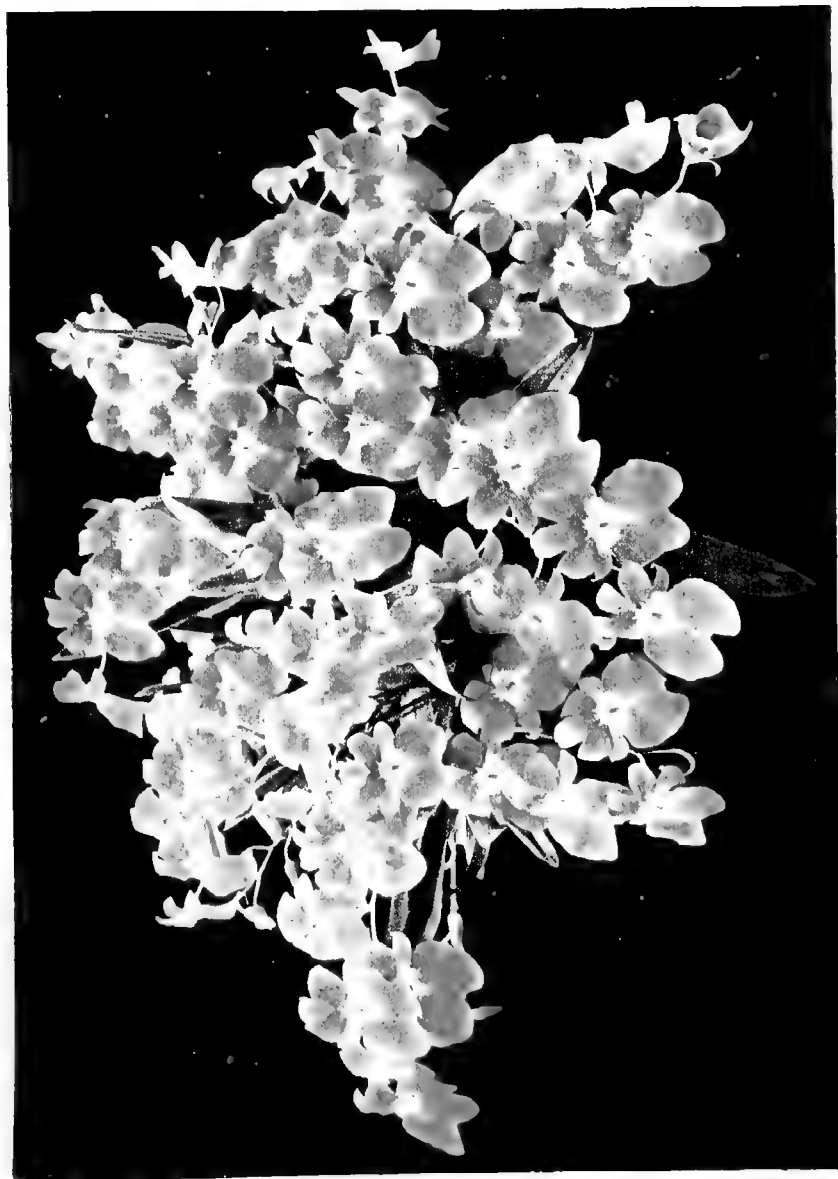
Iron frame-work is the best, because it is clean and almost indestructible. The uprights resting on the floor should be fixed in metal saucers, which, if kept filled with water, offer great obstacles to insects ascending from the floor. The open wood-work resting on the iron frames, and on which the plants are to stand, should be of teak or pitch-pine, and arranged trellis-like. For some years past it has been the practice to have a close, moisture-holding stage of slate, or tiles, beneath the upper and open wood-work stage. It was an invention of my own when adapting an ordinary plant-house with a slate stage to receive one of the earliest importations of *Odontoglossum crispum*. The existing slate stage was made water-tight at the joints, and a fillet of cement was run along the back; the surface was then covered with clean shingle, and home-made trellises, raised on bricks in three levels, were placed along the close staging to receive the plants. It proved a great success, and in the same house the small, bottom ventilators, the first of their kind, but which have now become general, were an equally good innovation. At that time, and for many years afterwards, the flooring of

PLATE II

MILTONIA VEXILLARIA

“EMPRESS AUGUSTA VICTORIA”

(This specimen, cultivated from a single growth, bore
126 flowers.)



Orchid houses was sealed by concrete or hard tiles, and the moisture-holding lower stage was necessary to give a reasonable amount of evaporating surface. More recently it has occurred to many of us that a moisture-giving surface might be obtained from the natural earth, if the earth was left either in its natural state or was given a coating of coke-breeze or similar porous material, and trellises used for the paths. In a similar way provision had to be made for the second object of the close stage, namely, the checking of the direct upward heat from the hot-water pipes. This has been done very effectively in some gardens by arranging a much less elaborate and costly means than the full, close staging generally in use. An iron frame is placed midway between the hot-water pipes and the staging on which the plants rest; a shelf of corrugated iron, slate, or tiles, extends from the back to about half the width of the side staging, its inner edge being about midway in the space beneath the staging, and an inch or so of space is left between the back of the shelf and the wall of the house to allow some of the heat from the pipes to pass that way, the greater part being diverted towards the middle of the house by the intervention of the shelf which is covered with turf or some other moisture-holding material. This is kept continually moist by frequent syringings during the warm season, when plenty of moisture in the air is required.

In arranging new houses having the natural earth for a floor, this plan is less expensive and altogether preferable to the formal, close staging of full width, which, however, should still be retained in adapting ordinary plant-houses already provided with a tiled or cemented base, unless it

is convenient to remove the tiles and restore the natural earth surface. In arranging the staging, one essential object has to be kept in view, namely, that no part of it shall be out of easy reach ; for very wide stages are apt to cause the plants in the back rows to suffer neglect.

METHOD OF HEATING

In these progressive times it is not well to lay down hard-and-fast rules with regard to the best type of appliance. It should, however, be urged that every Orchid house ought to be heated with hot water, and, that in all cases 4-inch piping should be used, the radiation of heat from that size being much more gentle and equal than from smaller pipes. Bottom heat by means of piping under closed-in beds of cocoa-nut fibre, or any other material, is bad, although, in a very slight degree, some arrangement of the kind may be of assistance in the house devoted to raising seedlings. If it is used, an outlet must be provided for the inevitable moisture thus raised so that it will not condense and fall on the plants.

For small houses or blocks of houses, the old saddle boiler in some form is all that can be desired ; and there are several forms of slow-combustion boilers which may be set almost on the surface of the ground outside the house, and these are satisfactory. For blocks of houses the English form of sectional boiler is one of the very best ; in large blocks duplicate sets of this pattern, or any other type that may be selected, should be set down, as it provides means of heating the houses if the ordinary boiler happens to fail. It is always better to provide more power than may appear

absolutely necessary, and work it at low pressure, than to have barely sufficient power and work it hard during severe weather, as the heat diffused in the latter case is harmful.

Before deciding on the means of heating to be employed, it would be well to pay a visit to some of the collections noted for the excellent condition of their plants, and inspect the appliances and their arrangement. Most Orchid growers, whether in private establishments or nurseries, are willing to assist amateurs in these matters. When the apparatus has been got into working order, tests should be made to ensure an equal distribution of the heat from the piping. If a draught of hot air to any part of the house from beneath the staging is observed, it is a good plan to build up openly-laid screens or brick walls $4\frac{1}{2}$ inches thick, the layers of brick being placed so that there is half the length of the brick opening between each brick and the next to it. Where there is a sufficient command of heat, these openly-laid brick walls, without mortar, built up below the side staging and running parallel with the edge of it, if they are syringed frequently, assist materially in preserving a healthy moisture in the house.

TEMPERATURE

One of the most important matters in Orchid cultivation is to see that a lower temperature is maintained at night than in the day. Nothing is more injurious to the plants than to be kept in a high temperature at night, nor is anything more contrary to natural conditions. All who have travelled in the countries from whence Orchids have been imported testify to the great difference between the tempera-

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ture during the day and that experienced at night, the difference in some parts being that between an excessively hot day and a chilly night and early morning. These cool conditions at night are absolutely necessary for the well-being of the plants, and in their absence the plants suffer as do human beings during the progress of a heat-wave, which often kills many people. Therefore it must be urged that at night the temperature must be from 5° to 10° Fahrenheit lower than the day temperatures. This condition is difficult to get during hot weather, but it is necessary. Although a scale of temperatures throughout the year must not be taken to mean that a little more heat may not be allowed occasionally—as, for instance, by sun-heat, which is beneficial—nevertheless it is better to have a scale to form a basis, and especially to emphasise the lower temperature at night.

Table of Temperatures for Orchid Houses

Months.	Warm House, East Indian.		Cattleya or Intermediate House.		Cool or Odontoglossum House.	
	Day.	Night.	Day.	Night.	Day.	Night.
January . . .	65-70	60	60-65	55	50-55	45
February . . .	65-70	60	60-65	55	50-55	45
March . . .	65-70	60	60-65	55	55-60	50
April . . .	65-70	60	60-65	55	55-60	50
May . . .	70-75	65	65-70	60	60-65	55
June . . .	75-80	65	70-75	60	60-65	55
July . . .	75-85	65	70-80	65	60-70	55
August . . .	75-85	65	70-80	65	60-70	55
September . . .	75-80	65	70-75	60	60-65	55
October . . .	70-75	65	65-70	60	60-65	55
November . . .	65-70	60	60-65	55	55-60	50
December . . .	65-70	60	60-65	55	50-55	45

Degrees Fahrenheit. The higher day temperature should be obtained by sun-heat when possible.

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Further remarks on this and other details will be found under the headings of the different genera, but it will be better now to state in general terms that during the season of active growth any reasonably high temperature by sun-heat, secured by keeping the house tolerably close and well shaded, greatly benefits the plants. This is specially noticeable where batches of *Dendrobium nobile*, *D. War-dianum*, and other deciduous Dendrobiums are grown. Those who grow them best allow the house containing the plants to become very warm; they remove the shading early in the afternoon in order to let the plants get the longest duration of light possible, and they keep the house very moist until the evening.

THE SINGLE ORCHID HOUSE

It is doubtful whether the owner of a large collection of Orchids gets a greater amount of pleasure than the beginner starting with but one Orchid house, provided the owner of the single structure is careful in selecting his plants.

In cases where only one Orchid house is possible, and a more or less general collection of plants is desired, that house should be heated as an intermediate house. The single Orchid house has often been the starting-point of more extensive culture. It is generally commenced by utilising an existing plant-house, in some cases, unfortunately, without making the necessary preparation for the new occupants.

When it has been decided to adapt a house for Orchids, the proper course is to clear the house of its contents, thoroughly overhaul the interior fittings, such as staging, &c.,

and make any alterations necessary. The heating apparatus should be regulated, and, above all, the best possible provision must be made for catching and storing rain-water, even if this necessitates the providing of a brick and cement tank beneath the staging.

If the existing floor in the house is of concrete or tiles, or any similar material, it must be removed, leaving the natural earth for the surface of the basement, and providing a wood-trellis for walking on in spaces between the stages. Let the house be thoroughly cleansed and painted, and after a short time has elapsed it will be ready to receive the plants.

In such a house heated as a cool, intermediate house, with a minimum temperature of 50° to 60° Fahr. in winter, a large number of showy Orchids can be grown successfully. Those species which require great heat should be carefully avoided, for, although cool-house Orchids are easily managed in a house warmer than is necessary for them, the hot-house kinds usually fail in a temperature which is too low to allow of their making growth under favourable conditions. In such an intermediate house the *Odontoglossums*, *Masdevallias* and other favourite cool-house Orchids can be grown successfully, if arranged in the cooler part of the house and carefully watered. The *Cattleyas*, *Lælias*, and the garden hybrids should be placed on the staging in the middle of the house, well up to the light; the Brazilian *Oncidiums*, *Sophronitis grandiflora*, and *Stanhopeas* should be suspended from the roof of the house, but in such positions as will avoid placing them over the plants on the side staging. The *Odontoglossums* and *Cochliodas* may be accommodated on the side staging in the cooler and moister part of the house. In such a house

all the varieties of *Cypripedium insigne*, *C. Spicerianum*, *C. Charlesworthii*, and all the green-leaved section known as Selenipediums, will thrive admirably, and a very large selection of other showy Orchids, including *Zygopetalums*; but again I would say that species which are usually regarded as warm-house Orchids must be rejected.

SHADING

It should be distinctly understood that every Orchid house needs to be fitted with proper means of shading, extending over the whole roof and removable when necessary. Some cultivators think they meet the case by providing shading only on the sunny side, or by painting the glass with some kind of preparation more or less in the nature of whitewash. Such preparations should never be used, because, when this is once placed on the glass, the shade, such as it is, is there in dull as well as bright weather, in the night time as well as the day, and for the greater part of the time, especially in dull seasons, it obstructs light which is necessary for the proper development of the plants. Another important objection to their use is that shading given by these washes wears off and leaves the plants exposed to the full sunlight. The substance is washed off by the rains and carried into the rain-water tanks, thus causing injuries to the plants watered with the polluted water, and rendering unsightly the foliage moistened with it.

Proper blinds running on iron or wooden supports, raising them well above the glass of the roof, are absolutely necessary. Lath roller blinds are excellent for shading, being durable, clean, and easily let down and drawn up.

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Light canvas or scrim shading fixed to roller blinds answers the purpose well, but care should be taken not to employ heavy, closely woven canvas. Too great attention cannot be paid to the working of these blinds, for they must never be down except when required for protection against the sun's rays, and they must be drawn up during dull intervals.

The blinds are useful also during severe winters as a protection against excessive cold at nights, and in this particular the lath roller blinds are the best, and may be left in position where they are likely to be required for this purpose.

When canvas blinds are used during the summer and removed in late autumn, care should be taken to have them perfectly dry before they are stored for the winter in some dry place, or they will be useless when they are required for placing in position the following spring.

CHAPTER V

THE POTTING AND BASKETING PROCESS

WE are often asked what season is the best for potting and basketing Orchids. Experienced growers say that, with the exception of the winter season, they are engaged in potting operations all the year round, potting each section as it requires it. Springtime is a period when a general overhaul of the plants is usual, and, at that time, plants requiring it should be repotted, but those which are not in the proper

POTTING AND BASKETING 23

condition, or which are showing flower-spikes, should be allowed to remain until their flowering time has passed.

As a general rule, it may be said that the best time to perform the operation is soon after the flowering season has passed, and that no plant should be repotted unless it really requires it; but any plant which has become in a bad condition in the pot by being in unsuitable material should be repotted at once, no matter what season it may be.

Care should be taken to use the pots and crocks in a thoroughly clean condition. Broken crocks are generally used for drainage, although they are not now placed in the pots to the depth of one-half or more, as they used to be. The depth of the crocks varies from about one-third in *Cypripediums* and terrestrial *Orchids* generally, to a rather greater depth for *Cattleyas*, *Lælias*, and similar *Orchids*, the depth of crocks also being varied according to the density of the material used, fewer crocks being necessary when a mixture of *Osmunda* fibre, or other material which lets the water through quickly, is employed in place of peat.

Sand and crushed crocks or potsherds are used by many for mixing with the potting material, but they may easily be dispensed with, or used only in very small quantities.

Turfy loam carefully broken up and mixed in suitable proportions with peat and *Sphagnum*-moss, or *Osmunda*, or *Polypodium* fibre, is necessary for *Cypripediums*, the proportion of loam being greatest for the stronger-growing plants; certain *Selenipediums* and *Cypripediums* require quite one-half of that ingredient. Some good growers

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use loam fibre with a sprinkling of leaves and broken crocks entirely for *Cypripedium insigne* and others of the green-leafed class, and also for *Calanthes*, *Phaius*, *Zygopetalums*, and other plants.

In preparing the peat for use in potting, the bracken rhizomes should be set aside to place as a layer over the crocks, with a little Sphagnum-moss. Bracken rhizomes have been used with advantage instead of crocks to form drainage for *Odontoglossums*, and some growers like it so much for that purpose that the horticultural sundriesmen supply it sterilised in bags.

The methods of potting and choice of material vary with different growers, each pursuing in some matters different methods to those observed by others. It is desirable that an Orchid grower should endeavour to find out the best methods for his own circumstances and, if the results are satisfactory, that he should adhere to them, for there is no more prolific cause of failure than in continually trying experiments recommended by others. The operation of potting or basketing Orchids is very simple, and can be readily learned by observation. The aim should be to avoid injuring the living roots but to leave the plant firm in the pot.

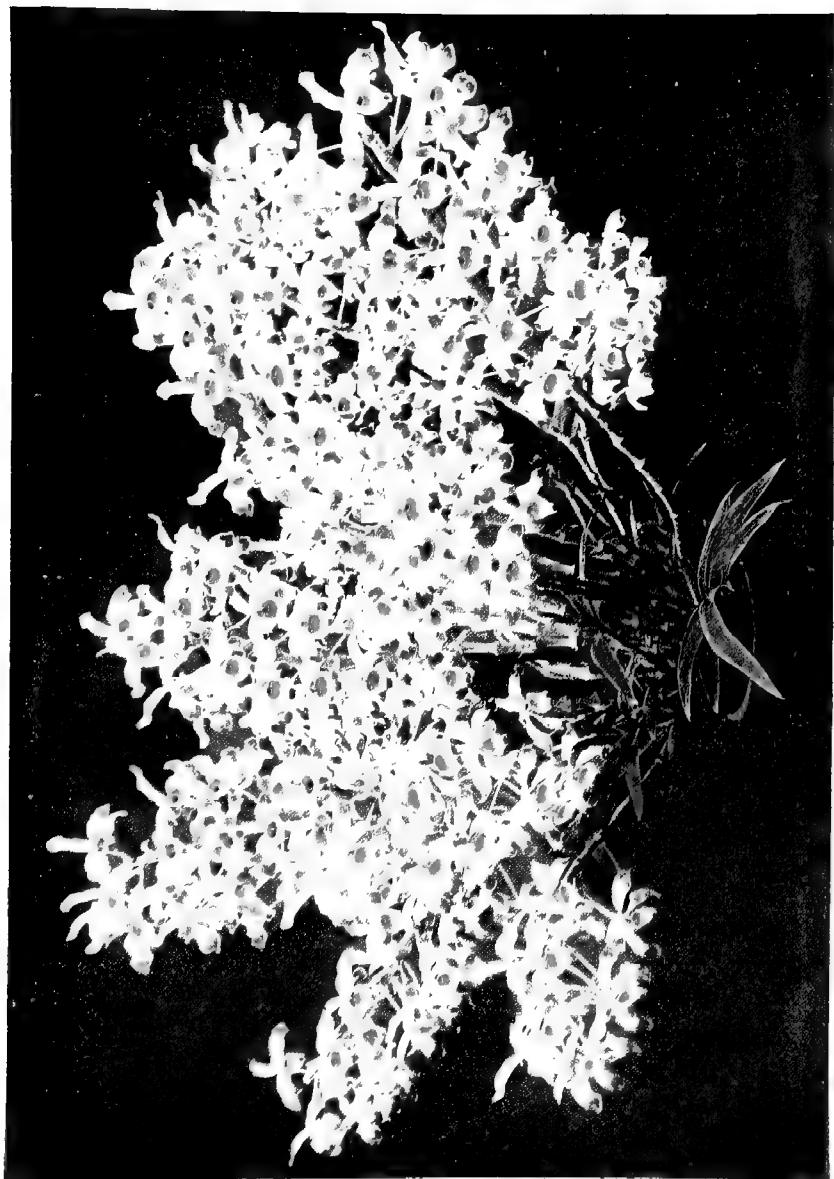
BASKETS AND POTS

It is more in accordance with nature to grow epiphytal Orchids of convenient size in baskets to be suspended from the roof of the Orchid house, and in the case of subjects reputedly difficult to grow the best results are often attained in this way. At the same time, this is due as much to the plants being placed near to the glass of the roof,

PLATE III

DENDROBIUM WARDIANUM

(At the time the photograph was taken this plant bore
264 flowers.)



as to the fact that the air has better access to the roots than when the plants are in pots. Hence it is that for suspending plants of small and medium growth, Orchid pans made in the same way as the flower-pot are found to be a convenient substitute for baskets, as they are not so liable to decay as wood-baskets.

Stanhopeas, Lueddemannias, Acinetas, and some other Orchids which produce their flower spikes directly from the base of the growth, must be grown in baskets to admit of the proper production of their flowers, which, if grown in pots, are sent down into the compost and lost. Gongoras, Cirrhæas, and similar genera, which produce slender spikes of flowers of drooping habit, are also best in baskets, as they produce their flowers much more freely when the plants are suspended.

The Orchid pan, for suspending, is also equally good for Masdevallias of the Chimæra section, a large number of Bulbophyllums and Cirrhopetalums, and generally for plants of small stature which would be too far away from the glass if placed on the stage. For the bulk of the collection the grower has to use the ordinary flower-pots, which are still unsurpassed for general purposes. The elaborately designed pots, perforated with holes or slits, which were used for Orchids years ago, are not necessary, for there is no defect in the ordinary flower-pot which cannot be overcome by the careful and skilful practitioner.

Rafts and cylinders of teak-wood made in the same manner as baskets are useful for some species, but it has to be remembered that plants on rafts are liable to suffer from lack of sufficient moisture-holding material around them. *Broughtonia sanguinea*, however, is never so happy as when

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grown on a horizontally suspended raft without the least potting material.

The great trouble with suspended Orchids, and one which precludes the cultivator employing this culture for so many plants as he could wish, is the drip they cause to the plants on the stages. No Orchid should have another plant suspended above it; if it is not possible to avoid this, the relative positions of the suspended plants should be changed as often as possible; water should only be given them by "dipping" the plants, and they should be allowed to drain thoroughly before being again suspended. As many of the suspended plants as possible should be arranged on each side of the path, and in other situations where there are no plants immediately under them.

Narrow rafts 4 inches wide and 1 foot or so in height are suitable for *Angræcum infundibulare*, *A. imbricatum*, and other scandent *Angræcums* of similar growth. These should be fastened to the rafts with some good Sphagnum-moss between the plant and the raft on the lower half, the base of the plant and the raft being afterwards fastened in a flower-pot with Sphagnum-moss, the raft leaning at a slight angle. Sphagnum-moss can be added on the upper part as the plant grows, and, when sufficiently rooted up the stem, it can be severed half-way up when the base will produce new growths.

STAKING OR FIXING ORCHIDS

Some years ago, when large specimens were favoured, it used to be the practice to stake or "stick" the plants, as it was called, some of them exhibiting almost as many sticks as

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pseudo-bulbs. The sticks rapidly decayed, often leaving the stumps to harbour fungus and cause injury to the plants.

The compact specimens of the present day, when properly grown, require no support from sticks. In respect to specimens of larger growth, such as *Aërides* of tall habit, *Lælias* of the *L. purpurata* class, and *Dendrobiums*, when they require sticking at all, they may be securely supported by one stick in the centre, to which one of the strongest growths should be fastened, any others requiring support being looped to the centre stick. The fewer sticks used the better.

Dwarf plants with creeping rhizomes between the pseudo-bulbs used often to be secured when repotted by small wire pegs, and the custom is not yet quite obsolete. Metal, especially galvanised iron wire, which is most commonly used, is very injurious to any portion of an Orchid which is allowed to come in contact with it. Such pegs are unnecessary, for the plants can be fixed with the potting material, and later on the new roots will effectually secure them.

In fastening Orchids on rafts or blocks, fine copper wire should be used, and all the care possible taken to prevent it resting on the rhizomes or stems, a small piece of peat or Sphagnum-moss being placed beneath the wire where it crosses the plant. Where Orchids such as *Phalænopsis* are grown in baskets or hanging pans, the leaves should not be allowed to touch the wire suspenders, or injury will result. Where leaves too closely approach the wire suspenders during their growth, the wire should be bent to avoid contact, or have a small

shred of cotton-wool or other material bound round it at the point of contact, if the leaf cannot be drawn aside.

For staking Orchids, bamboo canes are preferable to common deal-wood sticks.

LABELLING THE PLANTS

It adds much to the interest of a collection of Orchids, either small or large, if a proper system of recording the plants is arranged for by means of a stock-book, in which the name of each plant is entered as it is acquired, together with the source from which it was obtained, and any other particulars that may be required when the plant flowers. This entry need only be brief, and generally one, or at most two lines will suffice for each plant. If it is intended to keep the plants under numbers, the left-hand margin should bear consecutive numbers from one onward, but if it is desired to have the names on each plant, the names in the stock-book should be arranged in an alphabetical manner. In some collections where numbering is practised the number is written across the top of the label, and the name written lengthwise when desired.

The common deal label is not suitable, because the base soon decays in Orchid houses, causing danger from fungal growth, and rendering the identification of the plant after the label has perished, or fallen away, very uncertain. The lead number for clipping the rim of the pot, or attaching to the wires of the basket or suspending pan, is less objectionable, but they are only convenient where numbers are alone used. Zinc labels and various other contrivances have been tried, but the best and safest

REMOVING USELESS LEAVES 31

label, either for numbers or names, or both, is the white celluloid label, obtainable in all sizes, similar to the ordinary wooden plant label, and in the ticket form for attaching to the baskets by means of fine wire. This kind of label does not decay as the wood labels, and it may be cleaned and used again as long as it remains in a perfect condition. Let all labels be made as small as possible consistent with their being firmly fixed, as it detracts much from the appearance of a house of plants if the labels are too much in evidence. Care must be taken during repotting that the labels removed from the plants should each be returned to its proper specimen. Much trouble may be caused by mixing the labels.

CHAPTER VI

REMOVING USELESS LEAVES AND BULBS

AN unsightly appearance is given to many collections of Orchids by the presence on some of the plants of a number of damaged or yellow leaves. These are often supposed to be the result of bad cultivation, and, in some cases, rightly so. But in all collections of Orchids the old leaves, even of the evergreen species, do not pass off naturally as they do in their native habitats, where they have the natural seasons with their climatic changes to cause the leaves to fall naturally. When cultivated under glass, the species which are known as evergreen kinds retain their old leaves long after they would have passed away in their native wilds ; and not only that, but they decline and become

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unsightly for years under glass, instead of passing away in a few months. Consequently many Orchids in collections often carry at least twice as many leaves as they ought to do, and the oldest are the most unsightly. A ready example of this kind is given by most collections of *Masdevallias*. The leaves are usually densely packed, many of the older ones shabby, and not only unsightly in themselves, but interfering with the full development of the new growths.

Masdevallias have no developed pseudo-bulbs, but a joint will be seen where the leaf-blades join the basal stems ; all damaged leaves should be cut off just above that joint, and it will be found that some of the plants will be benefited, both in appearance and condition, by having from one-third to one-half the number of their old and damaged leaves removed. The same remarks apply to all Orchids of similar growth, such as *Pleurothallis* and *Octomerias*, and indeed to the species generally, for damaged or decaying leaves can be of no assistance in the development of the plant, unless in exceptional cases where the grower must use his own discretion.

USELESS PSEUDO-BULBS

If an imported Orchid such as a *Cattleya* or *Lælia*, which has been cultivated under glass for several years and has many pseudo-bulbs, be turned out of the pot and the roots freed from the potting material, it will be seen that the new roots which nourish the plant are confined to the freshest pseudo-bulbs, and that the roots beneath the older pseudo-bulbs are in such a condition that they are

useless in the economy of the plant. This fact goes to show that the old pseudo-bulbs are being supported by the newer growths, and, that they are seriously impeding the full development of the flower-producing part of the specimen. In such cases it is a common thing to see large specimens collapse and die off, the decay being traceable to the old bulbs in the centre of the plant. It is, therefore, better to remove old pseudo-bulbs behind the last three or four leading ones, and, if it is desired to retain all leading portions of a large mass in one pot or pan to form a specimen, they should be potted together, when it will be found that, given reasonable treatment, they will make better specimens than if left in a mass. In the case of varieties that need to be propagated, the pieces removed should be placed in comparatively small Orchid pans or baskets, properly labelled, and in due time useful and often valuable specimens may be secured from material which would only have been detrimental to the parent plant. The same kind of treatment will be found equally beneficial in the case of garden hybrids which have been cultivated long enough to have a number of back bulbs. In such cases the plants frequently degenerate after the first two or three years, until they produce inferior flowers, but the removal of the back pseudo-bulbs results in giving the flowering growths the full benefit of the root action, and consequently the plants again produce flowers of good quality.

Potting time is a very convenient season to give special attention to the removal of useless leaves and pseudo-bulbs, as the plants can be readily handled when they are out of the pots.

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All useless parts removed should be taken out of the house and burnt. It is a common practice to throw the leaves under the stage. No rubbish of this, or any other kind, should be allowed in the Orchid house, as it forms a harbour for insects and is, in other respects, objectionable.

CHAPTER VII

PROPAGATION BY DIVISION

IT used to be thought a very delicate operation to divide an Orchid, or to remove any portion of it for the purpose of obtaining another specimen, and, when the operation was carried out, it was thought to be at the risk of the plant and its offset.

In the case of badly grown plants, or where the houses are unsuitable for growing Orchids successfully, there may still be considerable risk in the process ; but under ordinary conditions, and where the plants have proper accommodation, there is no risk whatever ; it may be said that plants are never in better health than when they are divided at reasonable intervals. If we consider the case of *Cypripedium insigne* *Sanderæ*, some of the white Cattleyas, and many other Orchids which were imported only as single specimens originally but which are now well represented in gardens, the advantage of dividing the plants is readily seen.

Pseudo-bulbous Orchids with progressive rhizomes, such as Cattleyas, Lælias, Oncidiums, and Odontoglossums, should be divided by severing the rhizomes, retaining two

or more pseudo-bulbs together. This operation can be done at any season of the year, but it is most convenient to do it at potting time, and, for preference, just before the commencement of the natural growing season of the plant. Small pieces should be placed in small Orchid pans or baskets, but larger ones may be potted at once and placed on the stage with the other plants.

Dendrobiums may also be propagated by dividing the plants, but a large section of the genus may also be propagated by cuttings of the pseudo-bulbs. This method is specially useful for increasing a rare and fine variety of *Dendrobium nobile* or others of the section, as a good supply of plants can quickly be obtained in this way. The method is to cut the pseudo-bulbs into lengths of two or three inches and to place them in small Orchid pans, six or eight in a pan, suspending the pan in a warm, moist house. The Thunia section of Phaius, *Epidendrum radicans*, and some other Epidendrums and Orchids of similar growth may be multiplied in this manner. Further remarks on propagation will be found under the names of the genera enumerated.

CHAPTER VIII

WATERING EPIPHYTAL ORCHIDS

SUCCESS or failure with any class of Orchids depends largely on the exercise of discretion in watering. While it may be said that more specimens are lost by having too little water, especially among the smaller-growing species,

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than by over-watering, at the same time much mischief is caused by a system of giving a little watering frequently all the year round, and without any regard to the period of growth or rest through which the plants are passing. Such treatment does not provide for strong growth during the growing season, or adequate rest after the growths are finished; consequently the plants decline in health and the flowers are not satisfactory. Rain-water is the only suitable water for Orchids, and the growers who can command a supply of it all the year round possess a great advantage over those who have to use water from any other source.

During the period of growth and root action, too much water at the root cannot easily be given, provided the material in which the plants are potted is sufficiently porous and the pots or Orchid pans have a sufficient drainage. The rule should be to water thoroughly when watering at all, making sure that the whole of the potting material is moistened well, then not to give more water to that plant until the effect of the watering is seen to be passing, the plant being still moist but approaching dryness, when the thorough watering should be repeated. Nothing is more misleading than to pour a little water each day on the surface of the material in which the plant is potted. This is often considered to be careful watering, but it results in a large number of the plants never getting thoroughly moist at the root, while others in a retentive compost, or where the drainage is defective, become soddened. Such cases may arise occasionally under any conditions, and, where a thoroughly dry plant is found at a season when it should be moist, it is better to plunge

the pot or basket in water until it is perfectly soaked. In the case of a plant which is too wet with stagnant moisture, it should either be repotted after the wet potting material has been removed, or placed on a shelf to remain without water until it is again in a proper condition to receive it.

In all cases a spouted watering-pot should be used. The rose watering-pot and syringe are necessary things in the Orchid house, but the use of them should be rigidly restricted to some definite work, such as watering Orchids for the first time after repotting, sprinkling the floors, staging, and brick walls, and other work which cannot cause mischief. It used to be a common practice to water Orchids overhead with a rose watering-pot, but the plants so watered made but few roots, and the foliage was generally unsightly, owing to deposits from the water. It is therefore best to make a rule against watering overhead in a general way.

The syringe may be used among Dendrobiums and some other warm-house Orchids during the height of the growing season; but it would be safer to arrange for such work to be done by means of a sprayer and at shorter intervals. The sprayer is a very useful and beneficial contrivance, and, in the hands of a careful operator using clean rain-water, it affords a valuable aid in maintaining a healthily humid condition in the atmosphere of all the Orchid houses, especially during the heat of the summer.

Equal in importance to the giving of sufficient water during the growing season is the observance of the dry, resting season, which, in a varying degree, is required by all Orchids, whether they come from hot or cold habitats, and whether they are epiphytal or terrestrial species.

WATERING TERRESTRIAL ORCHIDS

These, like the epiphytal Orchids, may be divided into two main classes, namely, those which lose their leaves annually, and those which are more or less evergreen. Some of the genera contain both of these classes, and notably the *Calanthes*. In *C. vestita*, *C. Regnieri*, *C. rosea*, and their varieties and hybrids the leaves turn yellow after the growths are fully made up, a sign which gives a good indication as to the necessity for withholding water for a lengthened period ; while *Calanthe veratrifolia* and others of the class retain the last-made foliage green all the year round, the loss of foliage being in the old leaves, which should be removed at the first sign of decay. With these latter may be classed the *Phaius*, *Zygopetalums*, *Cymbidiums*, *Cypripediums*, and many others of evergreen habit, which require much care to be exercised in the matter of withholding water during the resting season, otherwise the plants will decline in vigour. After the growths are finished, most of these plants are benefited by removal to a cooler and more freely ventilated house for a few weeks, during which time the supply of water should be restricted, but they should never be allowed to suffer by being thoroughly dried. For *Zygopetalums* and other Orchids which it is customary to place in a rather drier atmosphere during the time they are in flower, such an interval would be sufficient rest.

CHAPTER IX

MANURES FOR ORCHIDS

It should be distinctly understood that, in the case of true epiphytes, there is no need for manures, and, that artificial chemical manures are almost certain to bring about disastrous results, the final collapse being in proportion to the potency of the stimulant used and the recklessness of the grower. Where rain-water can be obtained and stored for use throughout the season, it is safest and most satisfactory to rely on this alone, except for some terrestrial Orchids. The chief difficulty in recommending the use of manures for any class of plants, Orchids especially, is in the fact that, once the practice is commenced, even those cultivators who begin cautiously frequently lose discretion in the course of time and ruin their plants by excessive applications. It is for this reason that the growers of plants for market purposes, whose secret of success almost entirely depends on the use of manures, are careful to give out the supplies to the men who have to use them, or, with the very best intentions, they would often destroy a crop. Indeed, it is not uncommon for foremen, or men in charge of departments in large nurseries devoted to growing plants for market, to resort to unfair means to get extra supplies of manure for their plants, and frequently with bad results. There is another curious feature about the use of manures in market-plant gardens, namely, that all concerned observe the greatest secrecy in the matter, and rarely admit that they

use "anything but water"—that being the common expression. The same secrecy is observed by the Orchid expert in most cases. Another thing is that there is no common formula accepted by all practitioners. Each seems to have his own opinions as to materials, quality, and strength of the stimulants used.

One thing is certain, that even where artificial manures are used, the time of application and its discontinuance has more to do with success or failure than the nature of the manure itself. Even in cases where the administration of a mild stimulant is of use during the period of active growth and free rooting, if the manure is not discontinued after growth is completed much mischief is done.

It is not necessary to go into the relative merits of chemical manures, which are not recommended for use, but it may be stated that some growers do use small quantities with apparently good results, restricting the use of the manure to the active growing season and during the time the flower-spikes are forming. *Aërides*, *Saccolabiums*, and *Vandas* seem to be exceptions, as they represent the highest development of the epiphyte. *Odontoglossums* and some similar Orchids have been treated to a very small quantity of Peruvian guano sprinkled in the water used for watering them in spring while the flowers were forming, and without a bad effect; but the quantity used was very small, and the water was not allowed to touch the leaves or pseudo-bulbs. One grower on the Continent was in the habit of sprinkling a handful of nitrate of soda in the gutter of the house, especially before, or during heavy rain, in order that a little solution of it might be carried into the rain-water tanks in the Orchid house. His plants

PLATE IV
CATTLEYA TRIANÆ
VAR. "HYDRA"
(The plant bore 88 flowers.)



thrive well, and this shows that even with epiphytal Orchids there is a field open for experiment ; but the operator must not lose sight of the fact that he is "playing with edged tools." We will now state what has been proved to be beneficial when carefully carried out. Those who grow batches of the showy Dendrobiums such as *D. nobile*, *D. Wardianum*, *D. Phalænopsis*, and others of the class, and who, at the growing season, place them in a warm, moist house, suspended from the roof for preference, frequently give them weak doses of liquid manure during the season of growth, and the plants make very fine growth.

The liquid from farm-yard manure, or from a stable, should be avoided, as its strength cannot be known ; sometimes it is very weak, and at others fatally strong. A large tub with liquid manure made of cow-dung, and in which a coarse bag of soot has been sunk, is a safe manure for any plant, and if properly diluted can do no harm to plants requiring such a stimulant.

Terrestrial Orchids such as *Calanthes* and *Phaius* can scarcely be grown to their best without a liberal application of this, or some other manure known to the operator to be safe, during their season of growth. *Cymbidiums*, *Zygopetalums*, *Peristerias*, and other strong-growing Orchids have also been treated to weak liquid manure from the commencement of growth until the flowers expanded, with advantage so far as evidence is available.

An occasional watering of liquid manure, or slight sprinkling of guano, may be given beneath the staging in the evenings during the growing season.

The structure of the roots of Orchids does not favour

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the idea that they are suited for taking up stimulating liquid in the manner common to fibrous-rooted plants.

On the general question of the use of stimulants in Orchid culture many clever men have carried out experiments. The late Dr. A. H. Smee went into the question, basing his experiments on the chemical constituents of the plants themselves, which is not an infallible guide.

The late Norman C. Cookson carefully studied the subject, and he recommended for experiment the following formula :—

Potassium nitrate (saltpetre), 3 oz.

Ammonium phosphate, 2 oz.

Dissolve in a three-gallon jar of soft water, and when watering growing Orchids, or those perfecting their flowers, add one ounce of the solution to each gallon of water.

Again it must be urged that those experimenting with manures must do so only on growing plants, and when growth is completed it must be stopped. No Orchid grower should undertake such experiments without first obtaining his employer's concurrence.

CHAPTER X

RESTING ORCHIDS

WHILST we may definitely say that all Orchids require a resting season in some degree, the cultivator must be careful to arrange the resting season, in the matter of its duration and other particulars, in accordance with the nature of the plant, for in some classes of Orchids it is very

easy to do much mischief by subjecting them to a too prolonged and rigorous resting time. Seedling Orchids, as a rule, require little or no resting season until after their first flowering, and Cattleyas, Læliocattleyas, and other evergreen hybrids require a rather shorter period of rest than deciduous species.

Bulbophyllums, Cirrhopetalums, and many other small-growing Orchids are frequently killed by attempting to give them a dry resting season, although there is a section which lose their leaves in winter like the deciduous Dendrobiums, and these are benefited by being dried off in a cooler house when the leaves fall, keeping them dry until growth starts again, in the same manner as *Dendrobium nobile*, *D. Wardianum*, *D. crassinode*, and other deciduous Dendrobiums.

The evergreen Dendrobiums of the *D. densiflorum* and *D. Farmeri* class require a short rest in a lower temperature, and should be watered a little occasionally, especially if they show a tendency to shrivel, which is not a good thing for any Orchid.

Aërides, Vandas, and Saccolabiums require a lower temperature in winter, and less water. Many of these begin to grow in March; after that season they require heat and moisture more liberally.

As a rule, the plants themselves give the best indication when the resting season has arrived, and, in the case of those which lose their leaves, they show how much rest is necessary. The starting of the new growth indicates when growing conditions should be restored. In respect to the very small-growing species, and especially evergreen kinds, it is much better to ignore the resting season rather than to lower the vitality of the plants by a severe drying off.

CHAPTER XI

SPECIALLY RARE AND VALUABLE PLANTS

WHILE every plant in the collection should be given the best possible care and attention, it is advisable to keep the more rare and valuable specimens immediately under the eye of the grower. It is often the case that albinos, rare varieties, and new species are allowed to get mixed up in the general collection, and a plant that could not be replaced may be hidden by the commoner things which are not of so much consequence. In the case of the best spotted varieties of *Odontoglossum crispum*, albino Cattleyas, and other exceptionally rare things, it is a good plan to arrange a batch of them together in the most suitable part of the house, or to place each on an inverted flower-pot at intervals along the staging, thus bringing them into prominence and facilitating the inspection of each at all times. Some use wire plant stands instead of inverted pots, but the moisture-holding flower-pots are preferable, if they are inspected occasionally to see that they are not harbouring insects. Albinos and fine varieties of Cattleyas and Lælias could be grown in suspended Orchid pans or baskets, to take them out of the general collection, and so grown they would make better progress than if placed on the stages. In the case of any plant not making satisfactory growth it is often beneficial to place it on an inverted pot to bring it more prominently under notice.

CHAPTER XII

DISEASES AND INSECT PESTS

THERE is very much in the old-time advice, "Grow your plants clean," for a very large proportion of Orchid diseases and insect pests are due to errors in cultivation, more especially in the regulation of the temperature and the ventilation. Insanitary houses lower the vitality of the plants, and vegetation, like human beings, is a prey to disease when kept in unhealthy conditions.

Spot, or Orchid disease, exhibits itself in various forms. It is caused, as scientists say, by different micro-organisms, but in effect it is practically the same whether in the form known as "Spot," often seen in *Phalænopsis*, *Aërides*, and *Vandas*, or in the decayed and blackened pseudo-bulbs of *Cattleyas*, especially *C. Warscewiczii* (gigas), which from an apparently healthy plant may develop a diseased condition of the pseudo-bulbs, and become useless in a few days. In all such diseases it will be seen that the tissues have collapsed; the result being brown or blackish spots on leaves or bulbs. Imperfect nutrition from lack of healthy roots is a frequent cause of this mischief, for *Aërides* and *Vandas* which have been affected with "Spot" recover in the new growth, for a time at least, if a satisfactory root action can be set up.

Propagation, by freeing the recently made parts of the plants from the old and worn-out back portions, which are not furnished with the roots necessary to support themselves

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is one of the best means of preventing Orchid diseases, and efforts should be made to keep the plants vigorous and, therefore, capable of resisting attacks by insect pests.

Plants are also benefited greatly by having their position in the houses changed, and that is one of the great advantages of the periodical inspection, for during this process the relative positions of the plants are altered.

It should be said that Cattleyas and other common Orchids badly affected by disease had better be burnt, for it is cheaper to buy a healthy young plant than to waste time in trying to bring the unsightly and diseased specimens back to health.

The Cattleya Fly (*Isosoma orchidearum*), first imported probably with *Cattleya Dowiana*, and frequently with other Cattleyas since, affects the new growths, the grubs causing them to swell and rendering the growth useless. The same species, or one closely allied, also attacks the young roots of Cattleyas, *Laelias*, and their hybrids, causing unsightly galls on the points of the roots. Fumigation, with some safe preparation to destroy the fly, should be carried out, and every young growth and root-point as soon as they are seen to be affected should be cut off and burnt. By adopting these remedies it is possible to get rid of the pest. In purchasing freshly imported plants, care should be taken to reject those which show signs of having been affected by the fly.

Thrips, Red Spider, and Aphides occasionally appear in every collection, and the remedy is fumigation and sponging with an insecticide, which some growers prepare for themselves, either by pouring boiling water over coarse tobacco tied up in a cloth and adding a little soft soap, or by

making an infusion of quassia chips. But excellent insecticides can be purchased already prepared, which are guaranteed to be safe and effective, and being of uniform strength, they may be used with confidence if the instructions given with the preparations are observed strictly.

Avoid using paraffin and emulsions of paraffin, for it is dangerous, not only to the plants sponged with it, but to all the plants in the house, for it affects the atmosphere.

SCALE INSECTS

These appear much less in collections now than formerly, because the old large specimens are replaced by young and vigorous plants. Thirty or forty years ago, it was a usual thing to spend several days every year scraping the brown scales from tall plants of *Aërides odoratum*, *Vanda tricolor*, and other specimen Orchids, and what was called "cleaning" was going on all the year round. Now there is much less need of such work, although scale will appear in its various species on one section of plants or another. In the periodical inspections, all plants attacked by it should have the insects removed by a piece of stick blunted at the edge and point, sponging the leaves afterwards with some diluted insecticide. Syringing with an insecticide, or dipping the plants in the liquid, should be avoided, for the quantity applied is likely to saturate the material in which the plants are potted and to run into the centres of the young growths and cause injury. By means of a sponge, it may be applied lightly or heavily, but the operator has command in each case over what he is doing.

MEALY BUG

Fortunately this pest is rare in Orchid houses, but when it appears it is easily destroyed in the same manner as scale.

COCKROACHES

The first of these insects to be noticed should be the signal for the laying of poison. Search should be made for the breeding quarters, which are often in the stoke-hole, or in some hot, dry corner of the house. Various preparations are recommended, but the best still seems to be the old phosphor paste, which should be placed on pieces of paper in the haunts of the insects in the evening, and removed the next morning, a fresh supply being put down every two or three days so long as one of the insects remains.

SLUGS, SNAILS, AND WOODLICE

To combat these is more a question of diligence than anything else. The old remedies to attract them, such as lettuce leaves, or hollowed halves of potatoes, are still effective, and a walk round the houses with a light at night never goes unrewarded.

CHAPTER XIII

PERIODICAL INSPECTION

WHENEVER the time is to be spared, it is a good plan to overhaul one or other of the sections of Orchids thoroughly, and to have a more general inspection as soon as possible after the winter has passed, and at the end of the summer,

this latter inspection being the more important. Cleanliness in everything around Orchids is one of the most important aids to successful culture, and, during the periodical inspections, plants which are not clean should be cleansed, their pots where it is required washed, and the staging and any part of the house requiring it thoroughly cleansed before the plants are rearranged. During the course of the work certain plants which would be benefited by being repotted, or divided, will be found, and these should be given attention. The water in the tub in which the green deposit on the pots has been removed by scrubbing, and as much of the other water used in cleansing as can be dealt with, should be poured down a drain outside the Orchid house. If thrown on the floor of the house, it leaves an unpleasant odour, which is harmful and lasts a long time.

During the inspection at the end of the summer the staging should be repaired where necessary, the heating apparatus carefully overhauled and defects made good, in order to minimise the risk of having to do the work during the cold weather. Where it is deemed advisable to black the hot-water piping, use only lamp-black and oil. Paint gives off injurious gases for a considerable time, and where persons have been incautious enough to use gas-tar the most lamentable results have followed, the mischief lasting for years. These periodical inspections and rearrangement of the plants are also useful in preventing the same plants occupying the same positions for too long a time. A change of position in the house is beneficial, even where the plants are not crowded; but in collections where the plants are closely arranged, to change their positions fre-

quently, goes far to mitigate the evil arising from want of space. In preparing for a thorough inspection of the plants in a house, it is desirable to remove a number of the plants to another house to make room to examine the rest without risk of breakage, the plants removed at the commencement being returned to fill the space remaining after the work has been completed.

The Orchid grower is always supposed to have the plants under his direct inspection and to treat them with individual care, but these occasional reviews often reveal defects in some of the specimens which would otherwise have escaped for some considerable time.

CHAPTER XIV

ORCHIDS FOR THE CONSERVATORY

THERE are many dwelling-houses of moderate pretensions, especially in towns and suburban districts, in which the sole accommodation for plant-growing consists of the conservatory adjoining the house, and this is, in most cases, heated by one or other of the simple means at command for the purpose. The contents of such structures are usually unsatisfactory, the Pelargoniums, Fuchsias, and other soft-wooded plants which are arranged with some of the hardier Palms and Ferns being drawn into spindly growth, which results in a miserable supply of flowers for a short season, and afterwards in decaying foliage, which is not ornamental. Quite a new interest would open up to

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the owners of such places were they to turn their attention to acquiring from time to time a few of the Orchids which are now to be procured as cheaply as the less suitable plants, such as Pelargoniums. Already some successes have been recorded in this direction.

Let us consider the different classes of conservatories, and the species most likely to succeed in them.

To take first the commonest kind of small conservatory attached to villa gardens. These are unheated structures except in the winter months, when the temperature cannot be kept from getting below 45° Fahr. without the aid of one of the oil-stove heating apparatus, or heat turned on from the pipe connected with the kitchen range, where arrangements for doing so have been provided. These means of applying artificial heat should be used as little as possible, and only to prevent the temperature falling below 45° Fahr., for in confined spaces and with such means of heating, the atmosphere is better for the plants without the use of artificial heat, whenever the house can be kept from getting too cold without it. In such conservatories, many of the *Odontoglossums*, *Masdevallias*, *Oncidium varicosum*, *O. crispum*, *O. prætextum*, *O. Gardneri*, the pretty scarlet *Sophronitis grandiflora*, *Epidendrum vitellinum*, *Lycaste Skinneri*, *Cypripedium insigne*, *Disa grandiflora*, and a number of other pretty and inexpensive species can be grown satisfactorily, especially if the *Oncidiums*, *Sophronitis*, *Odontoglossum Rossii majus*, and other of the smaller species be placed in baskets for suspending, a means of cultivation which suits them best, and adds to their decorative effect.

The next step is the larger conservatory adjoining

many town and suburban dwellings. These are heated by a small boiler with hot-water pipes, a means, it should be said, which is the only satisfactory method of heating glass structures. To the species indicated for the smaller and less safely heated structures may be added a very wide range of subjects of great beauty. In such a structure the Palms supplying decorative foliage may be much restricted, or entirely dispensed with, as *Cymbidium Lowianum*, *C. giganteum*, *C. Tracyanum*, and any others of the section having evergreen leaves of much grace, are decorative plants at all seasons, and possess the further advantage of being furnished with fine spikes of flowers for several months in the year. These large and strong-growing species are specially adapted for the conservatory, an Orchid house being unnecessary for them.

To the heated conservatory also may now be handed over the showier species and hybrids of the South American Cypripediums (Selenipediums), which, probably because of their very free-growing nature rendering them too large for the Orchid house, and the ready manner in which they may be increased, have caused them to be slighted lately by growers of collections of Orchids. The air of the conservatory, rather drier than that of the Orchid house, suits these plants admirably. Their bright evergreen foliage and tall sprays of white and rose, or greenish flowers tinged with purple, which often by succession keep the specimens in bloom for six months in the year, render them beautiful and interesting subjects for the conservatory.

The strongest and best kinds to be acquired are *Selenipedium longifolium*, *S. Sedenii*, *S. cardinale*, *S. calurum*, *S. grande*, *S. Schröderæ*, and *S. albo-purpureum*.

Cypripedium Charlesworthii, *C. Spicerianum*, and *C. Leeatum* should also be added. The larger, heated conservatories might well be furnished with the Orchids recommended rather than the plants generally used for decorating them, for these have to be changed frequently. The Orchids, if carefully tended, will grow permanently in the conservatory and be a source of never-failing interest. In these large conservatories, Stanhopeas in baskets for suspending are ornamental plants, and Sobralias on the floor or central bed would prove satisfactory. To those enumerated many more might be added, but in all cases it is best to get only evergreen kinds, which may be grown continuously in the same house.

CHAPTER XV

ORCHIDS AS CUT FLOWERS

ORCHIDS having flowers with persistent perianths, in which the segments do not drop as in many other flowers, are of the highest value for cut flowers, as some or other of them can be obtained in every month in the year. Large quantities of the large-flowered Cattleyas, especially *C. labiata*, of *C. Harrisoniana* and its near ally *C. Loddigesii*, *Odontoglossum crispum*, *O. Pescatorei*, Dendrobiums, and other showy Orchids are grown for cut flowers in nurseries where Orchids are not required for other than market purposes. In many private gardens, also, the same kinds of Orchids are grown for decorative purposes, even without

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a desire to grow a general collection. Those who arrange for a general collection of Orchids as their primary object often cut the flowers for their own use, or to give to their friends, and the following remarks may be useful to all classes of growers.

A large proportion of the flowers of Orchids used for decorative purposes are in a great degree wasted by being cut in an immature state soon after the buds have expanded. Such flowers last but a very short time, and, if used for decoration by night, are only presentable for one evening. Orchid flowers should not be cut until they are fully mature and their tissues hardened. They last longer even if they are cut after they are past their best, than they do if cut too soon after expanding. When mature, the flowers require less support from moisture passing up the stem than most flowers, but if cut in an undeveloped state sufficient moisture cannot be obtained through the stems, even if well supplied with water, to continue the development, and the petals droop and the flowers soon wither.

When Orchid flowers are to be used for decorative purposes, no matter in what stage of development they may be, it adds greatly to their durability if they are placed head downward, thoroughly immersed in clean water (rain-water for preference), and kept so immersed until an hour or so before they are set up, gently shaking the water from them, and placing them on a cloth or some dry, cool surface until wanted. Treated in this way, Orchid flowers will last for weeks instead of days. The method should be to take them out of the dining-room or other place where they have been used after the guests have departed each evening. Have ready a large earthenware pan filled with water,

PLATE V

BRASSO-CATTLEYA DIGBYANO-MOSSIÆ

“WESTONBIRT VARIETY”

(Raised from a cross between *Brassavola Digbyana* and
Cattleya Mossiæ.)



and in it immerse the Orchid flowers, leaving them immersed until shortly before they are required to be set up again next day, repeating the same treatment every night. Managed in this way, sprays of *Odontoglossums* and other Orchids often last for weeks, and look better than freshly cut immature flowers do even on the first day. Flowers received by post should always be treated to the bath for some hours, and, during immersion, any defects which are reparable will be made good and the duration of the flowers ensured, especially if the immersion be repeated as before recommended. In this way *Masdevallia*, *Sobralia*, and other fugacious flowers may be used for decorative purposes for two evenings at least, but in the absence of immersion they would wither in a very short time. It might also be said that the Maidenhair Fern, also *Asparagus plumosus*, and other foliage used with the cut Orchids are materially benefited by immersion, the Maidenhair Fern especially; it should always be kept immersed until required for use.

CHAPTER XVI

IMPORTING ORCHIDS

MANY interesting Orchids have been imported by amateurs who have friends or correspondents in the countries which the Orchids inhabit, and many more would have arrived alive if the persons who sent them possessed some knowledge of the best methods of collecting, packing, and for-

warding the plants. The want of this knowledge often results in the trouble the collector has taken being in vain, and disappointment to the receiver who gets the dead plants and has to tell his correspondent the sad tale of failure.

Orchids should be gathered and forwarded during their resting season, and with a sufficient time between their being sent off and their natural growing season to allow of the period of their transit being made before their resting season expires. This rule is often needlessly violated by those who are settled in the district from whence they are sending the Orchids, and who could easily wait until the resting season comes round. For those who are travelling and have to take the Orchids when they can and in whatever condition they may be, however, there is some excuse, and by carefully forwarding the plants, even although at the wrong season, many may get them over alive. Residents in the tropics often grow a collection of Orchids, bringing to the gardens around their residences the plants collected in distant parts of their districts. These growers have a notion that cultivated plants are the best to send their correspondents, therefore, although they could collect fresh plants, they think it safer to send those in their own gardens. These are the very worst plants to travel. They are usually collected in high localities, and their sojourn in a garden results in lowered vitality, which explains why a large proportion die during the journey to this country.

Freshly collected plants, in whatever stage they may be, are the best, the ideal conditions being to take the plants at mid-resting season, to have the case to receive them beneath the trees on which they are growing, to pack them off at

once to a shipping agent at the port of embarkation, to catch a steamer previously timed, and to consign the case or cases to a reliable shipping agent in England.

Another cause of mortality in Orchids during transit arises from the mistaken notion that the plants require to be prepared by drying before packing, and this practice is continued so long and rigorously in many cases that the plants are half dead before they are despatched.

No such preparation is needed ; the plants should be packed at once after collecting, and any moisture which may be in them will escape through the small holes in the case. The parcels post is available from many parts of the tropics, and from some places it is the only reliable means of getting Orchids over in a reasonable time. But it is only available for small lots, and for these it forms the best means of forwarding. Unfortunately, there are drawbacks even to these means, for the parcels, especially from some ports, are frequently stowed in hot chambers on board the mail steamer, the object being to keep the mails dry, and plant-life is destroyed by the excessive heat.

Epiphytal Orchids with pseudo-bulbs, such as *Cattleyas*, *Lælias*, and *Epidendrums*, if collected at or near the proper season, require very little packing. The cases being ready, it is necessary to place a layer of plants at the bottom, with their heads all facing one way. The next layer is placed with the heads the reverse way, and so on until the box is full of plants firmly pressed in, but not sufficiently close to cause injury. During the packing a few struts of wood should be placed across the inside and fastened by nails driven into their ends from the outside ; these will prevent the plants from forming a

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mass and rolling about when the boxes are moved. A few small holes should be bored in the boxes to admit a little air.

Leafy epiphytal Orchids, such as *Phalænopsis*, *Aërides*, *Vandas*, and *Saccolabiums*, may be forwarded in the same way, but with a sprinkling of fine paper cuttings, layers of paper, fine but not resinous shavings, or dry moss between each row of plants. In respect to species which do not possess pseudo-bulbs it is absolutely necessary that they be sent at the proper resting season, if forwarded in bulk in boxes.

Phalænopsis for sending at any time are prepared by collectors in Java and the Philippines by establishing the plants on blocks. They are almost the only temporarily cultivated Orchids which often travel well when so managed, and they are usually sent fastened round the sides and backs of Wardian cases, a method which is somewhat costly. Terrestrial Orchids, such as *Phaius*, *Calanthes*, and others with above-ground pseudo-bulbs, if collected at the proper resting season, travel well packed in cases of moderate size and with a little dry packing material placed between the rows. The danger with these kinds is that the pseudo-bulbs, being soft and containing much moisture, are liable to decay, and a few damaged plants may cause the loss of all contained in the box.

Tuberous-rooted, terrestrial Orchids of the same nature as the British Orchis, and including the African *Disas*, and *Satyriums*, also the *Habenarias* of different regions, should be marked when in flower and lifted in the resting season, the tubers being placed in small boxes with a sprinkling of nearly dry sandy peat or sand, run in

between the tubers. If there are several different kinds to be forwarded, all the small boxes containing them may be packed together in a larger box.

Next to the trouble caused by loss in transit is that of having plants arrive without any means of identification. The collector should be careful to write the name of every specimen on an imperishable label, or, better still, send each under a number and forward a numbered list with the names corresponding to the numbers on each kind sent. Those who are collecting Orchids should, as often as possible, dry specimens of the growth and flowers of each kind, forwarding one set, numbered similarly to the set retained, to their correspondent, or to some authority, for identification. A description or rough sketch of the plant should be given on the same sheet as the dried specimens, stating such important particulars as colour of flowers, altitude of habitat, and exact locality.

CHAPTER XVII

TREATMENT OF IMPORTED ORCHIDS

MUCH depends on the condition of the importations, whether they have been collected at the proper time, and whether they have been properly packed and forwarded. Many imported Orchids offered for sale cannot possibly do well, as from improper packing they have "heated," or been subjected to excessive heat or cold whilst on board. Cases of Orchids awaiting transit are often left on the landings in the full sun and become partially desiccated,

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though while dry still retaining a green appearance. Such collectors' failures die rapidly as soon as heat and moisture are given, and, even in the case of those which seem to establish a healthy appearance of the pseudo-bulbs, growth is not possible, as the growth-buds have been dried up. It is waste of time trying to bring such plants round, therefore care should be taken not to purchase them at any price.

Imported Orchids of all kinds should be trimmed over as soon as they are received, the damaged parts removed, and the plants placed in a cool-intermediate temperature after they have been sponged over. They may be suspended for a few days and afterwards placed in small pots of broken crocks. Pseudo-bulbous Orchids, such as *Odontoglossums* and *Cattleyas*, should not be watered, but they may be sponged occasionally until growth commences, when they should be potted in the usual manner.

Aërides, *Saccolabiums*, *Vandas*, *Angræcums*, and other Orchids not having pseudo-bulbs may be treated in the same way as the pseudo-bulbous kinds, it being probably the safer and more cautious policy. But good results, and a quicker establishment may be secured, if the plants are recoverable by immersing them for five minutes in a rain-water tank immediately on arrival, suspending them head downwards from the roof of the house afterwards, and repeating the dipping two or three times a week. This method has the advantage at least that those which were not recoverable are quickly discovered, while the sound plants soon plump up. With all imported plants there is no use potting them permanently and watering them until growth commences, but they must not be kept too hot in the meantime.

CHAPTER XVIII

ODOURS OF ORCHIDS

MANY Orchids have fragrant flowers, while in some sections the fragrance is emitted by the whole plant. A large number of Burmese and Indian, highland Orchids, such as *Dendrobium moschatum*, the section of deciduous Bulbophyllums which includes *B. auricomum*, *B. hirtum*, *B. comosum*, and *B. suavissimum*, have leaves that on becoming dry after falling give off a strong odour of newly-mown hay, the plants also in all their parts being similarly scented when dry, even the cases containing them being pleasantly scented by the plants.

The odours of Orchid flowers may generally be likened to well-known perfumes. *Trichopilia suavis*, *Miltonia Roezlii*, and others are scented like the Rose; *Odontoglossum odoratum* and some other Odontoglossums, *Maxillaria picta* and other Maxillarias, like the Hawthorn. Certain Maxillarias of the *M. luteo-alba* section are scented like Honeysuckle, and odour similar to the Tuberose is given off by many Angræcums. Some have a much stronger odour at night than in the day, a peculiarity which is found in *Epidendrum nocturnum*, *E. ciliare*, and many species. Vanilla is a common scent in Orchids, being present in some Vandas. The odour of Violets is furnished by *Dendrobium heterocarpum* and others of its class, and the Primrose, Wallflower, and other common garden plants have their exact imitators in the matter of

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scent in some tropical Orchids—indeed, it is an interesting subject to consider how plants resemble each other in this particular. Then there are large numbers of Orchids with such delicate odours that some are unable to appreciate them, but they are specially grateful to those who detect them. Again, some Orchids have different odours at different times in the day. It is not safe, therefore, to declare a plant scentless unless it has been tested repeatedly at different times.

Variation in odour has been noticed. We remember flowering the first *Odontoglossum hebraicum*, and on testing it its odour was of cinnamon. It passed to Sir Trevor Lawrence's collection, and we asked the late Mr. Spyers to test the odour, and he replied that it was of Hawthorn, like others of its class. He tested it several times with the same result, but for some time before it passed off he reported to us that it smelt exactly like cinnamon. Then there are odours in Orchids about which opinions are divided as to whether they are pleasant or not. *Oncidium ornithorhynchum* is an example ; some like the odour of it very much, while it is disagreeable to others. The same applies to Anguloas, some *Lycastes* and *Stanhopeas* with strongly aromatic scent, which are pleasant at a distance, but not so when too closely approached. But the majority are distinctly pleasant, *Cattleya Dowiana* and its hybrids, *C. Eldorado* and others, being delicately fragrant.

A very few are malodorous, *Bulbophyllum Beccari* not being tolerable under any circumstances, the flowers smelling like some of the *Stapelias*.

CHAPTER XIX

HYBRIDISING AND RAISING SEEDLING
ORCHIDS

A NEW interest has been added to Orchid culture by the pursuit of hybridising and raising seedling Orchids, which commenced with *Calanthe Dominyi*, raised in the nurseries of Messrs. Veitch and recorded in the *Gardeners' Chronicle* in 1858. The practice has now become general, and a large number of Orchidists arrange for the production of new Orchids from seeds, while even in small collections some attention is given to the matter. When the engrossing pursuit is first taken up, the operator should neglect no opportunity to make himself conversant with the structure of the flowers. This may be done effectually by carefully examining any available flowers, and by making longitudinal sections of the bloom by cutting them in two, commencing at the apex of the column and finishing at the ovary and pedicel. This operation exposes the various organs that are concerned in the fertilisation of the flower.

In most Orchids, such for instance as *Lælias* and *Cattleyas*, it will be seen that the pollen masses are situated at the apex of the column covered by the anther cap, the stigma being in a cavity in the face of the column beneath it.

In *Cypripedium* there are two developed anthers ; the viscous pollen masses are not enclosed in cases, but are placed opposite each other ; the stigma is a shield-shaped

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body seen inside the lip on the under side of the column, and the stigmatic surface is not viscous.

The details of the structure of the flowers being fully understood, it will readily be seen that the first process in the production of seeds is to fertilise the flower intended to bear the seed capsule with the pollen of the other parent selected. This is readily accomplished by lifting the pollen masses beneath the anther-cap with a thin pencil or sharpened stick and placing them on the stigmatic surface of the seed-bearing parent.

Flowers which are intended to be fertilised for seed-bearing should have their own pollen carefully removed before the pollen taken from the other plant is introduced, the pollen removed being used to effect the reverse cross, or to fertilise another species if desired.

In fertilising small flowers with the pollen of larger species, as in the case of *Sophronitis grandiflora* with the pollinia of the larger species, the pollen masses may be cut and a portion of it used in crossing the smaller flower. When the flower of a plant has been fertilised, the plant should receive special attention; if it is a *Cattleya*, *Lælia*, or one of the large-growing epiphytes, it should, after the pseudo-bulb bearing the flower has had a number attached to it corresponding to the number in the stock-book in which the crosses are recorded, be suspended from the roof in a comfortable and not draughty situation. If the plant is in a pot, the pot should be placed in a basket and suspended; or if a suitable position can be found on the stage, it could be placed on an inverted pot to bring it into prominence and secure for it careful attention. Where there is a number of seed-bearing plants, they

should be arranged together in the respective houses in which they are grown.

Early in its development, the seed capsule should be supported by ties, which, however, should not bring it into an unnatural position, or press tightly on the part supported. From this time failure may arise from the conflicting natures of the agents used, or from various causes. Even the production of a fine and seemingly mature fruit is not a certain indication of good seeds, for seed capsules have been produced by irritation of the stigmatic surface by grit or dust, but no fertile seeds can be thus produced. On approaching maturity, a tie should be made round the middle of the capsule to prevent loss of seed when the splitting of the capsule takes place, and, when it is thoroughly mature, it should be removed, placed in a flower-pot lined with tissue-paper, and put on a shelf in a dry potting-shed until so thoroughly ripe that the seeds are being shed in the tissue-paper covering.

At this stage it is possible for the first time to determine whether the seed, or any of it, is good or not. Examination with a strong lens will show whether the minute seeds are good or not by the presence or absence of the embryo in the centre of the elongated covering, which in imperfectly developed specimens is chaff-like and not thickened in the middle as are good seeds. Where no good seeds are found, it is the custom of some growers to discard it at once, and where but few good seeds appear, attempts are made to discard the chaff and to retain the supposed good ones for sowing. Where space admits, however, especially with the beginner, it would be more prudent to sow a portion of the contents of the capsule, whether supposed to be good or not.

SEED SOWING

A number of the seeds of all seed capsules should be sown as soon as they are ready, the remainder being carefully stored for sowing later if required, the seeds sown and those retained being carefully marked with the number in the record book.

The manner of sowing the seeds varies in different establishments, satisfactory results having been obtained under very dissimilar conditions. Failure at first is the usual record of the amateur taking up Orchid hybridisation, although some few get fairly good success from the commencement, while those who have had a run of bad luck usually conquer in the end if they persevere. A scientific reason for some failures has been given, namely, that an endophytic fungus said to be necessary to the development of the freshly germinated seeds is wanting in the early stages, but may be developed naturally after a time, and a better state of growth result. Be that as it may, it is a curious fact that the line of demarcation between failure and success in the matter of raising seedling Orchids is very narrow, and, when the operator succeeds in raising a fair proportion of the seeds sown, he is generally surprised at his former want of success, apparently under practically similar conditions. Formerly the common practice was to sow the seeds on the surface of the material in which the parent plant was growing, or a plant of some kindred variety. This practice has been generally satisfactory and continues in most amateur collections to the present day. A plant in a basket, or suspended pan or

pot, is best, the subject being chosen for the good quality of the peat, *Osmunda* fibre, or whatever material the plant may be growing in. The *Sphagnum*-moss on the surface should be clipped very short, the plant thoroughly watered with rain water, and allowed to drain for a few hours. The seeds should be sown a few at a time, on the point of a knife or thin strip of hard wood or ivory, and carefully and evenly distributed over the surface of the material in which the selected plant is growing. In all cases the number of the record in the stock-book should be attached, a small celluloid tablet fastened by a thin wire being the best label, as it is clean and durable. Hybrids of *Lælia*, *Cattleya*, and other true epiphytes should be suspended in a warm, intermediate house, and *Cypripediums* and terrestrial *Orchids* may be sown in a similar manner in the pots of either the seed-bearing subject or similar kinds and placed in a moist, sheltered corner of a house, in which a genial warmth is maintained, the plants being elevated on inverted flower-pots. Once the seeds are sown, the plants fostering them should never be allowed to get dry.

Odontoglossum seeds come up best when sown on the surface of established plants in the manner described. To ensure the best results two or three sowings of each should be made, and the plants bearing the freshly sown seeds placed in different parts of the house, some being suspended and others placed on the stage.

The maintenance of a continual and even amount of moisture after sowing, and until the seedling plants send forth roots, is of the highest importance. To water either with a spouted or a rose pot overhead would wash the seeds

away. To avoid this, some resort to the practice of dipping the plants on which the seeds are sown, allowing the water to reach only to within an inch of the surface of the compost. This is better than watering overhead. Spraying with rain-water is an excellent means of securing uniform moisture, although it requires more care and attention than dipping. The sprayer is a great help in all stages of seedling Orchid growth, not only as a means of conveying moisture direct, but by spraying around the plants and on the staging it is a great aid to maintaining a moist atmosphere. Let the moisture be conveyed in whatever manner it may, it must not be forgotten that the seeds will perish soon after germination if allowed to get quite dry, either from failure of moisture in the material on which they are sown, or from an excessively dry air surrounding them. Against the above-mentioned practice of sowing the seeds on established plants, it is urged that in that way there is no certain means of keeping the different crosses from being mixed, by reason of the seeds of one kind getting into the water-tank and being thus conveyed and mixed with others ; and by seeds falling from plants suspended overhead and coming up on plants beneath, and in other unexpected places. Such acquisitions, though often very acceptable, are puzzling, as there is no record of their origin, or if they come up amongst seeds which have a record, the chance introductions sometimes have a wrong parentage assigned to them.

To lessen such risks, it is the custom of some growers to arrange a seed-raising case, constructed like an ordinary propagating case, in form like a miniature lean-to, or span-roofed Orchid house. This is arranged over a part of the

PLATE VI

CYMBIDIUM LOWIO-EBURNEUM

(This plant has been commended for its culture on two separate occasions by the R.H.S.)



staging where there is a slight warmth from the hot-water pipes. The staging has a few inches of cocoa-nut fibre, or chopped *Osmunda* fibre, fine ballast, or other moisture-holding substance, and on this a number of inverted flower-pots are closely arranged to form stands for the pots or pans in which the material for sowing the seeds on is placed : or a light, open wood-work staging is arranged. The favourite surface for sowing the seeds on is prepared by stretching a small square of coarse calico or fine light muslin shading material over a ball of *Sphagnum*-moss, and pressing it into a 60 or small 48 size flower-pot, so that the unwrinkled convex surface of the ball has the centre just below the level of the rim of the pots, the sides being lower. These are thoroughly soaked and allowed to drain before sowing the seeds on them, and they are then placed on the inverted pots in the case. The covering of the case is sometimes of the nature of hinged sashes to lift from the front, but the most convenient and best covering is that formed of sheets or panes of glass cut about one foot wide and of a length sufficient to cover the frame, by resting one end on a groove in the front side of the case, and the other on the top bar. A sufficient number of these sheets of glass should be provided to cover the frame ; they are excellent, as they give a certain means of continual ventilation in some degree through the laps of the glass, even when closed, and they may be closely or openly arranged to regulate the amount of air admitted. Such pieces of glass can easily be removed to inspect the seedlings.

What is commonly called "coddling" causes great mortality among Orchids, and in this particular the use of

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seedling cases, if not very carefully and sensibly worked is less likely to be satisfactory than sowing the seeds on plants growing in the houses. Too much heat is very harmful. *Odontoglossums* proved difficult to raise at first, and this was mainly because the seedlings were kept too warm and close. If the cultures are carried on in the *Odontoglossum* house, success is generally attained, although the products are seldom so numerous as in *Cattleya*, *Lælia*, and *Cypripedium* hybrids.

Another plan adopted by some growers, and with tolerable success, is to place squares of *Osmunda* fibre in pans, and after soaking them, sow the seed on them. Others have discs of soft wood, such as Willow, cut across the grain and placed in flower-pots or pans with the fibre of the wood-grain uppermost; after soaking the discs, the seeds are sown on them. When not raised in glass cases, round or square pieces of glass are placed on the pots. Indeed, there is ample evidence that, provided good seeds are sown and placed in a suitable temperature, Orchid seeds germinate readily. The first sign of vitality is given by the good seeds assuming a green appearance; in time they become little spherical green bodies, which later produce a growing point; in due course the true root appears, and the little plants are ready for pricking off or transplanting into previously prepared store pots prepared with a good drainage of small crocks or broken charcoal in the bottom, some *Osmunda* fibre or other Orchid potting material, and an inch or so of very fine compost formed of decayed leaves, *Osmunda* fibre, or good Orchid peat and *Sphagnum*-moss in equal parts, the whole rubbed together through a fine sieve. Some add a proportion of

sand to this compost. The whole should be thoroughly well watered before the tiny seedlings are placed a quarter of an inch or so apart in small holes in the surface of the compost and sprayed to settle them in position. Up to this stage the greatest mortality is observed. Wide crosses between species of dissimilar nature, and which have up to the production of the growth point or root appeared to be doing well, having shown that they did not belong to the unfertile, suddenly collapse. Those which have taken a long time to germinate have fallen victims to the minute fungi, and other low forms of vegetable organism, which, commencing at one or two spots, have gradually overgrown the surface of the pot and destroyed them. The stronger are often destroyed by small insects, while drip, however carefully guarded against, claims its share of the spoil. These things are specially vexing to the amateur who is working in a small way. To the expert cultivator who has a multitude of subjects in hand, and whose methods and appliances mitigate the evils, the losses are not so serious, for when Orchid seeds germinate freely they provide for losses when sown on a large scale. Nothing is gained by removing the little seedlings from the seed pot or basket too early. If thriving, they should be left until they are large enough to be handled safely. But where there is overcrowding, or "damping off," or decay from fungus, it is best to remove some or all of the little seedlings in any stage of growth to the store-pots.

The store-pots should be returned to the seedling case, or placed on a shelf near the glass in a warm, moist house, where the seedlings should increase in size until they are

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ready to remove to fresh store-pots, when they may be given more room ; or if large enough, they may be placed singly in thimble pots, or three or four seedlings may be placed round the rims of thumb pots.

Seedling *Odontoglossums*, when large enough to occupy thimble pots, are found to thrive well when the pots are fixed in pans or shallow seed-boxes in *Sphagnum*-moss, and placed on a shelf near the glass in the *Odontoglossum* house, where, like other seedling Orchids, they should be lightly sprayed several times each day in fine, warm weather, and as often as may be deemed necessary in colder and dull weather.

From the time the little plants are established in small pots until their flowering stage, it is only a matter of ordinary culture, although, as a rule, the small seedlings are safer with four or five degrees more heat than is afforded the established plants. In the matter of growth from the seedling stage to the flowering plant, there is but little need of a resting season, even with species such as are deciduous when mature, although a diminished supply of water may be given for a short time to any which, having completed a growth, show no sign of developing a fresh one. In most cases, a thorough drying, even if it does not destroy a seedling, causes the flowering season to be delayed by a year, or even longer.

The careful shading of the seedling house is a very important matter. Very young plants do best in a subdued light, and until they are quite strong plants they should not be exposed to direct sunlight. A hot summer often kills even the plants which have been brought satisfactorily through a long winter. It is, therefore, advisable to have

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on the seedling house, in addition to the lath roller blind, running on supports carrying it well above the glass of the roof, either a second lath roller blind running an inch or so above the glass and beneath the upper one, or a permanent thin cotton shading, which may be tacked on in spring and left until autumn ; or, preferably, so fitted that it can be rolled up when it is not required.

SELECTION OF SUBJECTS FOR HYBRIDISING

The best varieties procurable should always be selected for hybridising, it having been proved that crosses originally made with indifferent varieties are much finer when raised again from more carefully selected varieties.

There seems to be no certain limit to the possibility of crossing ; even the most dissimilar genera may be crossed with some probability of getting a successful result.

POTTING MATERIAL FOR HYBRID ORCHIDS

From the time the little plants are well established in single pots, the same potting material used for all of their kind may be employed, the plants in the earlier stage having the potting material in a finer condition than that provided for the larger plants as they approach the flowering stage.

As with other important operations, in Orchid potting and in the material used the practice varies considerably, even in the best collections, and this points to the fact that if the accommodation is good, the houses properly heated, and other details of culture carefully carried out, the exact

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composition of the potting material is of minor importance. For *Cattleya* and *Lælia* hybrids and a large number of epiphytes grown with them the compost is made by tearing up the materials with the hand, or in some other way which will not break the fibres very much. *Osmunda* fibre forms one-half to two-thirds of the compost, the other third being made up of good *Sphagnum*-moss and Oak leaves or other decayed, dryish leaves. We do not recommend leaf-soil or leaf-mould, which was formerly strongly advocated, especially by Continental growers, who used it with disastrous results. The most that is done now is to mix a proportion of it with other potting material for *Lycastes*, *Calanthes*, *Phaius*, and similar strong-growing terrestrial Orchids.

For mixing with the compost for hybrid Orchids, some use crushed crocks, sand, charcoal, and a small proportion of each or either may be employed safely, although there is no real need for such materials.

Polypodium fibre may also be substituted for *Osmunda* fibre, or a proportion of each may be used. Orchid peat fibre, which used to be the chief potting material for Orchids, is still perhaps as good as any of the other fibres, provided a really good quality can be obtained, a matter which has become increasingly difficult.

For *Cypripediums*, and especially *Selenipediums*, a proportion of good, fibrous loam should be added to the compost recommended for epiphytal Orchids, the proportion of loam being increased as the plants get larger. *Phaius*, *Calanthes*, *Zygopetalums*, *Zygocolax*, and other plants of a similar character should also have a proportion of loam-fibre in the compost, and in these cases Orchid peat may

be substituted for *Osmunda* fibre, if it is of good quality. So far as it has been tested, *Osmunda* fibre has an advantage over other fibres, in that it is more durable, retaining its fibre intact longer than any other. *Osmunda* fibre and *Polypodium* fibre in equal proportions, with an addition of leaves and *Sphagnum*-moss, make an excellent material for all young, epiphytal Orchids, the finer *Polypodium* fibre, if well worked in, giving substance to the more open *Osmunda* fibre.

For very small plants it is well to rub the mixture through a coarse sieve, but after the early stages the use of the sieve should be discontinued, and the compost carefully mixed with the hands.

CHAPTER XX

ENUMERATION OF THE PRINCIPAL GENERA AND SPECIES IN CULTIVATION

Acanthophippium.—A small genus of terrestrial plants with oblong pseudo-bulbs, and broad, plicate leaves. Scape erect, flowers ventricose, yellow and reddish-purple. Warm house. Pot in equal parts of turfy loam, peat, and leaves. Rest dry after the leaves fade and growth is completed. The most familiar species are *A. bicolor*, *A. javanicum*, and *A. striatum*.

Acineta.—The species of *Acineta* are epiphytal Orchids with stout pseudo-bulbs and broad, coriaceous leaves. The flowers are produced in pendulous racemes; they are

fleshy, whitish, or yellow, and spotted with purple or brown. They should be grown in baskets suspended in the intermediate house. *A. Barkeri*, *A. densa*, and *A. Humboldtii* are free-growing species.

Acropera. See **Gongora.**

Ada.—Cool-house genus from Colombia. Leafy evergreen plants with racemes of orange-scarlet flowers. *Ada aurantiaca* is almost the sole representative of the genus in gardens, and should be grown even in the smallest collections.

Aëranthus. See **Angræcum.**

Aërides.—A large genus of evergreen Orchids with distichously arranged, leathery, green leaves, the stem producing air-roots freely. Natives of India, the Malay Archipelago, and other parts of that region, extending to Japan.

All the species of Aërides may be grown in pots, crocked from one-half to two-thirds of the way up, the old stems of the plants, when long, being placed in the pots before the crocks are filled in. The surface should be of good living Sphagnum-moss, and the plants should be liberally watered from the end of February or beginning of March until autumn, when the supply of water should be restricted according to the condition of growth of the plants. Those which have finished their growth and are not showing new leaves in the centre should be given the least supply, but it is not advisable to dry any off completely, unless for some reason they have to be kept comparatively cool throughout the winter, when they are safest if kept tolerably dry. The smaller species may be grown in baskets with advantage when convenient—indeed,

the true epiphytal character of the whole genus would suggest that method as the better, but experience has proved that they may be equally well grown in pots. The warm house, or warm end of the intermediate house, suits all the species, but *A. japonicum* may be grown in the cool house. Most of the species have white and rose-coloured flowers, and they are very fragrant.

A. odoratum, one of the oldest of garden Orchids, is one of the best and most free-growing species. *A. crispum*, *A. crassifolium*, *A. Fieldingii*, *A. Houlettianum*, *A. falcatum*, *A. Lawrenciæ*, *A. multiflorum* in its many forms, *A. quinquevulnera*, *A. suavissimum*, and *A. virens* are the best for amateurs.

A. cylindricum and *A. Vandarum* have terete leaves like *Vanda teres*, the former with white flowers, having a fleshy yellow and red lip, and the latter, which is more membranaceous in substance, being white. Although often confused with each other in gardens, there is little resemblance between these two species.

Aganisia.—This genus thrives best in Orchid pans in the intermediate house, in the ordinary compost used for epiphytal Orchids, with an addition of leaves. Place the plants in a moist situation.

A. cærulea is of trailing habit, and has blue and white flowers. *A. ionoptera* is white and purple, and *A. lepida* white.

Angræcum.—A large genus chiefly from Africa and Madagascar, and requiring similar treatment to *Aërides*. Botanists have divided the genus into *Aëranthus*, *Listrostachys*, *Mystacidium*, &c., but for garden purposes the one generic title suffices. The flowers of nearly all the

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species are white and fragrant, many of them being furnished with long, greenish spurs.

A representative selection could be made with *A. arcuatum*, *A. Ellisii*, *A. Humblotii*, *A. infundibulare*, *A. Kotschyi*, *A. modestum*, *A. Scottianum*, *A. superbum* (*eburneum*), and *A. sesquipedale*, the last-named Madagascar species being the finest of the genus.

Anguloa.—Colombian and Peruvian Orchids of strong growth, and similar in habit to *Lycaste*. The flowers are usually produced singly on upright stems. Pot in two-thirds peat and one-third Sphagnum-moss or *Osmunda* fibre. When good loam fibre can be obtained, a small proportion may be added. Intermediate house. Rest tolerably dry and cool after growth is completed. *A. Clowesii*, yellow; *A. Ruckeri*, yellow and dark-red; *A. uniflora* and its variety *eburnea*, white.

Anæctochilus.—A dwarf genus with fleshy, creeping stems and very handsomely marked leaves. The plants should be grown in shallow Orchid pots, using a mixture of one-third peat, and loam and leaves in equal parts well mixed together, adding some finely broken crocks. The plants should be placed in a moist corner, or suspended in a shady part of a warm, moist house. They root along the stems, and may be increased by cutting the leading portions with a root or two and leaving the bases to break into new growth.

With the *Anæctochili*, and often under the same generic title, are usually associated *Dossinia marmorata* (*A. Lowii*), with broadly ovate, olive-green, veined leaves; *Macodes Petola*, emerald-green veined with gold; *Hæmaria discolor*, dark bronzy-red veined with copper colour, often named

Goodyera Dawsoniana, and plants of similar character. The flowers of most of the species are white. They are sometimes grown in plant cases, or under bell glasses, but if the proper position in a warm, moist house can be found, they are better without these coverings. Propagation renews the vigour of the plants and prevents them degenerating, as they often do in cultivation if left undisturbed for too long a period.

Ansellia.—A fine genus of some half-dozen species peculiar to Natal and Tropical Africa, and growing from one to six feet in height, the leafy pseudo-bulbs having at the top fine, branched spikes of yellow flowers, more or less barred or spotted with purple. Pot as for epiphytal Orchids, and grow in the intermediate house. Water the roots liberally until the flowering is past, and then rest the plants in cool and dry conditions.

A. africana is not only most commonly grown, but it is one of the finest species. Others, some of which are mere varieties of *A. africana*, are *A. confusa*, *A. gigantea*, *A. nilotica*, and *A. congoensis*.

Arachnanthe.—This is a small genus of warm-house plants possessing extraordinary habits, and including the Bornean *A. Lowii* (*Vanda Lowii*), a very strong-growing species which bears drooping racemes of greenish-white flowers barred with red. The two basal blooms are dissimilar or dimorphic both in shape and colour, being tawny yellow spotted with purple. The plants should be grown in pots or baskets as *Aërides*. Other species are *A. Cathcartii* (Himalaya) and *A. moschifera* (Malaya). *A. Cathcartii* will thrive in the intermediate house.

Barkeria.—The *Barkerias* form a section of *Epidendrums*. They should be grown in baskets or suspending pans in the cool intermediate house. They require a dry and cool resting period.

Bartholina.—The *Bartholinas* are dwarf, terrestrial Orchids of South Africa. They should be potted in loam, peat, and sand, and cultivated on a green-house shelf. Rest dry and cool. *B. pectinata* is the only species in gardens.

Batemannia and **Bollea.** See *Zygotetrum*.

Bifrenaria.—Pot these as recommended for epiphytal Orchids, and grow them in the intermediate house. *B. Harrisoniæ* is the finest species. Others worthy of cultivation are *B. aurantiaca*, *B. bicornaria*, *B. inodora*, *B. tyrianthina*, and *B. vitellina*.

Brassia.—The *Brassias* are epiphytal Orchids of South America, and may be grown in the intermediate house. The most familiar species are *B. brachiata*, *B. caudata*, *B. Lawrenceana*, and *B. verrucosa*.

Broughtonia.—*B. sanguinea* is a pretty, crimson-flowered species from Jamaica. *B. lilacina* is also a fine species, though rarely seen in gardens. *Broughtonias* should be grown on bare rafts suspended in the warm or intermediate house.

Brassavola.—A small genus with white, fragrant flowers. *B. Digbyana*, a species with large, fringed-lipped flowers, has been much used by the hybridist. *Brassavolas* may be grown with the *Cattleyas*.

Bulbophyllum.—A widely distributed genus which may be divided into two sections—the deciduous, chiefly Burmese, requiring a dry resting season; and the evergreen, which should not be strictly dried off. All the species thrive in

a warm, intermediate house, with cooler rest for the deciduous and highland species. The genus is one of the most varied and remarkable, and full collections of them are grown by some amateurs.

Calanthe.—These are terrestrial Orchids, which may be divided into two sections—the evergreen of the *C. veratrifolia* class; and the deciduous, comprising *C. vestita*, *C. Veitchii*, and numerous other species and hybrids which are extensively grown for flowering in winter. Pot them in a compost of one-half fibrous loam, one-fourth Sphagnum-moss, and one-fourth leaves, with a sprinkling of sand. Rest the deciduous section dry after flowering, and repot them when growth commences in spring. Water liberally with occasional applications of liquid manure, which should be withheld when the growth is completed.

Catasetum.—The Catasetums are curious, epiphytal Orchids, which should be grown in baskets, or Orchid pans, suspended in the intermediate house, and treated in a similar manner to the deciduous Dendrobiums. They require a long, dry rest after the growths are completed. All the species are worthy of cultivation, *C. Bungerothii*, *C. splendens*, and *C. macrocarpa* being the more showy kinds.

Cattleya.—One of the largest, most varied, and florally beautiful genera of Orchids. The plants should be potted as recommended for epiphytal Orchids, and they should be grown in the intermediate house. The *C. labiata* section, including *C. Gaskelliana*, *C. Mossiæ*, *C. Mendelii*, *C. Dowiana* and its variety *aurea*, *G. Warscewiczii*, *C. Warneri*, and *C. Schröderæ* in succession, produce flowers for the greater part of the year. *C. citrina* should be grown in the cool house, suspended from the roof. Cattleyas and Lælias are

impatient of a close atmosphere, and therefore the proper ventilation of the house in which they are grown is an important matter. *C. Trianæ*, var *Hydra*, is illustrated in Plate IV.

Chysis.—A small genus of intermediate-house epiphytes, comprising *C. bractescens*, white; *C. aurea* and *C. lævis*, yellow and red; *C. Limminghei*, and several hybrids.

Cirrhoptalum.—A section of *Bulbophyllum*, of similar habit, and requiring similar treatment. The curiously formed flowers frequently have the upper segments fringed, and the lateral ones approached and continued into slender tails.

Cirrhæa.—Allied to *Gongora*, and requiring similar treatment.

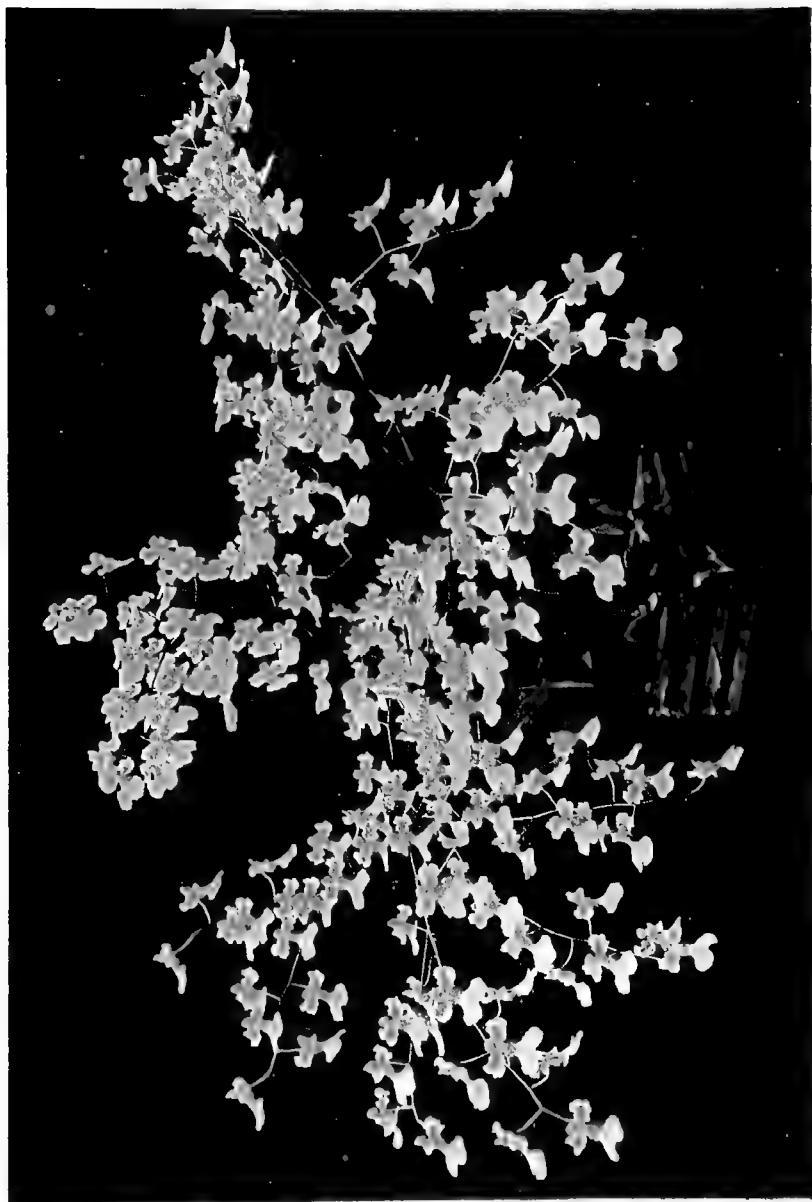
Cochlioda.—A compact-growing genus to be grown with the *Odontoglossums*. *C. Noezliana*, scarlet, has been a fine species in the hands of the hybridiser, and in the future may give us "Scarlet *Odontoglossums*." *C. vulcanica* has deep rose-coloured flowers.

Cœlia.—There are several species of *Cœlia*, and they require to be grown in the intermediate house.

Cœlogyne.—A very large genus of two distinct sections, that represented by *C. cristata* being evergreen; the *Pleione* or *Indian crocus* section deciduous, and requiring to be treated as terrestrial Orchids, while the larger section are epiphytal. The epiphytal sections are warm and intermediate house plants. The *Pleiones* should be grown in a cool house, and rested quite dry after the leaves fade and until growth again commences.

Comparettia.—These are small-growing epiphytes. Grow in small baskets or hanging pans in the intermediate

PLATE VII
ONCIDIUM MARSHALLIANUM



house. *C. falcata*, red, *C. macroplectron*, pale rose ; spotted ; and *C. speciosa*, scarlet, are the best species.

Colax.—A small genus of cool-house Orchids allied to *Lycaste*, and requiring similar treatment. *C. jugosus* has been crossed with *Zygopetalums* with good results.

Coryanthes.—These are similar in habit to *Stanhopea*. The plants should be grown in baskets suspended in the intermediate house. The structure of the large, fleshy flowers is most remarkable, and some interesting particulars relating to their fertilisation by insect aid have been recorded in the *Gardeners' Chronicle* (July 17, 1897, p. 31).

Cycnoches.—Of similar habit and requirements to *Catasetum*. The plants are best grown in baskets and suspended. They should be rested cool and dry with the deciduous *Dendrobiums*. *C. chlorochilon* (Swan Orchid), *C. Egertonianum*, *C. Loddigesii*, *C. maculatum*, *C. peruvianum*, and *C. pentadactylon* are fine species.

Cymbidium.—These are showy, large-growing Orchids for the intermediate house or warm conservatory. Pot the plants in equal proportions of fibrous loam, peat, and Sphagnum-moss. *C. giganteum*, *C. Lowianum*, *C. grandiflorum*, and *C. Tracyanum* are the most commonly grown. *C. eburneum*, *C. Mastersii*, *C. insigne*, and *C. erythrostylum* are fine, white species, the latter two with rose markings on the lip. There are numerous hybrids. *C. Lowio-eburneum*, a cross from *C. Lowianum*, and *C. eburneum* is illustrated in Plate VI.

Cynorchis.—Terrestrial Orchids from Tropical Africa and Madagascar, requiring to be grown in the warm house in moist and shady conditions. The flowers are generally of rose colour.

Cypripedium.—This is one of the largest, most useful, and most prolific genera, which, although commonly known in gardens as *Cypripedium*, may be divided into several distinct classes. Most of those generally known in gardens as *Cypripediums* have been termed *Paphiopedilum*, including *C. barbatum*, and *C. Rothschildianum*, and the green-leafed class, more commonly known in gardens as *Selenipedium*, are now termed *Phragmopedilum*. The name *Cypripedium*, however, has so firm a hold on cultivators that it is convenient to retain it in gardening handbooks.

The *Cypripediums* have very numerous hybrids, and their numbers increase annually. An enumeration is therefore impossible within the scope of this work. All require to be treated as terrestrial Orchids, a proportion of fibrous loam (see the chapter on potting terrestrial Orchids) being added in proportion to the strength of the subject, the largest proportion being given to the strongest growers. The *Selenipedium*, or green-leafed section, should be potted in fibrous loam, with a sprinkling of leaves and *Sphagnum*-moss. *C. insigne*, *C. Spicerianum*, *C. Charlesworthii*, and others of the class, also hybrids of them, may be grown in the cool house. *C. Rothschildianum*, *C. Stonei*, and the whole of that section require the highest temperature, but all may be grown successfully in an intermediate house. *C. insigne Sanderæ* is illustrated in Plate I.

Cyrtopodium.—A strong-growing genus needing to be grown in the intermediate house. The plants should be potted as terrestrial Orchids. *C. punctatum* is the showiest and most easily grown species.

Dendrobium.—One of the largest and most decorative genera of epiphytal Orchids, comprising several hundred

species and a large number of hybrids. Primarily the genus may be divided into two classes—the evergreen ; and the deciduous, which lose their leaves after the completion of the growths, and should have a protracted dry resting reason. The evergreen species have a shorter and less rigorous resting season accorded them. The deciduous class is exemplified by *D. nobile*, *D. Wardianum*, *D. crassinode*, and the plants associated with them, and their hybrids ; and the evergreen species by *D. densiflorum*, *D. Farmeri*, and *D. chrysotoxum*. *D. Wardianum*, with 264 flowers, is illustrated in Plate III.

Next, the genus may be divided into two further classes—those requiring a high temperature, such as *D. Phalænopsis*, *D. superbum*, *D. atro-violaceum*, &c. ; and those which may be grown comparatively cool, which include *D. speciosum* (an excellent plant for a sunny conservatory), *D. moniliforme* from Japan, *D. aggregatum*, *D. Jenkinsii*, and many others. All the species require a high temperature, moist atmosphere, and an abundance of water during the growing season, but should be kept drier and cooler after the growth is completed to prepare them for flowering. The species with pendulous growths should be grown in baskets or suspended pans.

Diacrium.—A section of Epidendrum, with hollow pseudo-bulbs, and white, wax-like flowers. *D. bicornutum* is a very fine species for the warm house.

Disa.—A genus of terrestrial Orchids from Africa, best represented in gardens by the fine Scarlet *Disa grandiflora*, which, with the others of its section, *D. racemosa* and *D. tripetaloides*, have produced many beautiful hybrids. These are cool-house plants, and should be potted in a mixture

of peat, Sphagnum-moss, sand, and loam fibre. They are increased by offsets, and, when repotted soon after the flowering season, the strong growths should be potted on for flowering, and the smaller ones placed together in store pans. Free drainage should be provided, and the plants liberally watered until they flower. After this stage, cultivation in a cold frame for a few weeks before repotting and returning the plants to the cool house will benefit them.

The *D. graminifolia* or Blue Disa section do not increase by stolons. They are heath plants, and should be potted in sandy peat, and kept quite dry when they lose their leaves.

Epidendrum.—There are over 400 known species of this genus. *E. vitellinum* is a fine orange-coloured, cool-house species. All may be grown in the intermediate house. *E. O'Brienianum*, *E. radicans*, and *E. Boundii* are fine plants for covering the ends of houses and back walls.

Eria.—An interesting genus, comprising many curious, and some very pretty species. They are epiphytes, and should be grown in the intermediate house. The deciduous species need to be kept dry when at rest.

Eriopsis.—These are epiphytal Orchids from South America. They should be grown in the intermediate house, and they need moisture and shade. *E. biloba* and *E. rutidobulbon* are the best-known species.

Eulophia.—A large genus in which both evergreen and terrestrial plants are represented. Grow them in the intermediate house.

Eulophiella.—The genus includes two species from Madagascar, *E. Elisabethæ*, white, and *E. Peetersiana*, rose. Grow them in a moist position of the warm house, giving them a liberal supply of rain-water.

Galeandra.—These are deciduous epiphytes, needing similar cultivation to *Catasetum*.

Gomezia.—Allied to *Odontoglossum*. The flowers are yellowish, and are produced in racemes. Intermediate-house plants.

Gongora.—Intermediate-house Orchids, which should be grown in baskets or suspending pans to allow of the full production of their long flower-spikes.

Grammatophyllum.—A genus of strong-growing epiphytal Orchids for the warm house. *G. speciosum* is a gigantic Malayan species.

Grobya.—Brazilian Orchids represented by *G. galeata* and *G. Amherstiae*. Intermediate house.

Habenaria.—Terrestrial Orchids. *H. militaris* and *H. rhodocheila* are bright scarlet; *H. carnea*, flesh colour; *H. Susannæ*, *H. Bonatea*, and *H. Ugandæ*, tall-growing, green and white. The two latter species will grow in a cool house; the others need greater warmth. The North American species are nearly hardy, and may be grown in a frame.

Houlletia.—Fragrant epiphytal Orchids from South America. Intermediate house.

Ionopsis.—Pretty, slender, white and lilac species. Grow in small baskets in the intermediate house.

Lælia.—One of the largest and showiest genera, great favourites in gardens, and fine subjects in the hands of the hybridiser. The Mexican species *L. anceps*, *L. autumnalis*, *L. albida*, &c., used to be allotted a special dryish intermediate house, but they are now usually grown in the intermediate or *Cattleya* house, and rested in a cooler vinery or corridor. All the species require the same treatment as *Cattleya*.

Liparis.—A genus of dwarf Orchids chiefly of botanical interest. Intermediate house.

Lissochilus.—Showy terrestrial Orchids, chiefly from South and Tropical Africa. They should be grown in warm or cool conditions according to their habitats. *L. Krebsii* and *L. speciosus* are two handsome, cool-house species; *L. giganteus*, *L. Horsfallii*, and others of this class require a warm house. Being marshy plants, they need weak, liquid manure when growing.

Lueddemannia.—A fine genus of strong, Acineta-like growth and pendulous racemes of bronzy-orange coloured flowers. The growths are three to five feet in length. The best species are *L. Lehmannii*, *L. Pescatorei*, and *L. triloba*. Grow in baskets suspended in intermediate house.

Luisia.—Terete-leaved Orchids that may be grown in the warm house with the *Aërides*.

Lycaste.—Most of the species thrive in the cool end of the intermediate house. They have been grown successfully in a compost in which decayed leaves formed the principal ingredient, the remainder being either Sphagnum-moss, loam fibre, or peat, with a little sand or fine crocks added. In some collections *L. Skinneri* and some of the other species are grown in the cool house. All the species require to be kept as cool as possible in summer.

Masdevallia.—Dwarf, tufted plants, with pretty and varied flowers, from high ranges in South America. They should be grown in the cool or Odontoglossum house. Pot them in equal proportions of Sphagnum-moss and peat, with a little sand and fine crocks. The species of *M. chimæra* section should be grown in suspending baskets or pans, and given a rather warmer situation than those of

the showier *M. Harryana* (*coccinea*) and *M. Veitchiana* sections, being placed in the cool end of the intermediate house in winter. *M. tridactylites*, *M. O'Brieniana*, *M. ionocharis*, and many others form an interesting section of dwarf Orchids, with singular, insect-like flowers. The *Masdevallias* require to be kept moist all the year, and are benefited by occasional division when being repotted in spring or late summer.

Maxillaria.—An extensive genus, widely distributed in South America, and extending to the West Indies. All the species are intermediate-house plants, requiring the ordinary potting material for epiphytes. The flowers are varied in form and colour from the white *M. grandiflora* and *M. venusta* to the large claret-blotched *M. Sanderiana*. Many of the species have fragrant flowers.

Megaclinium.—A singular genus from Tropical Africa, closely allied to *Bulbophyllum*, their chief characteristic being the singular flat rachis of the inflorescence, which bears a single row of insect-like, brownish flowers on each side. *M. Bufo*, the type species, is probably not now in gardens. *M. falcatum* is the commonest, and *M. purpureorachis*, *M. triste*, and several other species are sometimes seen. They should be grown in the warm house in baskets or pans.

Microstylis.—The species of *Microstylis* should be grown as terrestrial Orchids in Sphagnum-moss and peat, with fine crocks added. Rest the deciduous species in dry and cooler conditions.

Miltonia.—The *Miltonias* are compact-growing South American epiphytes, to be grown in pans elevated in a sheltered corner of the intermediate house. Pot the plants in ordinary material for epiphytal Orchids, and surface

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the compost with living Sphagnum-moss. *M. vexillaria*, *M. Roezlii*, *M. Warscewiczii*, formerly included in *Odontoglossum*, form a section requiring to be grown like *Odontoglossums*, but rather warmer. This section has been found to thrive well with a good proportion of leaves in the compost. *Miltonia Vexillaria*, "Empress Victoria," is illustrated in Plate II.

Mormodes.—Grow these with the *Catasetum* and *Cynoches*, and treat them similarly by resting them dry. The genus is a singular one, the curiously formed, generally fragrant flowers being very attractive.

Neobenthamia.—*N. gracilis* is an elegant, white-flowered, slender species from Tropical Africa, and it should be grown in warm-intermediate temperature.

Nephelaphyllum.—Dwarf, terrestrial species for the warm house. Grow with *Anoectochilus*.

Notylia.—Graceful epiphytes for baskets and suspending pans. Intermediate house.

Octomeria.—A genus allied to *Pleurothallis*. The flowers are usually white and rather small.

Odontoglossum.—The *Odontoglossums* are deservedly the most extensively grown genus of cool-house Orchids, the larger proportion of those in gardens being represented by *O. crispum* (illustrated in Plate VIII.), one of the most beautiful of Orchids. The spotted forms often realise very high prices. Cool, moist houses are provided for *O. crispum* and its section of *Odontoglossum*; in some gardens several houses are allotted to the species. Given a suitable house and careful treatment, the *Odontoglossums* are among the easiest Orchids to grow, and the most certain to flower. All the species generally classed with *O. crispum* should be

grown in well-drained pots. The compost in which they are grown used to be formed exclusively of Orchid peat and Sphagnum-moss, and, where these materials can be obtained of good quality they have never been improved upon. There came a craze in some collections for putting the *Odontoglossums* in leaf-soil, which ended in disaster, although it indicated that a proportion of dry leaves (not leaf-soil) may be used in the compost with advantage. Scarcity of good Orchid peat brought about the introduction of *Polypodium* fibre and *Osmunda* fibre, both excellent materials when prepared as recommended in the chapters on Potting Epiphytal Orchids, and Hybrid Orchids. For the general repotting of those requiring it September is the best month, but in early spring the plants should be examined in order to repot those which need immediate attention. The *Odontoglossum*-house must be kept cool at all seasons, and the necessity to have lower night temperatures must be strictly recognised. Free ventilation should be provided, but at all seasons when drying, east winds prevail, especially in winter and early spring, the bottom ventilators should be only opened slightly, the top ones being kept closed ; the laps of the glass of the roof will admit sufficient air. Moisture should be freely distributed about the house by syringing beneath the staging and between the pots in summer, but in winter the houses, if kept at the prescribed low temperature, will be moist without much water being distributed. *Odontoglossum citrosimum*, *O. Rossii*, *O. membranaceum*, and some other Mexican species should be grown in baskets or pans ; *O. coronarium* and its varieties in oblong baskets ; *O. Londesboroughianum* on rafts. *Odontoglossums* require abundance of water, but are easily injured if allowed to get

soddened. Water should therefore be given systematically—a thorough watering, and no more until the effect of it is passing and the still moist material is sufficiently near the dry point. After flowering, a lessened supply should also be given for a time, but the plants must not be dried off. At this stage it is a good time to repot any requiring to be repotted. In the cool houses, and indeed all the Orchid houses, observation should be made as to the rapidity of evaporation of water from the floors and staging. If the moisture evaporates too quickly and the floors and stages become dry rapidly, it must be remembered that the conditions are not favourable to sustaining the vitality of the plants in the house, for, where rapid evaporation takes place, a similar process affects the tissues of the plants. Means should be taken, either by lowering the temperature or checking the ventilation, to sustain a lasting humidity in the houses.

Oncidium.—This is a large genus, most of the members being suitable for cultivation in the intermediate house. *O. macranthum* is a cool-house plant, and *O. crispum*, *O. Forbesii*, *O. concolor*, *O. Marshallianum* (illustrated in Plate VII.), *O. varicosum*, and others also do well in the cool house in baskets or suspended pans. *O. Papilio*, *O. Kramerianum*, *O. Lanceanum*, and *O. ampliatum* should have a position in the warmest end of the intermediate house. Pot the plants as epiphytal Orchids. Withhold water for a time after growth is completed.

Paphinia.—Small-growing epiphytes. Grow in baskets or pans in a warm, moist house.

Phaius.—Strong-growing, terrestrial Orchids for the intermediate house. Pot them according to the directions

PLATE VIII
ODONTOGLOSSUM CRISPUM



in the chapter on the potting of terrestrial Orchids. The species are evergreen, and require but a short resting season. They require shade.

Phalænopsis.—These are warm-house species from the Philippines, Java, Borneo, India, and other places. Pot the plants in Sphagnum-moss. They succeed best when suspended, but if they are grown on the stage they should be elevated on inverted pots. A moist atmosphere is essential. *P. amabilis Rimestadiana* will grow in the intermediate house; so will also most of the other species, if placed in a moist corner.

Peristeria.—The genus is best known in gardens by *P. elata* (Dove Orchid). The cultivation is similar to that for Phaius.

Physosiphon.—A small genus allied to Stelis. *P. Loddigesii* has racemes of orange-coloured flowers.

Platyclinis.—These are pretty, intermediate-house Orchids, with pendulous racemes of white or yellow flowers, generally fragrant.

Pleione. See *Coelogyne*.

Pleurothallis.—A large genus of elegant, dwarf-growing Orchids for the intermediate house.

Promenæa. See *Zygopetalum*.

Renanthera.—These showy species are natives of Tropical Asia and Malaya. They should be grown like *Aërides* and *Vandas*. *R. Imschootiana* is a compact, free-growing species, with showy, crimson flowers.

Restrepia.—A cool-house genus usually grown with the *Masdevallias*, and requiring similar treatment.

Rodriguezia.—This genus includes the species usually called *Burlingtonia* in gardens. Suspend the plants in the

intermediate house. *R. secunda* has rose-coloured flowers ; most of the others are white, and they are generally fragrant.

Rhyncostylis.—These are warm-house plants, which are known usually as Saccolabiums in gardens. The commoner species is *R. retusa*, with fine racemes of blush-white flowers, spotted with purple ; and the blue *R. caelestis*. The cultivation is similar to *Aërides*.

Saccolabium.—The Saccolabiums should be grown in a warm house like *Aërides*. *S. bigibbum* and others of its class are pretty, dwarf species, with yellowish flowers spotted with purple and having a white lip.

Sarcanthus.—Allied to Saccolabium, and having similar cultural requirements.

Sarcochilus.—The species of *Sarcochilus* need to be grown in Sphagnum-moss in the intermediate house.

Satyrinum.—Terrestrial Orchids chiefly from South Africa, needing greenhouse treatment. The plants must be kept dry during the resting period.

Schomburgkia.—A strong-growing genus, requiring similar treatment to *Lælias* and *Cattleyas*. The best position for them is a sunny situation in the intermediate house.

Scuticaria.—The *Scuticarias* are handsome, bulbless species, with long, terete, pendulous leaves, and showy, yellowish flowers, blotched with purple. They should be grown on rafts, or in baskets suspended in the intermediate house.

Selenipedium. See *Cypripedium*.

Sobralia.—The species of *Sobralia* are strong-growing, terrestrial Orchids with reed-like stems, requiring abundance of water during the period of growth. Intermediate house. *S. macrantha* and its white variety are best known.

Sophronitis.—A dwarf genus, best known by *S. grandiflora*, which has scarlet flowers, and has been used for crossing with *Lælias* and *Cattleyas*. All the species are cool-house plants, needing cultivation in pans or baskets suspended from the roof. The hybrids succeed best in the intermediate house.

Spathoglottis.—Terrestrial Orchids of similar growth to *Bletia*, requiring a pronounced resting period. Intermediate house. Rest dry.

Stanhopea.—A fine genus, with large, pendulous, wax-like flowers of aromatic odour. They should be grown in baskets in the intermediate house. Rest rather dry in a cool house or vinery.

Stauropsis.—*Stauropsis* should be grown with *Aërides* and *Vandas*. The genus is best known in gardens by *S. lissochiloides* (*Vanda Batemanii*) and *S. gigantea*.

Stelis.—The plants in this genus possess similar growth to the dwarf *Pleurothallis*, and require the same treatment.

Stenoglottis.—*S. fimbriata* and *S. longifolia* are South African terrestrial Orchids, needing similar conditions to *Disa*.

Tetramicra (*Leptotes*).—Dwarf species with white flowers, having rose labellums. Intermediate house.

Thunia.—A section of *Phaius* with erect, terete stems and deciduous leaves. Grow them in a warm and moist house, but keep them cool and dry during the resting period.

Trichocentrum.—Dwarf, evergreen South American Orchids. Grow in pans suspended in a shady part of the intermediate house.

Trichopilia.—An ornamental, epiphytal genus, includ-

ing *Pilumna*, the white, fragrant *T. fragrans*, and its variety *nobilis*, representing that section. *T. suavis* is one of the showiest species. All are worthy of a place in collections. Intermediate house.

Trichosma.—*Trichosma suavis* is a pretty, cool-house species, with white, fragrant flowers.

Trigonidium.—There are several curious species of *Trigonidium*, with the sepals usually developed and arranged differently to *Orchids* generally. Intermediate house.

Vanda.—The genus is one of the largest and most interesting, and, like the other large genera, it may be divided into several sections. The largest-growing and best-known species are *V. tricolor* and *V. suavis*, which have white or yellowish flowers, spotted with purple, and without any distinguishing botanical feature between them. *V. cærulea* is one of the finest blue *Orchids*; *V. Sanderiana* one of the handsomest; *V. insignis*, *V. lamellata*, *V. Denisoniana*, *V. limbata*, and *V. Bensonii* are all desirable kinds. *V. Kimballiana*, *V. Amesiana*, and *V. Watsonii* form a distinct section, with fleshy leaves and erect spikes of pretty, white flowers, marked with rose in the two first, and requiring to be grown, where possible, in baskets suspended in the intermediate house. *V. teres*, *V. Hookeriana*, and their hybrid *V. Miss Joaquim*, have erect stems, bearing terete leaves, and fine, rose-coloured flowers. *V. alpina*, *V. cristata*, and *V. pumila* are pretty, dwarf species. All are generally grown together in the warm or East Indian house, but it is an open question whether the keeping of these plants and the *Aërides* and *Saccolabiums* continuously in the same house is not the cause of the un-

satisfactory condition of many of them in gardens. Each section should be watched, and, when growth is completed, a change should be given to a cool, intermediate house for a couple of months. *Aërides*, *Vandas*, and *Saccolabiums* suffer most from being kept too hot and close in winter. After spring opens the amount of heat and moisture should be gradually increased. Directly they have flowered, the tall plants which have lost their bottom leaves should be lowered in the pots or baskets by being cut off at the base. Dwarf-growing species should be brought well up to the light. *V. cærulea* grows well under the most dissimilar conditions, and with it, as with many other Orchids, there is more in finding a suitable place than in growing the plant. All require to be potted or basketed in Sphagnum-moss. Some growers add a sprinkling of leaves. The *V. teres* section may be planted in Sphagnum-moss in a warm corner of the house, or against the end of the house. If grown in pots, three or four should be potted together and trained to a stout stick or teak rod.

Zygopetalum.—Under *Zygopetalum*, several distinct sub-genera are included. The largest-growing and showiest species include *Z. Mackayi*, *Z. crinitum*, and other related species. These should be potted in peat, Sphagnum-moss, and loam fibre in equal proportions, with a sprinkling of leaves, and fine broken crocks added. During the growing season occasional waterings with weak, liquid manure should be given; and, after flowering, a rest with restricted water supply. Those that need repotting should be attended to before growth begins, but they will remain satisfactory for years in the same pots if carefully treated.

There are many hybrids, especially of *Z. maxillare*,

which should be treated like the species. *Z. rostratum* requires a warm, moist house. The Promenæas include *P. stapelioides*, *P. Rollisoni*, and *P. xanthina*. These should be grown in shallow pans, either for suspending or placing on a shelf near the glass of the roof.

Bollea, Huntleya, Pescatorea, Batemannia, and Warscewiczella.—These are sectional names for a leafy class, with rudimentary pseudo-bulbs. They are frequently mismanaged. The plants should be grown in the potting materials recommended for epiphytal Orchids, and surfaced with Sphagnum-moss. Being evergreen, and with no superabundant vitality, they should be kept moist all the year, but liberally watered when growing. A moist corner of the intermediate house, or warm house, should be selected for them, each plant being raised on an inverted pan or pot. When grown in the warm house, a rest should be given in a cooler house after growth is completed, but the plants must not be dried off. They may be propagated by division. All require shade. Botanically they are placed under *Zygopetalum*.

CHAPTER XXI

ORCHID HYBRIDS

IT is impossible to enumerate the immense number of home-raised hybrids in the scope of this book. It must therefore suffice to name some of the principal genera which have been crossed, and a few of the best hybrids, from the garden point of view.

Too much cannot be said for the absorbing interest of raising hybrid Orchids, which is referred to at length on p. 67.

Brassavola Digbyana has been one of the most satisfactory parents, crossing readily with *Cattleya* and *Lælia*, and imparting to the hybrids its large flowers and fringed lip. *B. glauca* has also been useful. *Brasso-Cattleya Digbyano-Mossiaë*, "Westonbirt Variety," is illustrated in Plate V.

Calanthes have been wonderfully improved, so far as the deciduous, winter-flowering kinds are concerned, by intercrossing, commencing with *C. Veitchii (rosea × vestita)* and now including all shades from pure white to blood-red.

Cattleya, *Lælia*, *Sophranitis*, and *Brassavola* have produced by intercrossing numerous showy garden plants, some of them, as for example *C. Iris (C. bicolor × C. Dowiana)*, and *Lælio-Cattleya callistoglossa (C. Warscewiczii × L. purpurata)*, exhibiting great variation in the colour of their beautiful flowers.

Cymbidium has been enriched by the hybridist, the

section *Cyperorchis* being merged in true *Cymbidium*. *Cymbidium Lowio-eburneum* is illustrated in Plate VI.

Dendrobium hybrids are among the most numerous and useful as decorative flowers.

Epidendrum has produced some satisfactory results, including *E. O'Brienianum* and *Epiphronitis Veitchii* (*Sophonitis grandiflora* × *Epidendrum radicans*).

Cypripedium has been so prolific that there are amateurs who cultivate them either exclusively or give the greater part of their accommodation to the genus and its hybrids, which may be numbered by the hundred.

Species of *Masdevallia*, *Odontoglossum*, *Lycaste*, *Phaius*, and *Zygopetalum* have all been intercrossed, and the number of possible combinations admits of incalculable development, especially as the crossing is not confined to the same genus. Plants of distinct genera have been crossed with each other, and in many cases the results have been unexpectedly good, as for example the pretty, scarlet *Cochlioda Noezliana*, which has been crossed successfully with several genera. Such facts as these seem to indicate that there are but few combinations amongst the genera of *Orchideæ* cross-breeders may not attempt with a reasonable hope of success.

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