THE MODERN GREENHOUSE
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etc.
THE MODERN GREENHOUSE

By

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A
Practical Guide to the
Management of the
Warm and Cool
Greenhouse

COMPLETELY REVISED

CASSELL & COMPANY LTD
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FOREWORD TO THE REVISED EDITION

Since this book was first published in 1938 many changes have taken place in horticulture generally, and this includes the cultivation of plants under glass. New methods of hygiene, new types of material used in construction, new heating systems, new approaches to feeding plants all have a bearing on success.

It was with this in mind that I set myself the task of bringing this book up to date, and I can only hope that it will help the reader to grow his plants up to a point near perfection.

I have tried to keep the book practical, so that it will help the reader to achieve this if he follows the cultural notes carefully. A well-grown plant is always a pleasure, not only to the gardener but to all who enjoy it.

Again I have avoided purely botanical subjects and kept to those which any intelligent amateur or professional can grow—given the right conditions—and the will to master the cultural details.

In many cases I have used the name by which a plant has been known over a long period, rather than switch over to new names conferred on old-timers by the various conferences on plant nomenclature.

After spending the greater part of my life growing plants under glass, I can only hope that all who read this book will find the fascination and pleasure that I know comes to those who grow and love greenhouse flowers and plants of all kinds.

I wish, finally, to express my sincere thanks to those firms who have so kindly allowed the use of their copyright photographs for the purpose of illustrating this book. I feel sure that readers will find them both helpful and instructive, as well as be grateful, as I am, for their excellence.

Arundel, Sussex
1955

J. S. Dakers
CHAPTER I

TYPES OF GREENHOUSES—HEATING

The interest in what may be called greenhouse gardening is developing year by year, and if evidence is required, then this can be seen by the large number of greenhouses which are being erected in the gardens of amateurs, and in the increasing acreage of glass on commercial holdings.

Greenhouses offer a most fascinating and satisfying method of cultivation, bringing a particular type of relaxation and quiet satisfaction in these days of fast-moving business and mechanized production, and perhaps that is why so many people have taken up what has proved an interesting and productive hobby.

This entails some knowledge and understanding of the special art of growing plants in what, after all, will be under artificial conditions. Just as the true craftsman finds pleasure in the perfection of his work, so the greenhouse owner will feel something similar as he masters the technique of cultivation and produces the perfectly grown plant.

Once having reached a point approaching perfection, the grower will have found the whole thing so fascinating and absorbing that he will want to go on and extend his interest and his glass. In this way one can be certain that such a grower has found a life-long pleasure ranging over a wide field of plant life which, without the help of a greenhouse, would not be possible.

Though this type of gardening does indeed require a specialized knowledge, the would-be enthusiast should not be put off by this fact, for much of the technique of cultivation can be achieved as one goes along. It is a case of trial and error and I can assure anyone who is prepared to apply himself to the task of learning, that it is not over-difficult or beyond the scope of the average person.

Success will come mainly from putting simple principles into action. Take the case of watering plants in pots as an example. One can read a dozen books on the subject or go to a number of lectures, but until one really does the job it is not possible to master either its importance or its technique. For this reason, then, I hope that anyone wishing to own a greenhouse will not be
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turned from his purpose, simply because he is conscious of his lack of knowledge. Up to a point one can get much help from the printed word and it is to assist the grower of greenhouse plants that I offer some instruction which, coupled with practice, will be of service both to the beginner and the more experienced grower.

The primary laws governing the growing of plants under glass will be made clear, and I would emphasize the fact that these laws cannot be side-stepped or neglected, because on them and obedience to them depends success.

A greenhouse needs daily attention, and it must be looked after every day, in the same way that one's domestic animals are cared for and fed. In fact, plants are very much like animals in this respect: they want water, fresh air, food, perhaps shade and of course must be kept clean. This means that a greenhouse will make some demands on one's time and this rather important point should be well and truly taken into consideration before buying one.

I advise starting with a 'cool' rather than a 'hot' house, and a very good structure to start with is one with a night temperature of 45° F in winter. This is distinct from a hot house which is considered to need a winter night temperature of 60-65° F.

In the cool house one can rely on a fairly representative collection of plants all the year round and I am sure it is wiser to learn the likes and dislikes of plants in the cool house first and then, when sufficient knowledge has been gained, progress to the structure with a higher temperature.

One may, of course, wish to concentrate on one special type of plant—Carnations, cacti, tomatoes, cucumbers, ferns, etc., in which case a start should be made by having a structure suited to the subject, with the requisite heating and ventilation arranged for at the outset.

I warn anyone buying a greenhouse not to expect the impossible from it; in other words, the choice of subjects must be suited to the size and temperature of the house, or, as I said in the last paragraph, the house must be suited to the subject.

Many initial failures have followed a wrong choice of subjects, often because an attempt was made to grow a plant requiring tropical conditions in a structure where the night temperature frequently dropped below 40°. There are plenty of beautiful plants suitable for even a cool house, and so the keen beginner can achieve a collection which is extremely colourful for the greater part of the year.
GROUPING HOUSES INTO THE FOLLOWING CATEGORIES MAY ACT AS A GUIDE TO THE BEGINNER. THE TEMPERATURES ARE THOSE FOR WINTER BEING THE MINIMUM FOR ANY NIGHT—EVEN IN THE CASE OF SEVERE FROST.

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These temperatures will allow a rise of about 10° during a sunless day (except perhaps in mid-winter), but considerably more as spring and summer approach. The night temperature of the cool house will also rise during the summer, so that no artificial heating is required.

The air temperature of any house will have to be controlled, and to ensure this there must be ample ventilation. Many small houses suffer because this point has not been considered and it is the small house which requires ventilation most of all, though it is a serious fault in any house if sufficient ventilators are not provided.

Plants, no less than humans, require fresh air, and it is wise to remember that opening ventilators not only lowers the temperature but also moves the stagnant air and causes what gardeners term ‘a buoyant atmosphere’, which really means, in that sense, a light floating or moving air current freed from the excess moisture which causes a lifeless atmosphere. Over-humidity through lack of fresh air is often the cause of much disease and failure amongst crops.

Make sure then that there are ample ventilators, not only at the top or ridge of the house but also nearer the ground. The latter are often incorporated as a sliding door or vent in the lower brickwork and though these are seldom used except in summer, it is always a good plan to have them put in at the time of erection. Err on the side of too many ventilators rather than not enough.

The next thing to decide is where the house is to be built and how it is to be sited according to the compass. First of all any greenhouse must be away from the shade of trees, for while the latter can afford something in the way of shelter, the shade they give will not help plants to retain that short, stocky, sturdy habit which is the hallmark of any well-grown pot-plant. Neither should it be built close to the dwelling house, and where a lean-to or other glass attachment is added to the house itself, this should be on the south or west side.
If possible the house should be sited north and south, with the door at the south end. There is a good reason for this, as in summer time the fierce heat from a blazing sun is slightly mellowed by the fact that the sash bars tend to break it by their shadow. True this is not much, but sufficient to make a difference.

One should also decide whether it is worthwhile making the house with two divisions—a heated end and a cool end. This is easily achieved by making a glass partition with a door, say at the centre of the house, though just how much space is to be given to the hot and how much to the cool section must be a matter for the owner. Naturally the extra piping or power required in the hot end should be fixed at the time of building, and a boiler sufficient for the need installed.

Greenhouses are made of wood, metal or concrete, and each has its own particular virtues. As I am thinking mainly of the amateur, I consider the two former preferable to concrete.

For a wooden structure there are several types of wood to choose from: teak, pitch-pine, western cedar, red and white deal and others. Teak, cedar and other dark woods do not require painting, but in the case of white wood the paint is both necessary and most important. Paint—and good paint at that—is the one means of preserving the wood, and the only worthwhile type for this work is a genuine white lead paint. Being white, off-white or a light cream, this also helps to reflect just that extra amount of light which is so vital in winter. In the case of the darker woods I think it pays to oil them.

I consider the building of greenhouses is best looked upon as a specialist’s task and I therefore suggest that all such work is carried out by firms who are masters of their craft.

If a greenhouse is to last in good condition over a number of years it must be built on a brick foundation and if bricks are taken up to that point where the glass starts, so much the better. When the lower part of a greenhouse is built of wood it immediately limits its value. Apart from the fact that it cannot possibly last as long as a brick built house, it is never very satisfactory in severe frosty weather. The chance of frost entering the house through the thin wooden sides is all too apparent to any one who gives the subject serious thought.

All brickwork should be nine inches in thickness, especially if the walls have to carry a long and high span. If four-and-a-half-inch work is used, nine inch piers should be built into the wall at intervals of not more than nine feet. This is most necessary, as
An easily-grown and very colourful spring display from bulbs in a cool house.

A delightful batch of the colourful Calceolaria hybrids, Victoria Prize.
A March display of the large-flowered Cineraria Brilliant Prize.

A splendid batch of the up-to-date Cyclamen during late winter.
after a time the weight of the house settling down, is likely to push the carrying plate on top of the wall and this, in turn, may cause the wall to bulge. If such piers are built on the outside of the wall so that they take the strain of the house, so much the better. All such piers should be keyed into the brickwork at the time of building and a strong cement mortar used at these particular points.

The neglect of strong supports has often caused a good deal of trouble after a house has been erected, and therefore one should be warned in time.

All such brickwork must be built on a reasonable foundation and it would be as well to find out what the local building laws say in regard to this. In fact, with the many variations of laws controlling buildings of this type, it would be unwise to proceed with any type of building until one has assured oneself that it is permissible. Generally speaking there is no vexatious element in this and it is usually possible to build a greenhouse in any reasonable position. On the other hand there are certain things to avoid and certain laws to be obeyed.
A greenhouse contravening a bylaw can be ordered by the local Surveyor to be pulled down, even after it is erected, so it is only too clear that the builder must be certain about these points, no matter whether the house is of wood, metal or concrete.

The gutters of any house are important, for not only does their correct use prevent damage, by carrying water away from the wood and sides of the house, but they are the means of carrying water to a storage tank. Thus they help to preserve good wood and are in my opinion a necessity, while the storage of rainwater is, quite naturally, something to be desired.

All heating pipes and electric cables should be in position before any stagings are built, and it is wise to incorporate them in conjunction with the erection of the house.

Types of Greenhouse.—There are three general shapes of glasshouse, (1) the span-roofed house, (2) the three-quarter span and (3) the lean-to. The span-roofed house is the popular choice, its roof having two equal sides, thus giving maximum light over its inside arcs. This type is best for pot-plants and indeed for most subjects, even if they are planted-out in the surface soil of the house. Getting light from both sides, this tends to make the
plant more sturdy and its growth equal, thus avoiding the tendency to 'draw' towards one side.

The second type, the three-quarter span, has a full side running upwards towards the ridge, but the other only about half that length, which rests on a sill attached to a wall—generally that of a building. Though this type of house lacks the full light of the span-roofed house, it is a most useful one, and especially so if a 'stepped' staging is erected, which will bring the plants as near the

FIG. 3
THREE-QUARTER SPAN HOUSE

glass as is convenient. Moreover, with a flat staging along the front of the house the range of subjects can be equal in number and variety to that of the first type of house. This house also makes an ideal vinery, peach house or fruit house—the fruits being grown in pots. It is also useful as a winter protection for many half-hardy or semi-tropical shrubs which have to be kept free from frost.

The 'lean-to' is fairly common and is often used in small gardens; it is really half—or one side—of a normal greenhouse leaning against a wall. Such structures should face south, west, or southwest, as all the light possible must be given to the plants to
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prevent them being 'drawn'. The wall itself will deprive the house of some light and therefore it is essential to face it towards a point where it will catch the fullest light possible—even if in summer this means shading the house.

There was a type of structure called a sunk-house, much used in the past in market nurseries, but this has been displaced by the more easily managed 'Dutch-light' house. This is really a matter of using Dutch lights for the sides and others for the roof, these

being firmly fixed on supports by the use of nuts and bolts. This means that should it be necessary, these houses can be moved from place to place without much difficulty.

Glass is of course an important part of the greenhouse and here again it is most unwise to try and save money by purchasing inferior glass. Proper horticultural glass is known as twenty-one ounce glass and must above all things be clear and without any blemishes.

The wider the pane of glass, the fewer rafters will be needed and at the same time a very great deal of additional light will be available, but the wider the glass the more necessary it is to see
that the full weight of the roof is taken on correct strengthening uprights. Frosted glass or coloured glass cannot be recommended, excepting in so far as such is necessary in a conservatory adjoining the dwelling house.

All ordinary timber should be given at least three coats of paint. Think for a moment of what you are asking the wood to do. It will be expected to resist its greatest enemy, water, and it can only do that if its coat of paint is good enough to keep the water out. Every joint should be painted as it is made and after that, special attention should be paid to all corners and places where moisture is likely to gather. It is usually at the joints where trouble first begins and the object of the owner must ever be to keep water out, instead of trying to put things right when the effects of rotting woodwork have made all such efforts futile.

Good quality paint is therefore essential and there are certain brands of paint made up specially for this work. All ironwork inside a glasshouse, such as ventilating gear, iron supports, staging uprights, ornamental brackets, etc., must also be painted with at least three coats. Failure to do this will result in rust eating into the iron in very short time. This ironwork is usually painted blue, but light green is a far prettier shade and this goes on much better if a coat of flat lead colour is given first.

Metal greenhouses are of interest, seeing they are practically everlasting. There are two main metals used, aluminium and steel (though alloys may make up the finished article). Of the two I favour aluminium, for it does not rust, is light in weight and does not require painting. Moreover such houses are very easily made in sections, thus making any further extension a simple matter. This also makes the transport and erection equally simple.

Glass is not bedded in putty but in a non-hardening plastic material, which not only prevents breakage due to the contraction and expansion of the metal, but allows the whole thing to be taken to pieces should this become necessary.

The bars of such houses are very thin, so one can be sure of the maximum light, especially where the glass goes down to ground level. Houses with this full light are extensively used for growing crops in the soil-beds, though I would also advise the use of a temporary staging, which can be erected and taken down easily. These stagings are of particular use in winter and spring for the storing of pot plants, for the raising of seedlings, striking cuttings and for the good health of those subjects which may require a more airy spot than is possible to give them on the floor.
THE MODERN GREENHOUSE

Heating.—I suggest that all greenhouses should have some form of heating, even if it is only a little. It makes such a vast difference to what one can achieve, and I want to state quite clearly that even the slightest warmth on a winter night doubles the value of any house. Coming to the point of how this heat is to be made available, I think that hot water, circulating around the house by means of three- or four-inch pipes, is still the best means of supplying a genial warmth.

What is of greater concern to the owner is the method by which such water is heated. Most amateurs will want something which is absolutely reliable and yet will not involve late visits to the stokehole on a cold winter night. He must, however, expect some little inconvenience at such times, but with continuous slow-burning coke or coal boilers, gas and electricity, this is reduced to a minimum.

In the case of gas, coal-, coke-, or oil-burning stoves, these should be erected outside the house and the apparatus protected from the weather. If using electricity, whatever the method, this does not require any outside arrangement.

There are a large number of coal- and coke-burning boilers on the market to-day which burn from ten to sixteen hours without attention and I would advise any reader who is contemplating the purchase of a boiler to study the catalogues and take expert advice on the heating capacity of the one thought to be most suitable. A point I would stress is that any such apparatus should be slightly larger than the heating of the house demands, because it is unwise to ‘drive’ a fire full-out on a frosty night and it is a far better proposition to increase the actual piping and use the slightly larger boiler. The initial cost will be higher but it will result in better results and much less worry.

For a number of houses or a large range of glass, I think the ‘sectional boilers’ the best proposition. They have the advantages of being particularly efficient, require no brickwork around them, and are easily controlled by the use of basal and top draught. Once proficient, the stoker can, by correct use of the chimney damper, make the fire do exactly as he wishes. This of course means the greatest economy in the use of fuel.

For a similar range a small oil-burning boiler can be installed, and though at present such boilers are being more used in commercial glass-houses than in those of the amateur, I imagine this means will soon be more general even in the smaller types of greenhouse.
TYPES OF GREENHOUSES—HEATING

Gas boilers accompanied by thermostatic control are now generally available, and though I do not consider them cheap to run, they do give efficient service so long as they are expertly examined by the gas authority from time to time. These simply take the place of the coal or coke boiler, heating the house by means of hot water pipes, and must be outside the house.

When I wrote the original edition of this book, I said that heating greenhouses by electricity was in an experimental stage, but I'm quite sure it has long passed that state and is now one of the accepted methods of heating open to most people.

It does not seem to be generally known that the normal hot-water system of the greenhouse can also be heated by electricity so I would like to emphasize this. It works quite simply on the same principle as an immersion heater, and of course such a heater can be installed inside the greenhouse.

Then there is the familiar heating by means of tubes, usually two inches in diameter and sold in varying lengths from two to seventeen feet. These tubes give out a dry and (it seems to me) a rather fierce heat at times, and this means that more care must be taken to keep the air moist and plants kept well away from these tubes. Tubular heaters for greenhouses are specially made for the purpose and it is essential to use this type and not those made for use in a drier atmosphere.

There are convector heaters, encased in a cabinet, so designed that air enters at its base and, being heated as it passes over the element, is discharged from the top. There is a tendency for the heat to be localized, but in a house of any length more than one convector would be needed, which would give a bigger spread of warmth.

All heating apparatus made for use in the home must be looked upon as useless in the greenhouse—in fact some of it may be dangerous. Such apparatus is of course made for dry places and no greenhouse comes into such a category.

Then of course one must have thermostatic control, so that there is little or no waste of heat. If a really sensitive thermostat is used it will switch off and on within one degree of the temperature it is set at. ‘The best kind is the “rod” type of thermostat, which should be fixed horizontally and approximately one-third of the way down from the ridge of the roof and should be screened from direct sunlight and be about 6 inches to 8 inches away from the glass.’ This is quoted from the British Electricity Development Association's booklet Electricity in Your Garden, and they
also give the following warning about electric water-heating systems: 'It is sometimes suggested that they should be controlled by a thermostat in the water. While it is possibly desirable to have a water thermostat in order to prevent any risk of the water boiling, the water thermostat will not keep the greenhouse temperature constant. A water-heating system should be controlled from an air thermostat in just the same way as any other system of electric heating.'

For the amateur then, it would seem that electric heating demands some serious consideration in the light of modern experiments and the excellent results which have followed them. I would also counsel the wiring of the house so that light as well as heat is available, and even more important than that, provision should be made for heating a small propagating pit, by the use of low-voltage soil warming cables. They give a warmth to the soil in the pit which makes the striking of cuttings or the raising of seeds a considerably simpler matter than when the soil is cold.

Whenever electrical heating is being considered I think it necessary to get the fullest and most expert advice, if one is not familiar with the subject, for while it is an excellent servant it can, in the hands of the novice, be both dangerous and ineffective. To all such people I suggest they seek the advice of their local Electricity Board—and take it.

Finally, there are the paraffin heaters, which are quite useful under certain circumstances. Let me be quite clear about these. So often people find that fumes from such lamps or heaters cause a good deal of damage and it must be admitted that this possibility may always be present. Do not, however, blame the lamp. It is unlikely that any firm would send out an article unless it was pretty sure that the appliance would warm the house without being dangerous. When damage does happen it is usually the fault of the owner, when he does not keep the lamp spotlessly clean or when the paraffin is of a low grade. Buy and use only the best paraffin and never neglect the daily cleaning of the lamp, wick and burners.

This point of clean fuel also applies to coal and coke, and the person who thinks he can run his greenhouse boiler on the residue of the household fires may find it a rather disappointing and worrying affair in the end. Efficiency of working demands good fuel, the daily clearing of the fire-box to free it from ashes and dust, and the removal of ashes from the pan below the fire.

When buying any type of heater, always make sure that all the
necessary tools are purchased with it, for these of course make their working much easier, and in the case of cleaning flues (which is so vital to good heating) ensures the task being done satisfactorily.

Paths.—I am all for a good path down the centre of the house. That is the only one necessary. It can be made of cement and sand (1 to 4) or a row of paving stones set quite level and made immovable and perfectly firm. Cementing the whole floor is wrong because it restricts the essential humidity, which normally rises from the uncovered soil beneath the stagings.
THE first and final objective in the mind of the greenhouse gardener should be to grow every plant under his care to perfection. Failures will inevitably come, but I feel that many of these could be avoided if only the fundamentals of cultivation were understood before a start is made. The simple principles of ventilation, watering, potting, atmosphere, etc., are not really difficult to master, but they are all vital from the very beginning.

There is of course no teacher so excellent as experience, but knowing something about these things in the earliest stages of a career as a grower may indeed spare the beginner a lot of worry and many pitfalls. It is wise for the older grower, too, to remind himself of these things from time to time, as it is so easy to become lax and casual and thus fail to reach perfection.

The atmosphere inside a greenhouse is of course of primary importance, though it must be coupled with the necessary temperature, suitable to the subject or subjects being grown. The cucumber, for instance, requires much warmth and lots of humidity, so the grower must provide this type of atmosphere, by keeping the house warm by artificial means or by using the sunlight, and at the same time, by spraying the plants and stagings, drenching the floors and so providing the accompanying humidity. Note, however, that even if one has given the plants the requisite heat, the correct soil, and kept the latter moist—this is not enough. It is absolutely essential that the humid atmosphere is created, if the cucumbers are to grow. This, as you will see, is where the grower’s knowledge of his plants’ requirements comes to his aid.

Other plants will require different conditions—the Carnation would not grow in the same conditions as the cucumber, this requiring cool and drier conditions, which in turn means less damping down and syringing, the drier air being ensured by ample variation. Succulents and cacti will need an even drier atmosphere—many of them being natives of hot, arid countries.

Atmosphere, as you see, is important and has a great influence
VENTILATION—HUMIDITY—SHADING

on the occupants of the house, as it is useless trying to grow plants which demand heat and humidity in a house that is probably half filled with other subjects which require a cool temperature and a drier air. In the course of this book I hope to give some helpful suggestions on this particular point.

The air or atmosphere of a glass-house is controlled in the main by ventilation, and therefore any system by which this ventilation is achieved must be efficient and capable of doing all that is asked of it. That is why, in the building of greenhouses, one

should pay great attention to this point. In large houses continuous ventilators are necessary, that is, the whole of the top pane of glass on both sides of the house (in the case of a span-roofed house) should be fixed in a ventilator which opens and shuts as one desires. In such a case these ventilators are fixed on gearing which causes the lights to open or close by means of a lever or a screw. Alternatively one can have lights or ventilators, three, four or five feet long, which may be opened by means of an iron arm worked by the pulling of a rope. This rope is fixed to a cleat in the staging to keep the light open at the desired distance.
THE MODERN GREENHOUSE

All houses when being built should have plenty of ventilators fixed, because even if little air is wanted for the particular subjects one has in mind, there may come a time when one wishes to grow other and greater air-loving subjects. To add ventilators to a house after it is built is expensive and difficult. As a general rule one should also make provision for ventilators to be built in at low points of the house. It is clear enough that with top ventilators only there can be no true circulation of air. This circulation is of premier importance because plants hate what is called a stagnant atmosphere. It is to achieve this movement of air that 'front lights' or vents are built in. The ideal method is to fix the glass side of a greenhouse (that is, the portion between the brickwork and the guttering) in such a way that it is hinged and will open and close by the pulling of a lever. Such ventilation that comes near the staging on which the plants are growing, and the current of air allowed into the house by this means, are of particular benefit in the spring and summer. When the opening and closing of the sides is impracticable, it may be found easy to
VENTILATION—HUMIDITY—SHADING

make openings in the brickwork, say six inches wide and two or three feet long, covering these openings by wooden shutters which slide to and fro in a wooden frame. It is absolutely essential that some method of allowing air to enter the house at a low point be provided so that stagnation is out of the question.

As I have already pointed out, the degree of humidity in the atmosphere will vary and part of the grower's job is to know how to create just that safe amount suitable to the plants in the house. I use the word 'safe' advisedly, because there are great dangers attaching to the culture of plants in highly humid atmospheres. The dangers are principally those of disease, usually a secondary condition following the weakening of plants which have an unnaturally rapid growth. I want to stress this point here because so many people fail to realize how easily a plant can be weakened by unnecessary moisture. It looks to be growing well, is a healthy green colour, rather fat in the stem and what gardeners call 'rank'. Actually the plant is too full of water: its cells, its pith, its leaves and buds are weak in consequence. Suddenly the plant is asked to bear a change of temperature or a sudden decrease of humidity with the result that it either collapses or becomes a very easy prey to disease—both insect and fungoid. A very common example is seen in the ordinary bedding geranium which has been grown in too high a humidity. If it does not actually become infected with black-leg (the black fungal growth seen near the base or on the stem), it loses its leaves or they turn yellow when exposed to outdoor conditions. Had the plant been grown in normal and far drier conditions it would have been much smaller, but every bit of its composition would have been hard and healthy and in a perfect state to withstand the attacks of disease or adverse weather. Thus it must be understood at once that though moisture in the air has a tendency to accelerate growth, it can only be allowed to do so up to the point which gives a normal and healthy plant; a sappy plant can never be a real success.

Everyone knows that light is an essential to all plants and in a greenhouse this is particularly so. During the sunless part of the year one of the main objects in the cultivation of greenhouse subjects is to provide sufficient light to keep all plants growing naturally. The importance of this is often overlooked. The light of our average winter is usually far below the requirement of many plants, so that you will see the great danger of excluding anything in the way of light. Even so, this happens very fre-
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quently, because greenhouse owners will not wash the outside of their glass often enough. To test this out for yourself, take a rough brush and wash two or three rows of glass and then compare it with the unwashed portion of the house. In the vicinity of towns where smoke or fog is apt to blacken the glass this washing must become a regular part of winter procedure.

While in winter and early spring there should be much benefit from light, there comes a time, usually about the beginning of April, when light may constitute a danger. I am referring to bright sunshine. This comes in bursts during spring and sometimes is so fierce, that as it shines through the glass, the plants beneath, being in a soft or sappy condition, become burnt. It will be seen at once that the owner of a greenhouse is between two difficulties.

He only wants shade for those two or three hours during the middle of the day and this means temporary shading only. If he shades the house permanently at so early a date he loses many hours of valuable light. The remedy of course is blinds, which can be let down and drawn up at will. With such blinds one is able to settle the question of shading quite satisfactorily throughout the whole period of hot weather. If, however, blinds are not available, the shading of certain plants from bright sunshine is imperative. For these early bursts of sunshine try and use some form of temporary shading, such as old muslin curtains, tiffany or scrim-canvas. Later on, say about the beginning of May, the permanent shading can be applied. This is best made of starch and whiting, flour mixed with milk and water, or a very thin coating of distemper. Never use lime, it is bad for the putty and woodwork. Certain proprietary articles are sold for this purpose and are for the most part easily applied. Starch and whiting mixed into a creamy consistency is the best thing I have found. It sticks tightly to the glass and is not washed off by rain, yet it can be removed easily, when necessary, with a brush. It is also nearly transparent when the roof is wet, a great point in its favour when the weather is dull and damp.

All plants do not require shade and thus you see that unnecessary shading can be a real hindrance. In a general way Carnations do not require shade, neither do cacti, nor melons. On the other hand Begonias, Gloxinias, cucumbers, ferns, palms, and most greenhouse foliage plants would not grow without some protection from our summer sun. Young seedlings especially, require shade. All the same, shading should always be looked upon as something to be done without as long as possible and taken off at the earliest
VENTILATION—HUMIDITY—SHADING

moment consistent with safety. As a rule, shading is left on the glass far too late in the season and I would urge growers to try and acclimatize all their plants to full light by the middle of September, taking the shading off gradually so that by such date the roofs can be washed clean. There is not much ‘burning’ in the autumn sun.

Where blinds are in use, these should be taken down from the houses during September and after being thoroughly dried, stored in a dry shed during the winter. The only exception I would make to this would be those blinds made of thin wooden laths which are usually quite safe left rolled up. Sometimes blinds are left in position all the time, so that they can be unrolled over the glass during frosty nights. This is certainly a great help, but the material of which the blind is made must be the very best and stoutest quality possible. Greenhouse blinds are not usually made with this object in view and the wear and tear of one night’s rain or frost is far greater than a month’s normal use. Hence from a purely monetary point I would deprecate the use of greenhouse blinds for such a purpose.

The danger of shade lies in its being too dense. It should be looked upon as a means of safety for the plants: if it is just heavy enough to keep the fierce rays of the sun from damaging them, it achieves its object. To make a greenhouse dark by too much shading is to encourage weakly and thin growth and therefore must be avoided.

I now come to the important question of cleanliness. Just as in every home the natural practice of keeping things clean has a direct bearing on the health of those who live there, so it is in a greenhouse. Anyone who has spent a good deal of time amongst pot-plants knows how they show their resentment of dirty conditions and also how difficult it is to improve these conditions once they have become really bad. Therefore I would urge growers to be really keen about this point. Get your houses clean and keep them clean. Wash the sash-bars and stagings at least once a year, using some sort of insecticide or carbolic in the water. Clear out everything from beneath the stagings and never under any conditions leave dead or diseased plants in the house. Never throw rubbish or old leaves under the stagings and always aim at a high standard of cleanliness, knowing that it will do very much towards keeping your plants in perfect health. Diseases are many and rampant in some greenhouses, but these can all be mastered if they are attacked in the early stages. The wisest
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course is to make their début difficult because the greenhouse is too clean.

Cleanliness is as vital to plant life as it is to the animal world, and if every grower believes this and works towards this end he will achieve much. The up-to-date insecticides and fumigants have done a great deal in recent years in making this happy state very much easier to attain than it was in the old days.

I would like to point out that there is a great deal to be said for the use of clean pots. Apart from the fact that the ball of soil cannot be turned out correctly if dirty pots are used, there is still the more important aspect of the dirty pot being a disease carrier.

Many diseases can, and do, live in or on pots, and seeing that the task of washing them is a simple and effective method of ridding the greenhouse of such diseases, there is everything to be said for always using a clean pot. A little insecticide or carbolic added to the water in which the washing is done is a great help. Special brushes are made for washing pots, while the use of up-to-date detergents considerably helps the removal of dirt.

Whenever people take up greenhouse gardening, they should be quite certain that they have all the tools and materials which will be required. I fear that running a greenhouse is often made into very hard work by the lack of certain essential tools or materials. This is a point to which the beginner especially should pay great attention and those who have had greenhouses for some time might, with advantage to themselves, also give it some thought.
Kinnell Horseshoe boiler heating apparatus, showing two rows of 4-in. hot-water pipes on two sides of the greenhouse.

Immersion heater for a medium-sized greenhouse. It can be used as a supplementary heater, or as the sole means of heating.
The Byron aluminium alloy and steel greenhouse—ideal for tomato growing.

A typical roomy wooden greenhouse, allowing the grower a wide variety of choice in the plants he wishes to grow.
VENTILATION—HUMIDITY—SHADING

Let us take tools first. The most important of these is the water-can. Haws' patent type of can is by far the best for all greenhouse work. It is made with a long spout and a cross handle from spout to the centre of can. This handle is so fixed that the point of balance about mid-way along this handle gives one a chance to tip the can easily to any angle required. The long spout allows plants at the back of the staging to be easily watered and at the same time delivers the water gently and not with a rush. For most purposes the six-quart can is plenty heavy enough, that and the four-quart can being the two sizes in general use. At the same time, if there are shelves in the greenhouse, a proper 'shelf can' should be purchased. This is a smaller can holding two or three quarts and with a much shorter spout. It is very handy, especially where shelves are near the glass roof. For all these cans there are extensions to the spout, usually made in twelve-inch lengths and these are particularly handy where stagings are very wide. A good can is worth paying for and as it is the one thing which will have more use than anything else, it is very unwise to get an inferior article.

Next to the can I would place the syringe. Here is something else that will be in constant use and again its importance demands a high quality tool. Cheap syringes are a continual source of trouble. A good brass syringe, strongly made, will last a lifetime if handled with care, so that the initial expense is not so large and costly as it appears. I call particular attention to using this tool carefully because there has only got to be one dent made in the barrel to put the whole thing out of action. Such a dent can be made by even the smallest bang and therefore anyone using a syringe should always remember this. When not in use, it should
be placed in such a position that it cannot fall or come to any harm. Besides the ordinary syringe, I would suggest the purchase of a smaller edition, usually called a spraying syringe, and of great value when it is necessary to use insecticides. These fine 'sprays' cover the foliage with the insecticide far better than the larger one would and of course do not use nearly so much material. Besides this, they are invaluable for spraying small seedlings and any plants that do not require the heavy syringeing which the large type gives.

While thinking of watering and syringeing it may be well to say a word or two about the water tank. This should always be in as central a position as possible. If it is at the end of a long house it means a good many extra steps when watering, so when the

house is being built remember this point. An ordinary water tap over or near the tank should be fixed at the time of building, for it is obvious that there will be times when rain water will not keep up the necessary supply. The tank should be cleaned out at least once in every two years. Empty the water and then scoop out all mud and sediment lying in the bottom, afterwards scrubbing sides and bottom with strong soapy water and drying the tank with old sacking. This is a way of ensuring that disease is not being transmitted by means of water.

Other tools should include at least three sieves, one quarter-inch mesh, one half-inch and one with inch mesh. By the aid of
these, the various textures of soils and composts can be mixed correctly. Without them this is a very difficult matter. At the same time I would suggest the purchase of a small sieve with a mesh of one-eighth of an inch. This need not be more than four or six inches in diameter and it will be found particularly useful when seeds are being sown and only require a very thin covering of soil. Without it, this operation is also rendered difficult.

Potting sticks or rammers of varying thickness should always be at hand, and as these are easily made out of pieces of wood there should be no excuse for being without them. Roughly they should be as follows: one thin rammer about three-quarters of an inch wide and quarter-inch thick, which should be curved at the bottom but not pointed; another should be half-an-inch thick and an inch wide, made wedge shape at the bottom and rounded on top, while another should be made similarly out of wood an inch square. The latter only to be used for large pots.

It is very necessary to have a stock of pots and the numbers and sizes must be governed by the type of plants grown and the numbers cultivated.

When buying pots you purchase them by the 'cast', a term which is misleading if not understood, because it is according to the size of the pot that the number in each cast is determined. A cast of pots 3 ins. in diameter would contain sixty pots while a cast of 4½ in. pots would only contain forty-eight. It is the number in each cast which has led to the universal use of the term, sixties, forty-eights or thirty-twos as the case may be. Perhaps it will be helpful if I make this clear by the following list:

<table>
<thead>
<tr>
<th>Sizes and Number to cast.</th>
<th>Diameter</th>
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<tbody>
<tr>
<td>Thumbs (72s)</td>
<td>2&quot;</td>
</tr>
<tr>
<td>Sixties (60s)</td>
<td>2½&quot;—3&quot;</td>
</tr>
<tr>
<td>Forty-eights (48s)</td>
<td>4½&quot;—5&quot;</td>
</tr>
<tr>
<td>Thirty-twos (32s)</td>
<td>6&quot;—6½&quot;</td>
</tr>
<tr>
<td>Twenty-fours (24s)</td>
<td>7½&quot;—8½&quot;</td>
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<tr>
<td>Sixteens (16s)</td>
<td>9½&quot;—10½&quot;</td>
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<tr>
<td>Twelves (12s)</td>
<td>11&quot;—11½&quot;</td>
</tr>
<tr>
<td>Eights (8s)</td>
<td>12&quot;—13&quot;</td>
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The larger sizes need not bother one. It will be found that different potteries vary slightly in their measurements, hence I have given the two diameter figures. Here also I would point out the value of procuring good quality pots. They can be used over and over again if they are good, but cheaply made pots soon crack and break and are expensive in the long run. For seedlings and cuttings, many of the fibre, whalehide and other type of pot are
useful, but are of course of a temporary nature. Besides pots, there should be a small stock of seed pans. These are shallow saucer-like pans with a drainage hole in them and are particularly handy for the raising of seeds. I would also advise the purchase of shallow boxes about two inches in depth, nine inches wide and fifteen inches long to be used for what is called 'pricking out'. Any kind of box will not do for this period of the plant's life, and I suggest that where old boxes are used these should be sterilized, either by soaking them in some sterilizing solution or by baking them.

Continuing the list of materials, there is the primary question of soil, etc., needed for making up potting composts. The most important of these is loam. This word is used far too loosely and is often the cause of a misunderstanding when it comes to the correct mixing of potting soils. A loam may be a sandy loam or a clayey loam but the ideal loam for use in the greenhouse should be a happy blend of both. Far more care should be given to the purchase of loam than is usual because it is the basis of all mixtures and used in greater proportions than any other material. The ideal loam should come from a cattle-fed pasture which has vitality and plenty of root-fibre in the soil. This fibre is of great importance because it keeps the loam, when used, from being sticky or pasty. The loam should be dug in nine-inch squares, about five inches thick. It should then be stacked into a heap, grass downwards for six months, when it becomes ready for use. As the heap is built up, a slight dressing of soot should be
given every foot and also a layer of partially rotted horse manure every fifteen inches. Manure that has lost its strength is not much good and should not be used. The top of the heap should be ridge-shaped so that any excess of rain will run off. When the heap has been stacked for six months, it can be chopped down perpendicularly, as required, with a sharp spade. Do not chop down more than is needed as loam is far better in the heap than cut up. The exception to this may occur in very wet weather, when it is necessary to put a certain amount of cut-up loam into some dry spot. Beware of buying loams from poor ground and also from ground containing a high percentage of chalk or lime. A little lime will not hurt, but an excess may mean unending difficulties when it comes to the cultivation of plants which dislike it.

Leaf-mould is the next item of importance. This must always be the residue of oak or beech trees, partially decayed and perfectly sweet. There is a certain school of thought in horticultural circles to-day which deprecates the use of leaf-mould altogether, and these folk will insist that the foundation of all or nearly all our greenhouse diseases is due to the use of leaf-mould. This is not fair, because for centuries leaf-mould has been a very helpful subject in the mixing of potting soils. I will, however, say that a leaf-mould which comes from sour and wet land and which is rotted down to a powder-like consistency may, and invariably does, bring a deal of trouble. The ideal leaf-mould should be flaky and rather dry, half rotten and of a light-brown colour rather than black, and should be from the oak or beech.

Peat is now widely used as a substitute for leaf-mould, partly because it is easier to obtain. One of the best ways of buying peat is by the bale. These bales, weighing one and a half to two hundred-weights, are made up of a compressed peat without any wastage in the way of rough fibre or roots. Such peats when broken down afford a most handy way of introducing peat to potting composts and are particularly useful in the following ways: for lightening heavy loams, keeping soils 'open' for general use in seed-sowing composts, and as rooting mediums for cuttings. It must, however, be pointed out that there are many grades of this peat on the market to-day and some may be positively dangerous. Some contain a very high percentage of acids and these are useless. Make sure, then, in the purchase of such peat that it is actually sold as 'horticultural peat'. (The ordinary peat moss litter sold for bedding down horses is useless. Even
after its use in the stable I would rule it out.) This horticultural bale-peat must be broken down and wetted slightly, when its bulk soon becomes greater and it can then be used as a very helpful agent in most potting soils, and may be used as a safe substitute for leaf-mould.

Sand is an essential. This should be of a coarse nature and for all general purposes should be an inland sand and not a sea sand. Too frequently people use a sand which is too fine, seeing that its main purpose is to aerate the soil and at the same time to keep an easy passage-way for all water passing through the pot. Coarse Bedfordshire or Cornish river sands are the best, though no doubt many local sands, if coarse enough, will do equally well.

Burnt ballast may be used to substitute sand. Obtained by the burning of clay, it provides a coarse material which does the same work as sand and is much less expensive. For greenhouse work this ballast should be passed through a quarter-inch sieve. Ballast-burners will always supply this, but the buyer should
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insist on the quarter-inch screening, otherwise he will find some of his purchase useless.

Some loam, leaf-mould, peat and sand should always be kept under cover for immediate use and a small open shed is very helpful in this respect.

Another helpful item is a heap of rotted manure. If mushrooms are grown, the spent manure is an ideal material for mixing with potting soils, but as a rule its importance is not generally appreciated. Anyone who has used this over a number of years is hardly likely to be without it, and therefore I suggest that the manure heap be counted in with the essentials. A yard or two of fresh manure, turned three times, will in three or four months be in splendid condition for use. Note that I refer to stable manure and do not include the synthetic materials in which some mushrooms are grown to-day.

Tying materials are also necessary, these being mainly very thin twine and raffia. Many fine soft green twines are now manufactured especially for greenhouse work and are often more useful and easier to handle than raffia. Where a deal of tying has to be done, such as on tomatoes or Sweet Peas, raffia is of course a cheaper proposition. It is much easier to use if soaked in water for a minute or two before using. Raffia differs in quality a great deal and only the very best should be bought.

Avoid the use of green raffia on soft wooded plants as there is something in the dye which causes a sort of burn to appear just where the tie is. For hard-wooded plants it is quite safe, though twine is better.

A box of painted labels should also be included, accompanied by a good garden pencil. If labels are smeared with paint and the name written on while it is wet, it will never come off.
CHAPTER III

GENERAL CULTURAL ROUTINE PROPAGATION

Every plant is a living thing with its own particular likes and dislikes. It is up to the grower to find out what these are and so model the conditions in which the plant is growing to ensure that it can get what it likes, not only in the way of soil but also in heat and atmospheric conditions. People frequently fail to grow some plant well, simply because they do not give it the conditions and environment which it needs. You will see therefore, how necessary it is to have houses of varying temperatures and conditions to suit a big collection or range of subjects. Only with such facilities can one expect to grow a wide range of plants satisfactorily. On the other hand, if there are only one or two greenhouses and they are capable of giving a genial temperature all through the winter with, say, 50° as their minimum temperature at night, then the choice of plants must be made with that temperature fixed in the mind. In the vast majority of amateurs’ houses the winter temperature is much lower—perhaps as low as 40° or even less. There again this must be borne in mind when choosing the type of plant to be grown. It is far better to begin with a collection of plants which will be happy under the conditions available than to be bothered and ultimately disappointed with a larger collection which never quite succeeds because of adverse conditions.

An ideal house—especially if the garden is limited to one only—is a greenhouse so heated that a winter temperature of 45-50° is easily maintained on the coldest night. The range of possible subjects is then very large, interesting and full of plants useful from a decorative point of view. Such a temperature will give the average man all he wants in the way of ordinary things, such as Cinerarias, Primulas, Cyclamens, Calecolarias, bulbs and Pelargoniums to mention only a few of the best known spring blooming subjects. The same house will be found particularly useful in summer for such plants as Gloxinias, Streptocarpuses, Begonias, Impatiens, cucumbers, melons, or tomatoes.

Get a clear conception of what you intend to do and then set out to do it to the very best of your ability. This, however,
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requires certain knowledge, for it is useless to have a sort of blind enthusiasm without knowing the elementary principles of growing plants. Therefore I will now deal with the principles which govern the cultivation of greenhouse plants, beginning with the important subject of watering.

I am quite sure that the most essential quality in the greenhouse owner is the ability to use the water-can correctly. It is the one tool which can help the grower to achieve success or it may, on the other hand, be the cause of failure. I wish there were some way of emphasizing this point because its importance can be so easily overlooked.

Too much water kills more plants than any other operation done wrongly and it is, unfortunately, a very general failing.

In summer, plants do of course require more water than in winter, but if there was some way in which I could tell readers just how little most plants need in winter it would make my task easier. Try and remember that nearly all plants are not big drinkers in winter. Roots are only working slowly, if at all, temperatures are not high and drying-out of soil takes a long time. Moreover, a plant which is dry at the roots will stand a lower temperature with greater safety than if it were wet, a point to keep in mind during particularly cold weather. Summing up winter watering—let it be as infrequent as possible, within the realm of plant safety, and during exceptionally cold weather don't worry if soil is perfectly dry for days.

In spring, weather and wind will take moisture out of the soil very much more quickly and this will mean continual vigilance to ensure that from early spring to autumn no growing plant is allowed to become really dry.

Water all plants when they have used up the moisture from the previous watering and if, when looking at the plants on a bright morning and finding some still damp, but with a fair possibility that by night they would be very dry—water them. That is just the opposite to winter treatment. No one can ever make rules as to just when plants should be watered, so it is a case of the grower mastering this art and becoming perfect and believe me, it is the man or woman who can water plants correctly who will succeed.

Above all, fill the pot right up to the brim every time water is given and if the plant has been so dry that the soil has come away from the pot, then such a plant must be soaked in a pail of water for an hour, to swell up the soil again.
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Though there are a number of ways in which plants may be propagated, the greenhouse owner need only trouble about a few of them. The two most important means of propagation are by seed and by cuttings.

These are the two methods which will be most useful in our study, but it must be borne in mind that there are other ways and means of increasing stocks of certain plants, such as by layers, offsets, runners, suckers, leaves, roots, grafting, budding and division. All these may be useful when dealing with certain plants and will be briefly dealt with later on.

The raising of plants from seed is one over which many people trip up and cause themselves a great deal of disappointment, often by sheer lack of knowledge of seed raising. I am quite sure that a great many people lose sight of the fact that a seed is a living thing. It makes such a difference if one remembers that. The thought creates respect for that tiny dry granule which is the seed, with its life hidden away somewhere in the inner recesses of its being. It is to bring that tiny spark of life into a visible thing that we sow it. That such a thing will happen is certain, if the seed is not too old and if the medium in which it lies is moist and warm enough to generate and stir the life-germ in the seed.

Now it happens that while warmth and moisture can induce most seeds to grow, it follows that something much more important is needed to ensure that such growth is continued. Every seed, as it springs into life, does one obvious thing, it begins to send out its roots, and it is here that the grower's art and help will have full effect on the success or otherwise of the operation. I have put this in a simple way because so much depends on one having a really clear conception as to what happens and why disappointments occur. Unless these tiny roots can find an easy way into the soil, they will give up trying and just die, with the result that the plant, so small and perhaps unseen, dies. Think this out for a moment. You sow seed and it does not come up. Too often the seed is blamed, whereas it is quite likely that the seed did its best to grow but the first frail roots could never enter into the soil. The seed struggled on for a day or two, but once the nourishment in the seed had been used up, there were no roots working to draw life and energy from the soil, so the growing plant failed and faded away. It will be seen from this how vitally important it is that all seed should be in a soil which allows the roots of a seedling to enter into it quite easily. This is the one great secret of all seed raising and that is why I stress this point.
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Another thing of almost equal importance is the condition of such soil at the time of germination. Once any seed is sown, moisture must be present in the soil. Should this soil ever become dry after the seed has begun to swell, there is an almost certain danger that nothing will ever be seen, because the seed has died. This frequently happens but I am afraid many people never realize it.

Supposing you sow a box of runner beans in a greenhouse. You water it and the seed swells. A root begins to push into the soil and the ‘seed leaves’ push themselves out of the soil. A drying day, a burst of sunshine and the soil in the box is dry for some hours. What happens? In this case the root may shrivel and cause the plant to die, but it must be noted that a bean has a certain amount of life in its leaves upon which it can draw for a brief period. This fact may save it from destruction, but some injury to the plant must have happened though it may not be apparent.

Now take another example, a very tiny seed such as that of Calceolaria. It is sown with care, given the requisite heat and moisture and begins to swell. Its tiny rootlet creeps from the husk too small to be seen. All is well so long as it is in contact with moisture. But again the drying day—the surface soil losing this essential moisture—and the tiny seed lying in the dusty surface dries up too. It may be that the soil is only dry for an hour. That brief space of time is sufficient to cause the seed to lose all life. Remember the great difference between these two examples given. One has some slight reserve of nourishment and the seed is large enough to stand up against bad conditions for a few hours, whereas the Calceolaria is small, has a tiny thread-like root easily damaged by dryness and the seed has no reserve to carry it on. I am emphasizing this point because so many failures in seed raising are due to the drying out of the soil in which they are growing. Its observance may save the novice a great deal of heartburning, while to the more experienced it may suggest a cause of frequent failures.

On the other hand, of course, a soil that contains too much moisture may have equally bad effects, but the number of losses from this cause are not to be compared with those caused by dry soil. This brings me to the methods which are used to give all seed a fair chance to germinate.

In dealing with the majority of greenhouse seeds one must bear in mind that they are small and that the conditions are more or less artificial. These two things imply care in the handling of
the seed and the necessity for giving conditions as near as possible to the natural ones.

The first thing to do is to mix up the soil. This is really a mixture of certain ingredients in such proportions as will ensure the compost being easily penetrated by the first tiny roots. It must be perfectly drained and free of any agency likely to cause disease to the new plants. During recent years leaf-mould, which is used to lighten a compost, has to a great extent been superseded by what is called peat-moss. This is the granulated peat mentioned in the previous chapter, highly compressed into bales, which forms an easy means of transit and which at the same time allows the grower to break down only so much as he requires.

Granulated peat can be recommended as being better than leaf-mould for this particular job. A general seed-raising mixture may be made as follows. Five parts good fibrous loam, four parts peat-moss, two parts sand. This should be thoroughly mixed and passed through a half-inch sieve. Be sure to pass both loam and peat through the sieve before they are mixed together, otherwise the proportions may not be correct. The sand of course will not want sifting. Add to every bushel $\frac{1}{8}$ oz. superphosphate of lime and $\frac{1}{6}$ oz. ground limestone. Such a compost will do for almost any seeds, but in special cases, where a different mixture is required, this will be noted as I deal with the plants in question.

The receptacles for seed raising are either shallow pans or boxes. Pans are usually three inches deep and of varying sizes, while a two or two-and-a-half inch box is plenty deep enough. Pots may be used but must be partly filled with broken crocks. Put on some rough fibre or soil to stop the finer compost running in amongst the crocks in the case of pans as well as pots, for pans must also be crocked. Boxes need little more than a covering of rough fibre over the bottom, as these must not be used for the very smallest seeds. This fibre is from loam which would not go through the sieve and should always be kept for such use.

When filling with the fine soil, only press it gently and always leave room at the top of the pot, pan or box for a thin covering of soil after the seed is sown, together with a sufficient space for watering. Before the seed is sown, the soil must be watered with a fine-rosed can. This is rather important, for it is no use sowing seeds on a half-dry, half-wet surface. After a good watering leave the pots, pans or boxes to drain for about two hours. The surface should then be ready to receive the seed. Note that the finer
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the seed the finer should the surface be. A small meshed sieve (such as is used in the kitchen) only costs a few pence and I would strongly urge its purchase, for this particular operation.

Now comes the actual sowing. Success or failure may depend on how this is done. To sow seed thickly is wasteful, for when the plants come up, they destroy each other by having no air between them and also little light. This sets up 'damping off', or the plants, growing so thickly, are drawn upwards towards the light and so become weak and useless. It will be seen from this,

that if seed is sown thinly so that each little plantlet, as it grows, gets a full quota of light and air each will develop sturdily from the very beginning. This is the real foundation of all good plants—a perfectly healthy beginning.

It is often a puzzle to know how deep to cover seed sown in this way, and here again there is a great danger of this being overdone. Actually, there can be no hard and fast rule about every seed, but the general rule laid down and one that can be followed with safety is that all seed should be covered by its own depth of soil. For instance, a seed that is an eighth of an inch in diameter will want the same amount of covering. The smaller the seed the less the covering and when it comes to such fine seeds as
Begonia, Streptocarpus, Gesneria, Lobelia, Trachelium and Gloxinia, then no covering at all is necessary, for such seeds are simply pressed into the moist surface and left.

Seeds of annuals or half-hardy annuals being raised in this way should be given a slightly heavier covering than the preceding rules suggest, but in the case of exotic or purely greenhouse flowers the rule should always be followed.

The actual raising takes place, not on the open stages of the greenhouse but in a propagating frame. This is a small frame with a glass covering and can be built in or made of wood so that it is transportable. An ordinary box covered with a sheet of glass will give the damp atmosphere which seed requires, but I would strongly advise a proper box or frame being made. This should be placed over the hot-water pipes in the warmest and shadiest part of the house. It should not be actually on the pipes. Between the pipes and the surface on which the seed is to stand, there should be at least three inches of what may be called insulating material. This can be moss, ashes, or best of all, coconut fibre or peat. Whichever is used must always be kept damp.

Having put the seed-pans or boxes in this frame, the glass
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covering may be darkened, for seeds always germinate quicker in the dark. It does, however, entail some danger if the germinating seed is left in the darkness even a day too long. Watch the seeds every day and on the first sign of life remove the dark covering or put the breaking seed into another moist but lighter frame. If during the period of germination the surface soil becomes in the slightest degree dry, then the box, pan or pot must be watered by the immersion process. This means lowering the pot or pan slowly into a pail of warm water (the same temperature as the frame) so that the water soaks upwards, until the dampness covers the surface. Lift it out just as slowly and let it drain before putting back into the frame.

Once the plants are seen, the next thing is to harden them gradually until they can take their place on the ordinary greenhouse staging. Never allow bright sunshine to fall on seedlings when they are very young, and above all, never allow the soil in which they are growing to become dry, even for an hour. The time which seed takes to germinate varies greatly. I say this because people often give up hope and throw seeds away when they find one subject weeks behind the others. Always allow plenty of time before deciding it is useless, unless you are certain that it is a subject which is quick in germinating.

FIG. 14
A SIMPLE METHOD OF RAISING DIFFICULT SEEDS.
THE LARGER POT IS FILLED WITH MOSS OR PEAT

FIG. 15
FIRST ROUGH LEAF
Where no propagating frame is available, place box, pot or pan on the staging, cover it with a sheet of glass and this with a piece of paper. The glass must be turned each day to disperse the condensation, and in the case of a frame the condensation must be allowed to escape each morning by slightly opening the frame for an hour.

So much for seed raising, and we now come to the next stage of the plant's life. This is called the 'pricking-off stage'. Pricking-off means transplanting, but it must be done at the earliest moment after the seed has become a plant. Here again it is difficult to make any hard and fast rule as to just how long after germination this task must be done. The general rule is that once a plant has got what is called the 'first rough leaf' the time has come to move it. To explain this term will be easy if you will look at any box of seedlings. Perhaps I had better give a definite example. When Stocks are germinating you will note that the first two leaves are thick and fleshy. These are called 'cotyledons' or seed-leaves, but in between them comes a different kind of leaf—a true Stock leaf. This is the 'first rough leaf', and it is when that leaf begins to develop that pricking off should be done. An even more pronounced example is found in the vegetable marrow, cucumber or tomato seedling.

Most plants are pricked off into boxes, though there is nothing against pots or pans being used. Boxes two inches deep are ideal for most greenhouse plants as these do not take an unnecessary lot of soil but give the roots enough room for the time being. As when filling the boxes for seeds, drainage is again an essential, but this can be ensured by covering the bottom with a layer of fibre from the soil, peat-moss or half-rotten leaves.

Soil for pricking out must be heavier—but only slightly so—than that used for the seed. The idea now is to build up a plant full of stamina. Root-action gets stronger every day, but if the roots could penetrate very easily into the soil it is possible that a weakened leaf system might follow. While the same ingredients may be used, the proportions must be altered to give a heavier soil. Thus the rate is five parts loam, three of peat-moss and one of sand, adding the superphosphate and chalk as before. Alternatively, one can use leaf-mould in the place of the peat if one wishes. When filling the boxes the soil can be pressed much more firmly, especially at the corners. See that the surface is level and make sure that the compost is moist, as the plants have to be placed in the soil before watering takes place. The actual
A flowering collection of the brilliantly-coloured Amaryllis or Hippeastrum.

One of the most useful pot plants for spring and summer is the popular *Primula obconica*. 
Primula sinensis (left) requires a slightly warm house, but Primula malacoides will grow in any frost-proof house and give a long season of blooming throughout the spring. These varieties are P.s. Coral and P.m. Tyrian Rose.

The Butterfly Flower—Schizanthus. This particular variety is aptly named Carters' Cherry Shades.
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transfer of the plants is not difficult. They must be levered out of their original soil carefully, by pushing a wide garden label down and under them. Lift each plant by its leaf in such a manner that its roots are not broken more than is necessary and drop these roots into a hole made with a dibber in the new box of soil.

There is one very important point. The hole made must be large enough to receive the roots easily, which means that the dibber must be fat enough to do this. Avoid thin dibbers, excepting for very small plants. Another point—never bury a seedling too deeply. This is a frequent cause of trouble. It is only necessary to bury the plant up to the same point as it was in the seed box. To put the fleshy stem of a seedling farther into the soil than it was before, is the surest way to have it damp off. This should emphasize the importance of pricking-off before stems of plants gain length.

Remember too that this removal is a check to the plant and the sooner it recovers from it the better. Give a good watering immediately after planting, then stand the box in a close moist atmosphere and shade from sunshine. Within a day or two the plants will have recovered and will then be ready to go to airier and sunnier quarters. Pricking-off may have to be done twice in the
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case of Begonias, Gloxinias, Streptocarpus and suchlike small seedlings, but the general rule is that one pricking-off is sufficient and after that, the plants can be allowed to harden and grow till they have made enough roots to entitle them to their first potting. During the time plants are in boxes, great attention must be paid to watering, for it is so easy to let them become too dry. After all, the depth of soil is not great and the roots soon do their part in drinking up the moisture, besides the drying action of wind and sun. Boxes of pricked-out plants usually take far more water than the average person gives them. You must not leave them too long in the boxes to get starved. For most things, especially bedding-plants, a mild feeding while in boxes is permissible. Once they have made good roots and while they are still healthy they must be put into pots.

This brings me to the important stage of studying the art of potting.

It is the most vital of all tasks in a greenhouse and therefore it must be thoroughly understood.

First of all, a small plant should not be put directly into the large pot in which it will bloom. It must be taken by gradual stages to the larger size, and therefore the pots required for seedlings after the pricking-off or box stage will be small ones. All the same, they must not be too small. From the box stage one can usually put them into 2½-in. or 3-in. pots.

This advice is given in spite of certain other opinions on this question, but I have yet to prove that putting small seedlings into large pots is either sound or the best method of economizing on space in a small greenhouse.
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Clean pots are essential, for dirty pots only make the task of turning the ball of soil out very difficult, because the roots stick to the sides of the pots, instead of coming away kindly, as they do when clean pots are used.

Before putting any soil into the pot, it must be 'crocked' or in other words, drained. This means that a piece of broken pot must be placed over the hole at the bottom of the pot, the arched side of the crock being upwards so that water can easily run out of the hole. Without this crock—or better still, several broken crocks—

![Fig. 18](image)

the drainage might soon become ineffective because the soil would clog up the hole in the pot. When using large pots it may be necessary, not only to put in one or two crocks and then cover these with smaller ones, but to cover these also with some rough material which will prevent the fine compost being washed into these crocks. This is easy to accomplish by placing a thin layer of moss, fibre from the loam or peat, or some very coarse lumps of loam. Remember that this drainage must always be in working trim, for if it fails, the soil in the pot will become waterlogged and within a short time turn sour. The roots of the plants will then die and that is the end.

After crocking is done, put some soil over them, lift out the small plant from the box by levering it up with a wide wooden label 'pushed well below it. Hold the plant with thumb and finger in its strongest part and so try to gauge the correct depth of planting by remembering that the stem must be buried only as deeply as it was in the box. There must always be enough space left at the top of the pot for watering purposes, and as a
rough guide I would suggest half an inch for small pots (60s), three-quarters of an inch for mediums (48s and 32s), with correspondingly greater depths as the size of the pot increases.

When potting into small pots, it is usual to do all the work with the fingers—not the thumbs—but with larger pots it is necessary to use a thin strip of wood—or in the case of 24s, 16s and upwards, a more substantial rammer, to work the soil down between the side of pot and ball of soil. I must make it clear that only very few plants need ramming hard. The soil simply wants making firm with gentle pressure but without any cavities being left between soil and pot. In cases of pot-grown fruit trees, vines and Chrysanthemums and similar subjects more pressure is certainly required, but even then I would urge readers to remember that soil rammed as hard as concrete would make rooting a very difficult job. In all cases see that the surface is finished off perfectly level, otherwise the water will run into the depressions and these will become sodden while other parts may remain comparatively dry. The secret of all good potting is to pot evenly all the way up, making the soil just firm and then finishing off with a very level surface.

Returning to the plant newly potted from its pricking-off stage, the grower must try and place the plant in a slightly warmer and closer atmosphere than it was before. This is to encourage quick root-action and to help the plant over the shock of potting. Whenever plants are potted they receive a check to their growth, but especially so when they are taken from boxes, owing of course to root disturbance.

In later pottings they do not suffer quite so much, because the ball of soil usually comes out of the pot more or less intact and the roots do not receive much injury. The close atmosphere can be created by frequently syringing in between the pots, damping the floors and beneath the stagings and keeping any walls damped
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with can or syringe. Most things will recover from potting in about three or four days, and from that time, air in increasing quantities can be admitted until the plant takes its normal position in the particular house in which it is to grow.

The watering of plants after potting usually takes place the day after, though in the case of soil being dry at the time of potting it may become necessary to 'water in' immediately. The ideal, however, is to have the plant which is to be potted rather on the moist side at the time potting takes place, and the soil used must also be in what may be called a happy medium between wet and dry.

Potting composts must vary to a certain extent for various plants, but it has been found that a very large number will respond splendidly to the same sort of soil, which can be called a general mixture. I have tried this and found it quite good and therefore I give the constituents.

Four parts yellow loam
Two parts peat-moss (from bales)
One part coarse river sand.

For every bushel of compost add:

\[ \begin{align*}
1 \frac{1}{4} & \text{ ounces superphosphate of lime} \\
1 \frac{1}{4} & \text{ sulphate of potash} \\
2 & \text{ horn or hoof manure.}
\end{align*} \]

Another general mixture can be made as follows:

3 parts yellow loam
1 part leaf-mould
\( \frac{1}{2} \) part coarse silver or river sand
\( \frac{1}{2} \) part rotted stable manure to which is added some general complete fertilizer at the rate the supplier states.

Sometimes I shall refer to what is called peaty mixtures, a compost used for such things as Azaleas, Heaths and Rhododendrons. For this I would suggest

2 parts loam
1 part peat (natural peat)
1 part leaf-mould
\( \frac{1}{2} \) part sand

or if you wish:

2 parts loam
2 parts bale peat-moss
1 part sand.
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Then again there is the now popular John Innes Compost which is available from most sundriesmen, already mixed for use. The two formulae below are the potting comports suitable for the amateur, and the ingredients are sterilized.

*Compost for Seed Sowing*

2 parts (by bulk) loam (sifted through three-eighth inch sieve)
1 part moss peat (horticultural grade)
1 part coarse sand (grading evenly from dust to one-eighth inch particles).

Add to each bushel of the mixture:

1½ oz. superphosphate and ½ oz. chalk.

*Compost for Growing-on plants in pots*

7 parts loam (sifted through three-eighth inch sieve)
3 parts peat-moss (horticultural grade)
2 parts coarse river sand.

Add to each bushel of the mixture:

1½ oz. hoof and horn meal
1½ oz. superphosphate
2 oz. sulphate of potash
½ oz. chalk.

One of the most important operations and one which will constantly recur is repotting. The question often arises as to

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**Fig. 20**

REPOTTING: THE NEW POT IS CROCKED AND FIBRE PLACED ABOVE TO ASSIST DRAINAGE

**Fig. 21**

REPOTTING: TURNING OUT THE OLD POT
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when a plant should be potted into a larger-sized pot and this is sometimes a difficult thing for the amateur to answer.

If a plant is growing fast and making a good deal of root—it should be considered as needing removal to a larger-sized pot when the present ball of soil is comfortably filled with roots. Turn the plant out of its pot and note if the roots are numerous and if so, pot on. Never leave a plant too long in a small pot so that it becomes 'pot-bound'. This only leads to premature hardening and weakening of the stem. Rather pot on before the soil is permeated with roots than delay the task till the goodness in the soil is spent.

Always have the compost ready and the pots clean before doing anything else. Then see that there is a vacant spot into which the newly potted plants can be placed.

Crock the pots according to the size being used, more in the larger ones than in the smaller sizes. Remember also that the larger the pot the rougher the compost should be.

Turn out the ball of soil by giving the rim of the pot a sharp tap on the bench while held in an inverted position. Keep the soil intact. While it is upside down remove the crocks and then it is ready for placing in the new pot. This should have a small

FIG. 22
REPOTTING: REMOVING THE OLD CROCKS FROM THE BALL OF SOIL
portion of the compost placed firmly over the crocks and on this the ball of soil should be carefully placed.

It is a great mistake to bury the stem or crown of any plant to a much greater depth than it was originally, so (in most cases) it will be only necessary to bury the ball of soil but slightly lower than it was. Low potting is often the cause of plants dying or rotting off, a particular instance being that of Primula and Cineraria.

When potting, work the new soil carefully between the edge of the pot and the ball of soil. That is where rammers both thick and thin come in handy, for it is essential that all soil should be firmly and evenly distributed around the ball, without any chance of a cavity being left when the job is finished.

The soil of a plant to be repotted should be well on the moist side. If a plant is potted when the ball of soil is dry, the chances are that it will be a very long time before it is moist again, as the water will have a tendency to pass through the new soil, without the ball itself becoming soaked.

After potting, it is usual to leave the plants a day or so before watering them in, but it depends rather on the season than anything else, for whereas, during autumn, plants may be left without water for some days after potting—it is often a good policy during summer to water them in the same day.
CULTURAL ROUTINE PROPAGATION

The time for general repotting is spring, but the growing plant will demand potting on whenever it is ready—so actually the work of repotting goes on, more or less all the year through, except in mid-winter.

Having followed the life of the plant from the seed stage to its adult period, and knowing that the vast majority of plants are propagated from seed, this particular means of increasing and maintaining stocks of plants takes precedence over all others, and that is why I have dealt with the whole thing in detail.

A great many plants are propagated from cuttings. There are reasons for this in most cases and briefly they are:

(1) to keep the stock true to the original type
(2) because cuttings will often produce plants far more quickly than if seeds are sown and
(3) as a means of perpetuating certain plants, especially those with double flowers, which do not ordinarily give seed.

One of the commonest examples is that of the ordinary bedding Geraniums. Though these can be grown from seed no one would think of doing so, cuttings being easy to strike and giving useful plants in the minimum of time. Another equally common example
is the Chrysanthemum. Cuttings give the same qualities as possessed by the parent, the same form, colour, foliage and stamina. Seed would give a very mixed bag in the case of both these subjects.

A cutting is usually taken from a plant while its growth is still young, but old enough to have a certain amount of strength and firmness to carry it through the rooting period. Cuttings must never be too soft or sappy. Chrysanthemum cuttings for instance are usually strong and firm in January and February (the months for striking) because the weather is cold and this prevents plants throwing up sappy growths. On the other hand bedding Geraniums give their best cuttings during August and September when the summer sun has partially ripened the stems and made them firm. If these were taken earlier and the cuttings were soft the probability is that they would not root at all but just rot away. Generally speaking, a cutting must be a half-ripened shoot, taken from a parent plant which is perfectly healthy and sound in every way.

Never take cuttings from diseased stock, for such diseases may be in the blood-stream of the plant and therefore will develop in any cuttings.
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The majority of subjects which come under the heading of greenhouse plants need striking in the spring and summer, though two popular favourites, the Chrysanthemum and the Carnation, are both struck very early in the year and a certain amount of bedding-plant cuttings are put in as late as October.

The method of preparing cuttings varies only slightly and it will probably be more instructive if I give one common example to show how a cutting is ‘taken’, how it is ‘made’ and how it is ‘struck’. I choose the Geranium because everyone knows it.

These cuttings must be chosen from the outside ‘branches’ of the growing plant—not the leaders nor the younger and more undeveloped growth near the ground. Look for a firm shoot and cut it off near the main or secondary stem. It should be about three or four inches in length. Choose a spot immediately below the lower pair of leaves and make a clean horizontal cut right across. Then pull or cut off the two or three lower pairs of leaves and you have a cutting ready for insertion. Sometimes a cutting is ‘pulled’ from the parent plant and in doing this one usually tears away a small portion of the main stem. This is called a ‘heel’ and in some cases is a great help in rooting the cutting. In such cases the ‘heel’ must be slightly trimmed if necessary,
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but no horizontal cut must be made. The 'heel' cutting has, I think, been overdone in garden literature, for in the majority of cases, if a cutting will strike with a 'heel' it will also strike without one.

The cuttings are then inserted in very sandy soil. Sand forms an easy rooting medium and is well drained, but here again granulated peat is of great assistance too, and so perhaps with half sand and half granulated peat we have the finest rooting medium for most cuttings, when quick root-making is desired.

If a third part of loam, sand and peat are mixed together it will also form an ideal mixture, but rooting will be slower, though to balance that the plants will be slightly more robust.

Most cuttings are best if struck in pots. In the case of the Geranium, 3½-in. pots are best and these, after being well crocked, must be filled nearly to the top with the rooting compost. Around the edge of the pot make four holes, one for each cutting, but make certain that each cutting goes right to the bottom of the hole. Should there be a cavity of air at the base of the cutting, it will never root.

Make the cuttings quite firm in the soil and water them in, using a fine rose on the water-can.

Now comes the question of where to put these pots to encourage rooting. The Geranium, because it is taken in August and September, must be put into a frame but this is the important point—the frame must be kept closed, so that the atmosphere is slightly humid. Remember, the cutting has to live on what it has stored within itself plus what it can get from the air. A drying wind would only wither it up, but a moist air will partly feed and sustain the cutting while it is rooting.

There should be in all greenhouses a frame (it can be a portable one) filled with coconut fibre or granulated peat, where a warm moist atmosphere can always be maintained, and into this damp fibre all pots of cuttings which require heat should be placed to root. This propagating pit is every bit as important as the greenhouse itself. Heat must come from below, so place it over, but not on, the pipes, as I have already explained.

When a cutting begins to root, it will show it by a more healthy look, standing up in a more perky manner than it has done so far. This is a signal to admit a little air to the frame or pit. Even during the rooting period the frame should be opened for half an hour a day to allow superfluous moisture to escape, but when rooting has begun it can probably be left open all day and closed
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at night. If cuttings wilt when air is admitted, it means that they are not rooted enough to stand it, or that the quantity of air has been too great for them. That is why this airing must be done gradually. If, after a day or two of full ventilation, the plants still show no sign of wilting, they can be taken to the more airy stages of a greenhouse, there to build themselves up in a natural way in readiness for their first potting. From this point they follow the same life as detailed for seed-raised plants.

Instead of actual cuttings it is often possible to strike leaves. This method is particularly handy for all plants of the Gesneria family and is used very largely in the propagation of Gloxinias, Saintpaulias and Begonias. The method is simple; a leaf has its stem cut neatly off to half an inch, and the leaf and stem are then inserted into a similar mixture as suggested for cuttings. The stem and about a quarter to half an inch of the leaf are put into the compost, the leaf standing more or less vertical. Roots are formed where stem and leaf meet and ultimately a small colony of other leaves appear, which in time become healthy plants ready for their first pots. For all this type of propagation, bottom heat is essential and a temperature of not less than 65° at the rooting base. It is most essential to keep the soil quite moist, for any suspicion of dryness would soon destroy the leaf and the job prove a failure.
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Another type of leaf propagation is as follows. Take healthy and well-developed leaves of any subject named above and partially sever the strong ribs on the underside. Many such incisions can be made on each leaf. Having done that, place the leaf right side up on a box or pan filled with a peaty mixture. Then take some fine wire, shape it into a hair-pin and peg the main ribs of the leaf into the peat. This is to keep the leaf firm.

Given the same conditions as above, tiny plants should form at the points where the ribs or veins were cut.

Many plants are increased by division and this is fairly simple. A number of plants which throw underground suckers must have these separated from the parent plant and be re-potted singly, as these will usually end by sending up a new growth. These underground growths are sometimes called rhizomes (or creeping roots) as in the case of Cannas and some Dracænas. Division is practised when bamboos, ferns and ornamental greenhouse grasses have become too large for their pots. The chief detail is to watch for the youngest parts of each and pot these up in preference to those older worn portions. Most division is carried on in early spring, just at the time when root action is beginning, so that the young portion takes to the new soil with all speed, thereby reducing the effects of a check to a minimum. Orchids are nearly always increased by division or from seed.

Another form of propagation is by 'offsets' and this applies mainly to bulbs or corms. The Lily is a familiar instance. There is a parent bulb which in time becomes the owner of a family of small bulbs clustering around its base. These bulbs are 'offsets'. Freesia, Tritonia, Gladioli, Hippeastrum, Vallota, Nerine are other examples. These offsets are taken from the parent and planted in suitable soil, mainly of a loamy nature, and grown on until they reach maturity and usefulness.

All these methods of propagation may be taken as the general ones and though there are others, they need seldom bother the average greenhouse owner.
CHAPTER IV

THE GREENHOUSE IN SPRING

In the general arrangement of this book I have decided to group together those plants which bloom at more or less the same time in the four main seasons. The spring may be roughly taken in this case to mean a period from February to May, the summer period being June to September, the autumn one from September to November, while the winter portion will deal in a general way from November through to March. A certain amount of overlapping is unavoidable as greenhouse plants can be made to bloom (providing there is heat, etc.) at the caprice of the grower. Thus I will not suggest that there is any hard and fast rule as to what is a spring or a summer plant, but will deal with these groups in a general way, so that any plant blooming on the border line of spring and summer will be placed in the group in which it will be most useful.

It is during the spring that the greenhouse is at its brightest, due in a large measure to the multi-coloured bulbs which flower at that time. These will be dealt with in a later chapter and it will be well if the reader bears in mind that no spring display can possibly be complete without the use of bulbs. The plants mentioned are all capable of being grown by the average grower and every one of them has a real decorative value. I am leaving out any plants that are grown simply as botanical specimens, and plants which are outside the scope of the average amateur's greenhouse.

Moreover I wish to make it quite clear that the number of species and varieties given under each genus are those which I consider of special interest to the amateur. There will be others (many of them) which for one reason or another I cannot give here. The two prime reasons are that it would take a much bigger book than this to give all the possible genera and the second is that so many of them would not be obtainable from the usual commercial sources in this country.

Acacia.—This is the Mimosa. It is a hardwooded greenhouse shrub which may be kept from year to year, so long as it is potted on occasionally and given frequent feeding during the growing season.
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It is propagated by taking cuttings of partially ripened wood during summer or early autumn, these being placed in sand and put into warmth under a cloche or hand-light. Main treatment is, to grow outside in summer, bringing the plants into a cool greenhouse during October and keep them there until the turn of the year. Then put them into a temperature of 55–60° and the buds will quickly develop. A compost of four parts loam, one part peat and half a part sand suits them. All the flowers are yellow, varying only in density of colour. Give plenty of water in spring and summer.

_A. armata._ One of the best of all, its balls of fluffy flowers being close to the stem, among the foliage. Lasts a long time in bloom and is very easy to grow.

_A. dealbata_ (Wattle). This is the well-known Mimosa seen in shops during the early months of the year. A good plant for the frost-proof greenhouse. This is classed as a variety of _A. decurrens_.

_A. Drummondii_, a good shrubby form with lemon coloured flowers which is very decorative.

_A. lophantha_, a large flowered variety of value, an easy grower and very elegant. This really belongs to the genus, Albizzia.

_Astilbe._—Better known to the older generation as _Spiraea japonica_, this group of easily grown plants can make a great contribution to the spring greenhouse. Plants are purchased in autumn as a cluster of roots, and these are simply potted into any old potting soil, kept cold till the turn of the year and then put into warmth. The spikes of flowers soon shoot up. By introducing a few plants at a time into warmth the display can be spread over the whole spring and early summer. Grow the pinks and reds as well as the whites.

_Auricula._—These plants, which belong to the Primula family, are not grown so much as they were years ago, but there is still a great charm in the heads of bloom, which embrace nearly all colours. They love a cool greenhouse and plenty of light, and during the winter are best if kept on shelves near the glass. Much depends on soil, which should be very loamy, with enough sand in it to make it porous. Water very carefully in winter and never give more moisture than is actually necessary. Repot after blooming, splitting up large plants at that time. Sow seed in April and grow on in cool shady frames all the summer. There are many lovely named varieties, which of course do not come true from seed. Sow seed in springtime, choosing the best strains possible.
Far more use should be made of the brilliant single Begonias for summer and autumn decoration.

Probably the most ornate and most colourful of all summer greenhouse flowers is the double Begonia, especially the newer varieties in such a highly-bred strain.
A cascade of beauty in a pot-grown Fuchsia. This variety is Melody.

The Chimney Campanula, *C. pyramidalis*, easily grown from seed sown in summer and treated as a biennial.
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**Azalea.**—Here is a group of greenhouse shrubs of exceptional value, because the earliest may be forced into bloom at the beginning of the year while later sorts will be in flower in May. There are many groups and still more varieties. All need growing in half loam, half peat, with liberal supplies of sand.

*A. indica* (Indian Azalea) is not hardy and must be grown in a warm greenhouse during winter. It forces well and is evergreen. There are many colours but mainly tones of pink and red. Best procured in the autumn, when such plants, if potted, will give a wealth of bloom the following spring. After potting, keep well watered and syringe twice a day. This is to keep down the thrips and red spiders which readily attack the plants. After blooming is over, pick off dead flowers and stand plants in a shady part of the house to encourage growth. In June the plants can be stood outdoors (preferably in the shade) until October. They are propagated by taking half-ripened cuttings during the summer and rooting them in half sand, half peat, under a bell glass. It takes several years to make large plants. The usual method of propagation is by grafting named varieties on to a common Azalea stock. Soil when potting must be mainly peat and sand.

*A. japonica.* A group of very hardy forms which are particularly useful in cold greenhouses. Flowers are smaller than *A. indica* but they cover the plant for weeks during the spring. May be placed outdoors from April to November. Best varieties: Hatsu-giri, purple; Hinomayo, pink; Hinodegiri, rose-red. If planted out, this group is hardy.

*A. malvatica.* This has produced many fine sorts, which in turn have been crossed with the *Kampferi* group. These crosses are of great value because their colours include pink, red, rose, orange and yellow and the plants themselves are as hardy as the *Japonica* group.

*A. mollis.* These are deciduous and bloom before the leaves appear. They are hardy and can be kept outdoors until wanted for spring decoration inside. Bring plants into a temperature of 50–55° in February and March. Syringe daily and the buds will swell and break rapidly.

**Calceolaria.**—One of the outstanding spring-blooming plants. There are two kinds, one known as the 'herbaceous' and the other as the 'shrubby' Calceolaria.

*Herbaceous* Calceolarias are extensively grown and are well known for their large, brilliantly coloured pouches which make
them so attractive. No other plants make such a brilliant show during May and June. Their culture demands a certain amount of care to bring them to perfection, but it should not be thought that these plants are difficult. They are grown from seed sown on a very fine surface during May and June. The seed must not be covered, but simply pressed into the moist soil. Germinate it in a cool shady frame, making sure that the soil never becomes dry for a moment.

When the plants are large enough to handle, prick them out into a very sandy soil, still keeping them in a cool frame. Avoid sunlight and keep the air of the frame humid. Pot on into tiny pots as soon as the pricked-out specimens have roots enough, using a little coarser soil and a proportion of peat-moss worked into the compost.

Plants can be wintered in the 5-in. size without losing any of their vitality, providing they are potted into this size by October. Use a coarse gritty compost, three parts loam, one part leaf-mould or peat-moss with enough coarse sand to keep it open. Grow them in a cool frost-proof greenhouse all the winter and pot on during February or March into their flowering pots. 6-, 7- or 8-in. pots are ideal. Soil must be rich and rather rough. Suggested mixture, five parts turfy loam, one part flaky leaf-mould or peat-moss, one part rotted manure with a generous supply of coarse sand.

Put this through a one-and-a-half inch sieve, and pot firmly but by no means hard. Always grow under cool conditions and fumigate frequently to keep down aphis or greenfly. When plants begin to grow freely during the early months of the year, pinch out the tip of the central shoot. This will cause the plant to send out its side-shoots and it is on these that the buds will form. Each of these will need staking when they get about six inches high and if the stakes are spaced out evenly, this will ensure a symmetrical plant. Feed the plants with soot water once the pots are full of roots, and after that, feed with some well balanced general chemical manure given in solution. Besides the giant forms of Calceolaria there are also types with smaller flowers which have all the good qualities of the former, and which, as the whole plant is proportionately smaller, are of particular value in small greenhouses. The culture is the same, excepting that their flowering pots should be the 5½-in. size. It is called C. multiflora nana.

Shrubby Calceolarias are nearly hardy and therefore very
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happy in a cool greenhouse. They are best grown slowly and should never be subjected to forcing. While all of them can be propagated by cuttings, the majority can be grown from seed in much the same way as the herbaceous kinds. Pinch the leading shoot of the seedling or cutting when it is three inches high to encourage a bushy habit. Keep the plants well syringed and clean. The most useful of these are *C. Clibranii* (profusa) which grows three feet high and is covered with pouches an inch across, their colour being a bright shining yellow. Next to this I would place *C. rugosa* hybrids, a mixture of all colours very valuable for pot work. *C. Banksii*, a rich shining orange-red, is a non-seeding hybrid, a plant that should be more popular.

Cuttings of the shrubby types should be struck during August and September, taken from the spring-blooming plants, which, after their flowering period, must be cut half-way down and left rather on the dry side, but syringed every day to encourage the new growth.

**Calla or Richardia.**—*The Arum Lily.*—Though its correct name is *Zantedeschia aethiopica* I prefer to use the better known names, for this is the well-known white Arum seen in markets and florists. These are too well known to need any description, their white or yellow spathes being one of the most important spring blooming subjects. Culture depends a great deal on the way the tubers (which form the root part of the plant) are grown in the summer. Immediately blooming is finished, say about May or June, put the plants intact into the garden. Dig trenches about a foot deep and put the lily tubers into these and press the soil closely around them. During dry weather water the plants well, for they suffer badly if allowed to become dry. During early September, when the new growth is seen pushing up from the base, take up the whole root and divide it into portions as required. If large pots are to be used, four growths may be placed in each, but the usual method for greenhouse decoration is to grow one shoot in a 6-in. pot. Soil should be four parts turfy loam, one part peat-moss or leaf-mould with half a part of sand. To this can be added superphosphate of lime and sulphate of potash, using one and a half ounces of the former and one ounce of the latter to every bushel of compost. As an alternative, a gallon of dried cow manure to every bushel of soil will give a fairly rich mixture. Arums need plenty of water while growing and two syringeings a day are necessary once they are potted and placed in the greenhouse. Avoid bright sunshine.
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When pots are full of roots, feed freely with soot water and also with chemical manure once a week. During early spring these roots tax the soil to a very great degree, and therefore weak feeding must be continuous unless the plants are in large pots. When Arums are wanted to bloom in December they should be potted up early in July, stood under a shady wall till early September, then taken into a growing house with a temperature of 55° at night. This must be gradually increased to 60°, when the plants should respond by giving a crop of bloom beginning about Christmas time. This can only be done with the white arum.

The yellow species are not so strong and require careful handling at all times. Their repotting must be done early in the year. They require warm humid conditions until the spathes form, when they may be cooled off to keep them in good form. Their resting period is autumn and winter.

The two best yellows are *C. Elliotiana*, with spotted leaves and bright yellow blooms, *C. Pentlandii*, with plain green leaves and deeper yellow blooms. There is also a rose-coloured species called *C. Rehmannii*. This needs very careful growing to bring out its best qualities.

Camellia.—These beautiful plants are not so popular as they were in past years owing to the room they take up. They are hardwooded shrubs and though capable, under proper treatment, of giving a show year after year, the plants usually become too big for small structures. It is not worth while for the amateur to bother with the propagation of Camellias, they are best purchased direct from the nursery. It is best to buy them in spring, so that the buds already there can give flowers at once. Pot on immediately after blooming has finished, should this be necessary. Soil is important because it must be rich and not too heavy. This is best made up with four parts extra turfy loam, one part leaf-mould or peat-moss, one part rotted manure and a little sharp grit. Pot very firmly. Once roots have penetrated the new soil, the plants can be stood outdoors till September. They must be syringed daily the whole time they are out of doors. Take into the greenhouse during September but keep the house cool. During winter a temperature of 45° is ideal but this can be raised to 50° after the turn of the year. A higher temperature can be dangerous. Never allow the plants to become dry or the buds will most certainly drop off just as they should open. Keep the leaves sponged if they show the slightest trace of dirt. Pot on at least every two years and give the plants a top-dressing
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each spring. This is done by removing the top half-inch of soil and replacing it with a compost, half loam, half rotted manure. There are many named varieties in varying colours, white, pink, red, salmon-red, blush and crimson. Definitely a cool-house subject.

Celsia.—A pretty greenhouse plant allied to the Verbacums. There are two species, both yellow, and grown from seed sown in early summer. They are best when raised and grown all the time in a temperature of 50°. As the plants get large enough pot them first into 3-in. pots and then on into the 4½- or 6-in. size. Use a mixture that is rather more loamy than for most things. One part leaf-mould to five parts loam with the addition of sand will suit them. During winter keep in a cool house (45°) and with the warm weather the plants will send up their flowers, usually during May and June.

C. arcturus, makes a bushy plant which is covered with relays of light yellow flowers about an inch across. This is the one I recommend the amateur to grow.

C. cretica. Throws up spikes of yellow flowers clustered together, these spikes being four or five feet high.

Chorizema.—A group of Australian shrubs, which make very pretty greenhouse plants and are rather unique because their pea-shaped flowers are contrastingly marked. The orange and purple combination of the best species C. cordatum is particularly beautiful. Grown from cuttings struck in warm sand. Easily trained either into a bush or as a dwarf climber by pinching growing shoots as required. Loam, sand and peat suits them admirably. A plant which deserves greater popularity.

Cineraria.—A most important and popular group of easily grown plants of great value in every greenhouse. Their culture is easy. Sow seed at intervals from April to August: those sown first will bloom at Christmas and the August-sown ones in April. Its botanical name is Senecio cruentus.

Use a gritty soil for sowing and sow thinly. After the seedlings have made three leaves prick them out into boxes, two inches apart. When boxes are filled with roots put into 3½-in. pots. Use a soil composed of three parts loam, one part peat-moss or leaf-mould with just enough sand to keep it open. Grow in cold frames. As pots fill with roots pot on to 6- or 7-in. size, using a similar mixture as before, but adding one part rotted manure and half a pound of bone meal to each bushel of compost. Crock the pots well to ensure perfect drainage and pot firmly. Keep as cool as possible all the time, 40° at night being quite safe.
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during winter. If the plants are wanted early, grow them in a temperature of 50–55°. Enemies are aphides and thrips, therefore frequent syringeing and periodical fumigation are essential. The leaf-miner maggot also attacks them, but if syringed with insecticide once a week during summer, this will help to keep the fly from laying its eggs in the leaf—it is these eggs when hatched which give the mining maggot.

Perhaps the most vital period is just as the plants begin to open their buds, when an overdose of water can so easily cause the plant to wilt and collapse due to an attack of *Botrytis cinerea*, a fungoid disease which attacks many greenhouse plants.

There are various groups of Cinerarias, perhaps best described as follows: *C. stellata* and its cactus-flowered form—tall growing plants with heads of star-like flowers. *C. grandiflora*, dwarf, large-flowered type and a semi-tall form between these two. Each of these groups is split into a number of varieties which can be seen in any good seedsman’s catalogue.

**Clivia.**—A South African group belonging to the Amaryllis family, but instead of a bulbous root has thick fleshy ones in great number. They are particularly useful during April and May and for the most part are orange in colour. The clusters of flowers carried on two-foot stems may contain twenty or thirty lily-like blooms in each cluster. The leaves are thick and strap-like and are evergreen, because this plant does not have a resting season like some of the family. It is sometimes known under the name of *Imantophyllum*. Seeds can be raised in a temperature of 65° during January but it will be three years before the plants make anything of a show. It is best to purchase plants in 6-in. pots and grow these on. They need plenty of room to develop and ultimately require 8-in. pots. Soil must be composed of six parts loam, one part leaf-mould, one part rotted manure, with one pound of bone meal to each bushel of compost. Grow in moist conditions for a month or two after potting, temperature about 50° at night. After that, these plants are quite happy in a cold frame until October, when they should be brought into a dry, cool house. Very little water is wanted in winter. During March, when the spikes begin to show, put them into a warm house (55°) where they will soon bloom. Cool off once the blooms are opening.

The best species is *C. miniata*, but this has a large number of varieties, the result of crossing various tones of colouring. Most of these are shades of orange and red, though there are one or two yellows as well.
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Coronilla.—A useful and easily grown plant with pea-shaped scented yellow flowers and slender stems. C. glauca should be found valuable in cool houses. Pinching now and then will make the plant break and form a compact bush. Can be grown from seed or cuttings during March and April.

Cyclamen.—C. persicum is one of the most important of all spring blooming plants, though it must also be considered as an autumn and winter flowering subject. I have chosen to place it amongst the spring flowers as it will be treated this way by most amateurs.

There are two ways of beginning the culture of Cyclamens, one by planting dried tubers, the other by sowing seed. The latter is the better way every time.

Seed should be sown in August in a very gritty soil and placed in a moist shady position when the night temperature is round about 60°. It is very important that the seeds should be only slightly covered and also that the soil is never for a moment allowed to become dry, once seed is sown. When seedlings are three-quarters of an inch high, prick off into boxes of half loam, half peat-moss or leaf-mould with a little sand. Grow in a temperature of 55° avoiding bright sunshine. Alternatively, these small seedlings can be potted direct into very small pots (72s) but the pricking out is probably the easier method for the amateur. When large enough to remove from boxes, pot into 2½-in. pots. Use a more loamy compost. Three parts loam, one part peat-moss or leaf-mould and one part sand will do. Do not have the loam too fine as Cyclamens want a free and easy root run. Grow in moist conditions of 55°. During April, May and June the plants should be ready for their final pots, which must be the 5- or 6-in. size. A rich mixture is essential; add rotted manure and a little bone meal to ensure this.

In potting, great care must be taken to bury the tuber only half-way in the soil. If it is potted too low the plant will die. Grow during summer in a cool house with slight shade, or better still, put the plants into frames for the summer, taking them into the greenhouse by October. After that they need light, careful ventilation and a temperature of 50–55°.

The number of colours procurable are many and varied and in the newer strains the quality is so high and so far in advance of the older types that every grower ought to buy only the highest class of seed or tubers.

Plants grown from tubers should be treated in the same way
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as the others after starting. Tubers can be purchased dry and are best started into growth during July and August.

After blooming, Cyclamens should be placed in a cool house, water being given sparingly until they begin their rest. Such plants, of course, will provide tubers for starting later. All the same, seed should be sown every year.

Cleanliness plays a vital part in the cultivation of high class Cyclamen, and constant spraying and frequent fumigation will prevent such pests as red-spider mite, thrips and aphides becoming so numerous as to do damage.

Cytisus (Genista).—A group of very useful spring blooming shrubs which give a rich reward for the trouble of keeping them from one year to another. The bushes are covered with flowers during February and March and are very little trouble to grow. Best procured as small plants, they can be potted on into 5- or 6-in. pots and grown perfectly cool during summer and winter, say 45°. During January a portion of the batch should be given ten degrees more and the plants will develop their flowers very quickly. A loamy soil with some rotted manure chopped up amongst it and a little sand will suit them. Pot firmly and give plenty of water during the growing season. The best species is C. canariensis—the popular form seen in florists' shops during spring. They are grown from cuttings rooted in sand. The hardy Cytisus or Brooms also make ideal greenhouse plants for forcing, simply being potted up and taken into a warm house after the turn of the year.

Deutzia.—A group of easily grown spring blooming shrubs, usually bought during autumn and potted up in any good soil. Brought into a growing temperature during January, they will bloom in March. After blooming they can be plunged in the garden till wanted the following autumn. The best species is D. gracilis.

Dicentra (Dielytra).—This is the well-known Bleeding Heart, which is really a hardy plant but is so valuable for forcing that I include it here. Pot up roots or crowns when these are dormant in November and stand the pots in cold frames. During January bring a number into a cool house and allow them to grow at their own pace for the first week or two. Do not in any case give a higher temperature than 60° or the stems will be too weak to stand upright. Better to grow them in 50° all the time. Very easy and very pretty. The species usually grown is D. spectabilis.

Epacris.—These are Australian Heath-like shrubs and very
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useful during spring. They never want a lot of heat and may be classed as cool greenhouse plants. When in bloom they remind one of Heaths with very large flowers and some are particularly brilliant in colouring.

I suggest that the beginner starts with a few purchased plants. If these have to be potted on, a mixture of peat and sand must be used, one part sand to six of peat with a little sandy loam added to give body to the compost. They like sun and must always be kept moist, especially during their growing season which follows blooming. A certain amount of pinching is necessary to keep the plants shapely, but all such pinching must cease in the middle of June. Grow near the glass, especially in winter, and after blooming is over, cut the plants partly back and keep them syringed until new shoots appear.

_Erica._—To some species of this family we owe much of the early spring colour in our greenhouses. The greenhouse heathers bloom for a long time, are not delicate and do not want much heat. This suggests their value. All the same, their culture must be correct or failure will follow. The soil used must be similar to that suggested for Epacris and the whole compost should be rubbed through a half-inch sieve before using. Purchase young plants and grow these on. Always pot in spring. Pot very firmly and give close conditions for the first ten days or so, after which air may be gradually given until the summer weather comes and the plants can stand outdoors. Repotting should be done in the following spring when growth is well started, generally in April. No stopping is required, except in the case of loose shoots which may have to be pinched. House the plants in September, keeping the atmosphere rather on the dry side, but attend to the watering with scrupulous care. The plants need all the light possible during winter.

There are a very large number of species and varieties, but as so many have gone out of cultivation I will only give a few really useful ones. _E. Cavendishiana_ (yellow), _E. gracilis_ (rose-red), _E. g. nivalis_ (white), _E. hyemalis_ (white and rose pink), _E. melanthera_ (pink), _E. persolula_ (white).

_Kalanchoe._—This plant is worthy of far more attention than it has received, especially as the addition of very useful species like _K. Blossfeldiana_ and _K. Vivid_ has given us a particularly lovely pot-plant. The leaves of Kalanchoes are succulent and in the case of the species mentioned the flowers are borne in large clusters at the extremity of wiry stems about one foot long. The scarlet
flowers are particularly welcome in April. Culture is not difficult. Sow seed, which is very fine, during March in a warm house. Prick off when large enough and cool off gradually till they are in an ordinary temperature of 45–50°. Pot into small pots when ready and grow all through the summer in frames. They are sun lovers, so never shade them. Final potting should take place in July, the plants being given 5-in. pots. Grow in frames till September then take into a sunny house of about 50° and keep in full light. Water sparingly during very cold weather and never allow the foliage to become wet at that time.

*K. flammea.* Is also grown from seed in much the same way, but it blooms in early summer. These like a soil nearly all loam with a little broken brick or mortar rubble added to the compost.

**Lily of the Valley.**—An easily grown subject, very popular and well worth growing in pots. There are two types of crowns, one called ‘retarded’ crowns and the other ‘forcing’ crowns. The difference is that retarded crowns have been refrigerated and once out of the freezing chambers will rush into bloom, while forcing crowns are the natural product specially grown for pot work. The culture of each differs.

**Retarded Crowns.** Immediately they are received, pot up eight pips or crowns into a 5-in. pot. Place these into a dark, heated propagating pit of about 65–70°. When the buds begin to push, cool down very gradually to 60° and give light equally slowly. When flowers develop, cool to 55° and use as required. This takes a month from the time of planting.

**Forcing Crowns.** Pot during November and December, either in soil or bulb fibre and place in frames. Put into gentle warmth in January and after a week or two they can be subjected to the sharper forcing temperature of 65–70°. Again cool gradually as blooms develop.

**Pelargoniums** (Regal). It is a pity these plants have gone out of fashion, because they are so decorative and well deserve the name of Regal. These must not be confused with the Geranium, which is also a Pelargonium. Culture of Regal Pelargoniums has been said to be difficult, but my experience is that most amateurs having grown this type have had great success without much trouble. Briefly the cultural points are these. When plants have finished blooming, cut them about half-way down and only give enough water to stop the soil becoming dust dry. During June syringe them to encourage the new growth. This growth will do two things; it will provide cuttings and a certain number of the
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remaining shoots will be the growth for next year’s bloom. Cuttings must be about three inches long when ‘taken’ and should be inserted in a mixture of half loam, half sand. These are generally ready for ‘taking’ in July, so that by early September they should be rooted and ready for 3-in. pots.

Here they will remain through the winter in a house of about 45–50° night temperature. When growth begins in March, pot on and pinch the leading shoot after a fortnight or so. This will make a branching plant in either a 5- or 6-in. pot. These, and all other plants not wanted to supply cuttings, must be cut hard back during July, keeping them well on the dry side till growth commences. Pot on any that require it when growth becomes active. Use a loamy soil, with just a little leaf-mould. Bone meal is a useful addition, half a pound to each bushel of soil. There is a very long list of varieties in all colours; maroon, orange-scarlet, pinks, crimsons, cherry, salmon and many mixtures of colour. These may be had in bloom from April onwards. Zonal Pelargoniums will be dealt with under summer blooming plants.

Primula.—One of the main groups of spring-flowering plants and one that should be studied by every amateur. The first of these is no doubt the Chinese Primula (*P. sinensis*), which is available in white, crimson, blush, salmon, cerise, scarlet, and blue. There is also the stellata or star forms which grow much taller than the ordinary Chinese Primula. There is a great variation in foliage amongst these Primulas and this rather adds to their usefulness. The culture of these is easy but at the same time they must not be treated casually or they will fail. All can be grown from seed.

Sow in April, covering the seed very slightly. Temperature 60–65° at night. Cover seed boxes or pots with paper till germination begins, then remove, but keep shaded from bright sunshine. Prick off into gritty soil when three leaves are formed and after a day or two in the higher temperature, cool off to 60°. Pot into 3-in. pots during July, by which time they should have been cooled off gradually, enough to allow them to be placed in a cool house. After rooting has commenced, cool frames, if shaded, will suit them. When roots are running around the sides of the pot, move the plants into the 5-in., which is the flowering size. Much depends on soil. Suggested mixture: four parts turfy loam, two parts peat-moss, one part sand. Reduce the peat-moss if you add some rotted manure. One and a half ounces of superphosphate of lime, three quarters of an ounce of sulphate of
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potash with one and a half ounces of hoof and horn manure to every bushel of compost will give a rich mixture.

When potting it is essential to pot neither too high nor too low—the plants should 'sit' on the soil much as a lettuce 'sits'. Drainage is very important, too, so crock the pots well. After potting, replace in the frames or put into a house that can be kept moist. Syringe between the pots twice a day if it is warm, but do not overdo this in cool weather. Give plenty of air while the weather is kind but as it gets colder, only ventilate during the warmer part of the day. If, however, you can keep at a temperature of 50° at night, a slight crack of air will be helpful all the time. The best temperature for Primulas of this kind is 50–55°. There are some doubles and semi-doubles in this group, worthy of attention because their flowers last longer than the singles.

P. s. flore-pleno. This is an old double white, which can only be propagated from cuttings. These cuttings will root in a moderate heat in sand and after rooting can be given the same conditions as P. sinensis.

P. obconica. A very showy Primula with flowers which last in full beauty over a long period. It may be had in bloom at almost any time of the year, but its great season is the spring. Its leaves are irritating to people who suffer from skin diseases and may cause a form of dermatitis which can be very painful. On no account should people who are likely to suffer in this way have anything to do with this plant. Luckily it does not affect the majority of people. Sow seed every year in March and again in May to ensure successive batches of bloom. Prick out, as soon as the plants can be handled, into a loamy and gritty soil. Temperature 55°. Later on before plants are given their first pots, cool off to 50°. This is a very good temperature for the plants during the whole time of their growth. They will grow well without the addition of leaf-mould which they do not like. Six parts loam, one part peat-moss, one part old manure, one part sand is very suitable. Crock the pots rather well, for much depends on drainage. Keep plants fairly dry in winter, especially if they are in a low temperature. Beware of aphides at all seasons and also thrips and red spiders in the summer, but periodic fumigation should keep the plants clean. Make certain that you only grow the best quality seed, as the newer introductions supersede the older type in stamina, in colour and in size.

P. malacoides. This is one of the outstanding Primulas for cool
greenhouses. It is being improved year by year and already embraces some of the loveliest colourings, rose-pink, mauve, lilac, salmon, white and red. Its flowers are carried in whorls on wiry stems, nine inches or a foot high, and there may be ten or fifteen spikes all carrying blooms at once. It is an easy plant to grow and blooms from December to May. Seed should be sown in May and June to give a succession of bloom. Raise it in a cold frame or house and remember that the one thing these plants do not want is heat. When ready, prick out the seedlings into loamy and gritty soil. Beware of burying the plants deeply, a frequent cause of early losses. When potting, still keep the soil well on the gritty side and always crock the pots generously.

For the final potting, use the following compost. Six parts loam, two parts peat-moss (or leaf-mould), one part finely chopped-up manure and one part broken brick and sand. Never add chemicals at this stage, for chemical feeding can be given later on in solution if the plants require it. Actually, they should not want feeding until the end of January. Grow in cold frames until November. After that they are best on an airy shelf in a cool greenhouse. Damp conditions and heat will ruin them. They are nearly hardy and should be regarded as such. Protection from frost is all they need. During summer, aphides may attack them, but they can be kept down by a dusting of tobacco powder, or a slight fumigation.

P. kewensis. Another Primula as hardy as P. malacoides. It has very pretty foliage covered with farina, which adds considerably to its beauty. The fact that the farina (or flour-like powder) comes off on to one's hands has led some people to think of this as poisonous. This is not so and it would be a thousand pities if this lovely Primula suffered in popularity because of a misconception. It needs a slightly longer season than P. malacoides, and therefore wants sowing in January, February and March. Raise in a temperature of 60° and during its younger stages keep growing in about 50-55°. When the weather becomes warm enough—about the end of May—transfer to the cold frames and grow them there in shady conditions until October. The same treatment as given for P. malacoides will suit them in summer.

It has also become a habit to sow some of the hardy varieties and grow them in pots. I must say that some of these lovely things are so good that a few of the best add to the spring display in any greenhouse. The usual procedure is to pot up some healthy looking plants during the autumn from the open ground, keep
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these in frames through the winter and take them into a cool growing house in March, where they develop their blooms slowly and naturally. The most useful are *P. pulverulenta*, *P. Bulleyana*, *P. japonica hybrids* and *P. denticulata*. There are many others, including of course the Polyanthus which makes a splendid subject for cool houses.

Now that the wonderful strains of Polyanthus have reached such a high degree of perfection, it would be a very great loss not to use them for pots. The method is to lift plants about eighteen months old and put these into large pots in November. Keep cool till mid-January. Then give them a temperature of 50° at night and the result will be most pleasing.

One can also put seedlings raised in April into smaller pots but these must not be expected to give such a generous show.

**Schizanthus.**—No pot-plant is more popular in the spring than the Schizanthus. First of all it is easy to cultivate, grows far better in a cold house than in a hot one and is easily raised from seed. It is called the 'Poor Man's Orchid' and the 'Butterfly Flower', the latter aptly describing the nature and shape of its flowers, which are borne in many hundreds, all in bloom at the same time. It is at its best during April and May, though with care and extra warmth the early sown plants may be made to bloom in March. When early blooms are wanted, seed must be sown in July, but it is the September sowing which gives the best and most robust specimens.

Perhaps the best way is to sow some seed at the end of July, a small quantity in mid-August and another sowing in September. From the very start the seedlings must be kept cold, therefore raise them in the cold frame. Prick out into a loamy mixture as soon as large enough, still keeping them cool. Pot on, using a compost of four parts loam to one part of leaf-mould and sand. Pot firmly, otherwise the plants will become thin. Still keep cold and if the plants have to be taken into a greenhouse during November, see that it is into a cool house and stand the plants near the glass. A shelf is the ideal spot. A low temperature of 40° suits them but frost, even a few degrees, will damage them if not prevented. The early plants will be ready for the final shift during October. For this batch, 6- or at most 7-in. pots should be used. The later batches will winter quite well in 5-in. pots and these are best if given their final potting during February. Use pots of 8- or even 10-in. diameter, if you want specimen plants. A great deal depends on the final potting.
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compost which must be rich. Eight parts loam, one part rotted manure, one part peat-moss or leaf-mould with half a part sand will make a good mixture. To this should be added some concentrated chemical manure, for the Schizanthus is a great feeder.

Once the roots fill the pot, give some soot water every week, and later on when the plants are growing freely, give a feed of concentrated manure in water twice a week. Yellowing leaves are the first indication of the food in the soil becoming exhausted. If this is not corrected the plants will be a failure.

At all times, excepting in very frosty weather, the schizanthus needs fresh air and plenty of it. Any attempt at coddling will spoil the plant at once. After all, it is a half-hardy annual.

When the plants are about three inches high the leading shoot should be pinched out, but after that, little or no stopping is needed. As the plants grow they require a thin stake and in springtime they must be given several side-stakes of thin hazels or canes if the plants are to be shapely.

There are many varieties, but undoubtedly there is nothing better than the Large-Flowered Hybrids for the average greenhouse. These are sold in separate colours so that one has a choice in this respect. These varieties have superseded the old S. wise-tonensis, which however is the basis of many of our best hybrids to-day. There is a compact growing variety called nana compacta and there are also some fine named sorts. There is also the S. retusus type, which has a looser habit and slightly more open flowers. The Pansy-Flowered form is of recent origin and as its name implies, has its petals overlapping—with a slight tendency towards doubling. This is a very welcome addition to the group, and a very promising plant from the amateur’s point of view. One of the remarkable colours now available is the cherry-red which is fast becoming a general favourite.

**Stocks.**—This well-known flower is one of the plants now largely used for spring greenhouse decoration. The varieties chosen usually belong to the section called ‘Beauty’ Stocks, one of the best known being ‘Beauty of Nice’. In this section there are all sorts of colours; blue, rose, buff, lilac, violet and white, usually sold under distinctive names. Seed of these should be sown in cold frames during July or August and the subsequent seedlings treated as hardily as possible all the time. They should stay in the frames with plenty of air playing around them until hard frosts begin, when they must be removed to a cold greenhouse. Usually grown in 5-in. pots, they will give a good account of themselves after
the turn of the year, if a temperature first of 50° and then later of 55° is given and the plants allowed fresh air and plenty of light. A great deal depends on two things—the soil in which they are grown and the watering. The first should consist of a soil nearly all loam, with only about an eighth part of either leaf-mould or peat-moss and the usual amount of sand. Firm potting is required. As to watering, this must be reduced to the very minimum during late autumn and winter, otherwise the plants will damp off and become very unhealthy. During the growing season, however, they absorb a good deal of water and must not become so dry that the leaves 'flag'. I would say that watering has far more to do with the culture of good Stocks than anything else. Brompton and Ten Week varieties may also be grown, the former being sown in August, the latter in January and February.

The newer type known as the 'Column' Stock makes an ideal pot subject and the one thick column of flowers, perhaps a couple of feet high from the staging, gives an imposing display. It is to be had in many colours, mostly of the softer shades—a point in its favour. Note, too, those strains of Ten Week Stock which are guaranteed as being 100 per cent double.
Gloxinias nearing their flowering stage showing exceptionally good cultivation.

An exquisite collection of Gloxinias Invincible Prize.
A display of warm-house tropical plants, grown mainly for the beauty of their foliage.
CHAPTER V

PLANTS THAT BLOOM IN THE SUMMER

DURING the hot days of summer a great deal of attention must be paid to watering and ventilation. No plant likes to be dry during this period and it must be borne in mind that a day’s dryness during summer may cause any plant to give up altogether. Special attention must be paid to young and growing seedlings, for even one hour’s dryness at the roots may cause them to shrivel and die, and in any case it will give them a check from which they are unlikely to regain their health and stamina. Besides water, plants must have plenty of fresh air and this entails the very free use of the ventilators. As these are open a good deal, it will be found that any humidity inside the house is very quickly withdrawn into the air. This means that extra damping down of stagings, paths and in between pots is more than ever necessary. When a house has to be left unattended during a summer day, several canfuls of water should be thrown on to the floor and under the stagings during the early morning, and if this can be repeated during the middle of the day, so much the better. If this cannot be done, then give a similar damping down during the early part of the evening, though six o’clock is quite late enough for a heavy damping. Many of the failures which people experience with their summer-blooming flowers are due to a persistently dry atmosphere. This is one of the causes of Begonia buds dropping, and of Gloxinia foliage and flowers being flabby and immature. It is also the ideal atmosphere in which the greatest of all pests, red-spider mite and thrips, breed. They breed with such rapidity that within a week their numbers may be so great that they will damage crops beyond repair. These enemies hate water or humidity, so if plants are thoroughly syringed night and morning and the air kept reasonably moist, there is a sporting chance of at least reducing these evils.

Shading in some form or another is necessary for most greenhouse plants during summer, but there are some exceptions to this rule, including Carnations, melons, vines, succulents and tomatoes. So long as shading is not too thick, it does not really matter what the material is, but there is little doubt that blinds
are the best proposition. Avoid any sense of darkness in a house. Although plants need shade from bright sunshine they still want the maximum of light. The grower must try to understand the difference between the danger caused by burning sunshine and undue shade inside the house, steering a line between the two.

**Abutilon.**—These are plants of fairly easy culture and only need a cool house to give a really good display. Some species are grown for their flowers while others are grown for their decorative foliage. It is not generally known that seed sown in a warm house during February will give flowering plants by the end of June and that these will go on blooming till the late autumn. The soil must be on the loamy side, four parts loam to one of leaf-mould with a little sand. Grow first-year plants in 5- or 6-in. pots, but second-year in 7- or 8-in. Feed frequently with liquid manure as they grow. All decorative species and varieties are raised from cuttings, rooted in sand in a temperature of 65°. The best known decorative varieties are *A. Savitzii*, silver and green leaves; *A. Thompsonii*, mottled golden and green; and *A. vexilarium variegatum*.

**Achimenes.**—These plants belong to the Gesneria family and as such require shade, warmth and moisture all the time they are growing. Their treatment is similar to that of the Gloxinia (which see). They may be grown from seed or corms. If the former method is chosen, procure a good strain and keep the plants in a temperature of 65° until they are potted into 3-in. pots, after which the 60° will be sufficient. Corms can be started in January and February in a temperature of 60-65°. Grow six or seven in a 5-in. pot, or plant them in baskets so that they can be suspended from the roof. An ideal soil is one third loam, one third peat, one third leaf-mould and enough sand to keep it open. They may also be grown in a cool house, if started into growth during April.

**Adenophora.**—Plants allied to the Campanulas, which make pretty greenhouse plants during early summer. Easy to grow. Loam and leaf-mould with some decayed manure make an ideal soil for them. Cool house treatment with copious supplies of water are all they require. Best in 6-in. pots.

**Agapanthus.**—A blue Lily-like flower from South Africa which loves moisture and will grow outdoors during summer if stood in water. Usually too large for small greenhouses yet of value in roomy structures; its long spikes carrying heads of lavender-blue flowers are very attractive. Propagated by division, which
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takes place in spring. Large pots are essential. Soil, pure loam, one fourth part decayed manure and sand. Pot firmly and stand in cool growing house. Potting is necessary about every three years. *A. umbellatus* (blue) and its white form are the ones usually grown. Must be wintered in a frost-free greenhouse.

**Begonia.**—This is perhaps the most popular of all summer blooming plants, though of course the family is so large that practically all the year round one may have some Begonia or other in bloom. For the sake of convenience I am including all general species and varieties under this group, while the autumn and winter-blooming sorts are included in chapters dealing with the season in which they flower.

The great favourite is the tuberous-rooted Begonia. It is the most brilliant of all the family and embraces practically every colour with the exception of blue. Both the doubles and singles are now so highly hybridized that the magnificent specimens seen at shows increase in size and quality year by year. Tuberous Begonias are grown from seed or tubers.

Seed should be sown very carefully on a specially fine surface. Pots half-filled with crocks are best, and the mixture must be very porous. Peat-moss, light loam and sand in equal proportions, put through a very fine sieve, will do for sowing. The seed is exceptionally small, so do not cover. Prick out at the earliest possible moment and keep plants in the same temperature as was used for raising them. This should be around 65°. At this first pricking out, plantlets only need half an inch between them, but as they develop must be pricked out again into a slightly heavier mixture and given more room. From this size put into 3-in. pots filled with a very open compost and begin to cool them off until they have a night temperature of 50-55°. All the time they need slight humidity in the atmosphere and careful watering. If potted into 5- or 6-in. pots they will bloom six or seven months after sowing. Soil should be three parts loam, one part leaf-mould or peat-moss and some very sharp sand. If manure is added it must be thoroughly decayed. When plants are in active growth give plenty of soot water and weekly feeds of some complete manure.

If growing plants from tubers, start these up in leaf-mould or peat-moss in a temperature of not more than 60°. For the first month or two this temperature will do, but after that, treat as suggested for the seedlings. Pot on as required, using a slightly richer mixture than suggested above, adding some bone-meal and
horn and hoof manure to the final mixture. Stake plants as required and do not over-shade. Syringe under and not over the plants and if permanent shading has to be put on the house, keep it as thin as safety allows. Give plenty of ventilation at all times. Cuttings can be taken from these plants at any time during summer and rooted in a close frame in peat-moss and sand. After blooming, gradually withhold water as leaves turn yellow and store the bulbs in a temperature of 40° during the winter either in dry sand or in the soil in which they grew.

Begonias make ideal plants for growing in hanging baskets but when ordering the plants state the purpose for which they are required, as only certain varieties are suitable for this purpose.

Other Begonias include the fibrous-rooted sorts *B. semperflorens*, which are always very attractive as pot-plants. Much easier to grow than most, these fibrous sorts will make splendid plants within six months of sowing. Treatment is much the same as for tuberous sorts, but slightly lower temperatures will ensure more robust plants. They can also be increased by division during spring or by cuttings taken during summer. There is a very long list of varieties, some of them having bronze or reddish foliage. During winter they must be kept on the dry side but never actually dust-dry.

There are many species of Begonia, some climbing, some shrubby, some with ornamental foliage which makes the family of far greater value than is generally supposed. Here is a list of the
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most useful in an average greenhouse, with the methods of propagation.


B. fuchsioides. Tall woody stems, with small leaves and drooping panicles of reddish blooms. Cool house. Of easy culture and worthy of greater popularity. Cuttings and division.

B. Froebellii. A good glistening crimson scarlet species, best grown from seed each year. A hybrid of value for summer blooming. Warm house. Best in 5-in. pots.


B. Lloydii. A tuberous variety easily grown and flowered from seed in four or five months. It has reddish flowers, semi-double and curiously shaped, the outside petals being very pointed. It is of pendulous habit and very decorative. The tubers can, of course, be kept from year to year.

B. maculata. Lovely foliage, spotted white above, crimson below, white flowers. Cuttings.

B. manicata. Thick stems, very large leaves of rich green. Pushes up flowering stems early in the season, these being about eighteen inches or two feet high carrying panicles of small rosy pink flowers by the hundred. Even after the flowers have passed, the seed pods are attractive. Cut up old stems into one-inch lengths, put these pieces into pure sand and stand in propagating pit. They will send up growths very quickly. This is an evergreen variety. More use in spring than in summer.


B. Rex. These well known foliage varieties are so diverse in colouring that it is impossible to describe them. The main colouring is silver with veining of green, purple or crimson. Seed or cuttings. Best growing in a medium temperature. This species is widely used as a house plant, being quite adaptable to room conditions.

Beloperone. — A lovely Mexican plant grown for its reddish-salmon bracts and is especially beautiful in early summer, though it is attractive well into the autumn. It likes a warm house but will grow in any moderately heated structure. It can be grown from seed, but is more generally propagated by taking cuttings.
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This plant prefers a loamy mixture, but it must be well drained and while liking plenty of water in summer, it must not be given too much in early spring and autumn. During winter it must be kept almost dry. The species usually grown is *B. guttata*.

**Boronia.**—Plants which come from Australia and are easily adaptable to the English greenhouse. They usually grow a foot or eighteen inches high in 5-in. pots and are covered with small drooping flowers, which are highly scented. Cuttings must be taken in late summer and rooted in a close frame or cloche. Use pure sand for striking. Pot on either late in the year or in early spring, pinching the shoots occasionally to make a bushy plant. All potting must be done firmly and the compost used must be well on the peaty side, half peat, half loam with some sand will do. An airy position and plenty of light is essential all the time.

**Campanula.**—A few members of this large family should always be included in greenhouse collections, though most of them are hardy or half-hardy. They are very easily cultivated and ask nothing more than ordinary cool house treatment and a rich loamy compost. Keep all soil on the heavy side, using four or five parts of loam to one part of leaf-mould and sand. During summer they must be given plenty of water as they are big drinkers.

*C. pyramidalis*, is known as the Chimney Campanula and is a biennial. It has long spikes usually five feet in length, of white or blue flowers, and is particularly useful in July. Sow seed in May and June, pricking the plants off immediately they can be handled and then potting on equally quickly to 5-in. pots. If one wishes they can be grown out doors and potted into large pots during spring. The finishing pot should not be less than the 8-in. size otherwise the plants will be starved before they bloom.

*C. isophylla*, which again gives blue and white flowers, is a drooping plant. Is an ideal front row plant and will bloom the whole summer if fed generously. Propagated from cuttings, taken in spring. The great enemies of this family are red-spider mites and thrips, but if the plants are syringed continually there should be little fear of these pests gaining the upper hand.

Some of the hardy varieties are worth potting up during winter and then if placed in a cool house will give a fine show, some weeks ahead of the outdoor plants.

**Canna.** (The Indian Shot Plant). The colourings found in Cannas are perhaps the most intensely brilliant of all greenhouse subjects, while the large leaves add to the decorative value of
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these lovely things. Some of the foliage is bronze or dark brown, and in other cases varying shades of green. The florists' Canna as we know it to-day is the result of much hybridization and this has given a long list of named sorts from which one has a great choice of colourings. The flowers are at their best in high summer and if they receive generous treatment will give a marvellous show.

During winter the plants must be left in the pot in which they bloomed the previous summer and kept almost dry in a temperature of not less than 40°. During February bring them into a warm growing house and thoroughly soak them. Within the next month several shoots will appear and it is then that the plants can be repotted, splitting them up so that two or three new shoots are allowed to each pot. When splitting, use a sharp knife. Pot into 6-in. pots using a rich loamy soil with enough sand in it to ensure perfect drainage. Grow in a temperature of 60°. Rooting takes place very rapidly. Pot on again into the 8-in. size when the roots are running round the pot. Make this compost very rich, five parts loam, one part peat-moss, one part decayed manure (cow manure is best) with plenty of sharp sand and half a pound of bone meal to every bushel of soil.

Keep plants growing in a warm moist atmosphere until flower spikes are up, then cool slightly and gradually until the plants are in bloom, when they need an airy cool house. Seed takes a long time to germinate, but if soaked for three or four days previous to sowing and then chipped with a knife it will accelerate things. It needs to be kept quite wet and in a hot house during the whole of the germinating period.

Cassia.—This plant is half hardy and will bloom outside during summer if given the protection of a greenhouse during winter and spring. At the same time it is an ideal subject for the summer greenhouse. The best and most useful species is C. corymbosa, which implies that its yellow flowers are borne in corymbs or clusters. These flowers are pea-like and exceptionally attractive and continue to bloom until late autumn. Can be grown as a climber. Other species C. australis, which is always bush shaped and C. occidentalis; both useful and both yellow. A good rich loam with one-third peat will suit them, with lots of spring and summer feeding.

Celosia.—The large showy plumes, mainly in red, yellow, cerise and crimson of C. plumosa, make these easily grown plants a general favourite. Their culture depends on one thing—an
uninterrupted growth from start to finish. As the plants are always grown from seed, it is best to wait until the outside weather is genial before sowing. If changes of temperature come while seedlings are still small there is every chance of them receiving a check from which they never recover. March is the best month to sow and in a temperature of 60°. Prick off and pot on with all possible speed. It is essential that immediately they are reasonably rooted in small pots, the next move must be given at once. More Celosias are spoilt by being pot-bound in the young stage than by anything else. From small pots transfer to the 5- or 6-in. size. For good plants the 7-in. pot is not too large. Use a mixture of four parts loam, two parts peat-moss and one part manure, with plenty of gritty sand. Pot firmly and stand in shade till rapid growth is being made. Make plants used to partial sun and keep a fairly moist atmosphere below them. Avoid dryness, but at the same time don’t over-water the plants or the stem will begin to rot near the soil. Stake as required. Feed with soot-water when pots are full of roots and if artificial manure is used it must be in weak doses. These plants will not stand heavy fumigations. There are dwarf, tall, and intermediate varieties.

*Celosia cristata* is the well known Cockscomb. Treatment is the same as for *C. plumosa* excepting that the 5-in. size pots are usually large enough. Good ‘combs’ depend on the early treatment being good and generous.

**Chironia.**—The plants are not generally grown but are very useful because they come into bloom during August when greenhouse flowers are not too plentiful. They belong to S. Africa and if grown from seed are best treated as biennials. Seed should be sown during early summer and the seedlings kept in a growing house until large enough for small pots. If it is possible to get them into 5-in. pots before winter, do so, but if not, do it in March. Use a compost three parts loam to one part peat-moss or leaf-mould. Pot firmly and put into a growing atmosphere, but after root action has started, cool off and give an airy sunny spot. The species that is most useful is *C. ixifera*, (*C. linoides*), which grows a foot high and forms a bush covered with pink circular flowers an inch across. Grow from seed or cuttings.

*Clerodendrum* or *Clerodendron.*—This plant is useful in large warm greenhouses but cannot be recommended for small structures because it takes up far too much room. There are three species worthy of attention. *C. Thomsoniana* is a climber with red flowers and white calyces. *C. fragrans* which is moderate in
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growth, has white flowers tinged with red. Both these are grown on year by year and given a repotting every two years. A rich open loam and peat is wanted for this. Cuttings may be rooted of half ripened wood if inserted in sand and given a temperature of 65°. The other species is C. fallax. Grown either from seed or cuttings. Seed should be sown in January to produce blooming plants the following autumn, or in August to give blooms in June. Temperature must be around 65° and not less than 60° in winter. Cuttings may be taken from cut back plants, when they break into new growth in spring. Those about three inches long are best. The plant grows about two feet high and produces a regal head of hundreds of orange-coloured flowers. It likes peat and very rich soil. Water every week during growth with a good liquid chemical manure, once root action is normally rapid. This plant needs plenty of room.

Clianthus.—These are climbers belonging to the pea family and there are two varieties worthy of culture. C. Dampieri, the Glory Pea of Australia, has flowers of bright scarlet with a purple or black spot, a most curious contrast. Grown from seed, it presents great difficulties even to the best growers, so it is better if it is grafted on young plants of Colutea arborescens. The latter must be sown a month before the Clianthus to give the stocks on which to place the grafts.

At the same time if English-grown seed is used and every care taken it is possible to get the Clianthus to bloom on its own roots. This entails sowing in February, in a temperature of 60° and growing the plants in that temperature without a check all the time. Sow in pure peat-moss and sand, using only a third part of turfy loam to the other two parts of peat in the later pottings.

Crinum.—These are bulbous plants and of value only in large structures, as they require big pots and take up a good deal of room. Easily grown in loam, which has some manure mixed with it. Three species are worth growing, C. longifolium, C. Moorei and C. Powellii. All are rose-pink but have white varieties. Give cool house treatment, and rest bulbs during winter.

Datura.—This is the plant known to many old gardeners as Brugmansia or Angels Trumpet. It makes a noble plant both from its habit and its foliage, while its large pendent white, red, pink, or yellow flowers are especially ornate. It belongs to the Solanum family and is on the tender side, so the resting plants must be kept in a temperature of 50° during winter, when it is wise to
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keep the soil on the dry side. Prune back in March and new growth will soon start and if well fed during May, June and July, buds will form and develop a great size.

Can be stood outdoors in summer, so long as the position is sheltered and ample water given.

Soil should be rough and made up of three parts loam, one of peat and half a part of decayed manure. Propagated from cuttings taken in spring.

The most popular species is *D. suaveolens* with its double white form *D. s. Knightii* and the red *D. sanguinea*.

**Diplacus.**—A very easily grown plant—bush-like in habit giving brownish-orange flowers through late spring and summer. Strike cuttings in spring. Pinch the plants after being potted on to make them bushy. Rest through the winter, cut old wood partially back and the new breaks will bloom continuously over a long period. Use loam and sand. Give cool house treatment. The old species *D. glutinosus* is now called *mimulus austriacus*.

**Erythrina (The Coral Plant).**—There is one species *E. Cristagalli*, which makes a most beautiful pot plant. It is herbaceous in habit, throws up new growth each summer to a height of four to six feet, and on these comes a wealth of coral-red pea-shaped blooms. It needs a large pot and rich loamy soil. It can be grown from cuttings or from seed. There is a dwarf species *E. herbacea* with racemes of red flowers and there are quite a number of others very useful as greenhouse plants but not easily available in this country.

**Francoa (Bridal Wreath).**—This one-time popular flower is still as beautiful as it ever was and should always be included in summer groups. It can be flowered from seed sown about June the previous year. It may be grown in cool airy frames during the first season, potting on after the turn of the year to 7-in. pots. Always keep cool, temperature 45° during winter, raising it during March to 55° if early blooms are wanted. There is one outstanding species—*F. ramosa*, which has white flowers clustered round a two-foot high wiry stem. Plants may be potted on after blooming to make large specimens the following year. Soil required is four parts loam, one part leaf-mould and sand. Add bone meal at the rate of half a pound to a bushel of compost.

**Fuchsia.**—This is one of the outstanding summer plants and is too well known to need any introduction. Besides the many florists’ varieties there are also types of equal beauty and value for the summer greenhouse, which should be better known. Culture
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is quite easy and as they grow in cool houses they may be termed everybody’s flower. Fuchsias can be grown from seed, but the usual method is to take cuttings of young shoots and grow plants from these. They will strike quite easily all through spring and summer if placed in sand and given close and moist conditions with moderate warmth. As soon as the shoots begin to elongate it is a sign that they have made some roots and are ready to be cooled off and, after that, potted on. Any moist cool temperature will suit the growing plant. Pinch the leading shoot to encourage a bushy specimen, and continue to pinch the main branches if the plant does not send out enough side shoots. Fuchsias only need shade from bright sunshine and it is a great mistake to keep them in permanent shade. Syringe twice a day when it is warm enough, giving plenty of water at all times except during the resting season.

Plenty of manure-water or fertilizer given in solution is needed during late spring and summer, for the Fuchsia—unlike most flowers—requires feeding while in full bloom. Plants can be grown on for many years, if given large pots and a rich compost, so long as they are rested during the winter in some frostproof shed or greenhouse. Only very infrequent waterings are then necessary to stop the soil from becoming dusty. When starting into growth during February, soak the soil in a tank or pail to make certain that every portion of the soil is wet again. While at rest all Fuchsias should be pruned, the best results being obtained by cutting out all thin wood, and leaving a couple of eyes on each shoot near the two-year-old wood. To obtain a well-shaped plant, prune with this object in view. Fuchsias can be trained up pillars, or grown as standards. Sometimes they are trained against walls in the shape of a fan. It is an adaptable plant and has recently recaptured public favour.

The soil must always be rich and well drained. To ensure this, add dried cow manure to the potting compost and give a generous feed of artificial manure if the former is not available. Use four parts loam, one part peat-moss and half a part sand. Pot firmly, but crock the pots well.

Besides the florists’ varieties which are listed in nursery catalogues, there are many species of value.

Of these I would call attention to the following, which all make good and rather fascinating plants for the greenhouse: F. F. boliviana, corymbiflora, fulgens, procumbens (trailing), triphylla and (for cold greenhouses) the many varieties of F. magellanica, especially Riccartonii, which are quite hardy.
**Gerbera (Barberton Daisy).—**This is a plant which many people fail to grow well, yet its culture is easy if understood. It is a greenhouse perennial hailing from S. Africa and as such, needs dry sunny conditions. Continued moisture will spoil it. It is best grown from seed sown in March. This must be new seed. Use a sowing mixture half peat half loam with a generous dash of sand and put the seed boxes in a temperature of 50-55°. When seedlings are seen, put near the light and as soon as large enough, prick out, but shade from bright sun for a week afterwards. Pot on into a sandy loam, keep near the light and give plenty of air. Frames are ideal growing quarters during summer. During winter, reduce the water supply and only give enough to keep soil from becoming dust-dry. Keep plants at least ten degrees above freezing point in very cold weather. At all times beware of overwatering and remember they are great sun lovers.

**Gloxinia.—**One of the loveliest of all greenhouse subjects, these choice plants, with their multi-coloured blooms and rich velvety leaves, are always welcome during summer. They need a warm moist house, shade from bright sunshine and a light, well-drained peaty soil. They can be grown from seed and, with good treatment, will bloom within six months of sowing. The young plants form corm-like tubers, which must be kept in a temperature of not less than 50° during winter. These start into growth as soon as they are given a slightly higher and moister temperature. The second year plants are covered with rich blooms during the summer.

Seed must be sown on a very fine surface and nothing is better for this than peat-moss, loam and sand in equal proportions. Temperature must be 65-70° and seedlings appear in ten to fourteen days. Early prickling out is essential to avoid damping off. If possible, do this first prickling out when the plants have developed their first two leaves. This involves the use of a thin split stick. Lever out the plants and transfer them to an equally peaty soil with the aid of another pointed stick held in the other hand. Keep in the same temperature and then, as the seedlings grow, prick them out once more, two inches apart. When large enough, transfer to small pots and ultimately to the 5-inch size.

As a great deal depends on soil, I suggest a mixture which I have used for years. One part fibrous loam, one part leaf-mould and one part peat with enough sharp sand to keep the drainage perfect. During the whole of the growing period give moist
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conditions and shade from all bright sunshine, syringing between the pots twice a day rather than over the foliage.

When the season of blooming is over and the leaves show signs of withering, reduce the amount of water until, as all the foliage disappears, the soil becomes quite dry. If possible, store the pots under a warm staging till the turn of the year.

During January or February take the tubers out of the soil and place them close together in good leaf-mould or peat-moss in shallow boxes. Place in a warm house (65°) and within a week or two new roots and tiny leaves will form. Move on, first to 3-in. pots, then to the 6-in. size, as tubers need more root room than the first-year seedlings. This final potting may be enriched by adding one eighth part of decayed manure to the whole, but I would not advise the use of artificial fertilizer at this stage. Later on, when the final pots are full of roots, weekly doses of some general plant food may be given with safety.

Although few enemies attack Gloxinias, the task of keeping them free of aphis, red-spider mites and thrips, means a periodical fumigation and what is even more essential during the growing season, the plants must be given a perpetually moist atmosphere. During summer, Gloxinias may be grown in unheated houses. This means closing such houses early in the afternoon so as to capture the last of the sunshine and so ensure a warm house. It is useless to start the tubers into growth until April, when the weather is warm enough to keep the new leaves growing without a check. Gloxinias are not difficult, but they do need reasonable attention.

Hedychium.—This is the Ginger plant and gives a spike of bloom, reminding one of the Canna, though the flowers are not so brilliant. They are easy to grow and like a good loamy soil. A warm house suits them rather than a cool one. They need much the same treatment as Cannas and, like them, are increased by division during the spring. They grow four or five feet high and for that reason are useless in small houses.

The two best-known species are H. Gardnerianum, which is yellow and H. coronarium, white. These plants have a very delicious perfume which perhaps may be counted as one of their greatest attractions. The foliage too is extremely handsome.

Heliotrope.—The well known 'Cherry Pie' will always be a favourite greenhouse plant owing, first of all, to its lovely scent and then because of its long season of blooming. The best method of culture is to grow it from cuttings struck during summer and
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keep the resulting plants warm enough throughout the winter to ensure slow growth. If they are wintered in small pots, one has the choice of taking one big bunch of bloom from the terminal by removing the side shoots or, alternately, pinching out the tip and allowing the side shoots to bloom. Pot on in spring when growth shows signs of being swift, putting them from small pots to the 5-in. size. During winter, reduce the water supply and keep the plants in a temperature of not less than 45°. As the wood is soft and pliable while young, it is possible to train Heliotropes into almost any shape, but for ordinary pot culture, nothing is more useful than a symmetrical bush, with all thin growth cut away. The fewer the shoots the better the flower heads. Soil must be rich and on the loamy side. Feed continuously when in full growth, with soot and manure water. Old plants need pruning during winter and this must be done severely enough to limit the number of new growths. These old plants must of course be repotted each spring and given a very rich compost. New stock should be struck each year. Only the best named varieties should be used though this plant can be raised quite easily from seed.

Hovea.—This plant used to be in great favour years ago but has now gone out of general cultivation. All the same its pretty leguminous flowers are worthy of cultivation. Grown from seed, sown in peat-moss and raised in a warm house during April, the plants grow and root rapidly, if given a very open soil, mainly on the peaty side. This involves a couple of pottings before the autumn. Water with great care at all times but especially during the autumn and winter, when only just enough water must be given to keep the soil from becoming dry.

When growth shows signs of beginning in March, give rather more water and a slightly moister atmosphere. Plants can be kept in shape by pinching truant shoots. The two best known species are \textit{H. Celsii} and \textit{H. pungens}. Both are blue.

Humea.—Known as the Incense Plant and Amaranth Feathers. The former name is derived from the smell of its leaves, which have an odour reminiscent of incense, while the latter is an apt description of the feather-like habit of its flower plumes. Actually the flowers are small but there are myriads of them borne on branches hanging gracefully from a central stalk being smothered with blooms. The main upright stem may be as much as six feet high if well grown.

This must be treated as a biennial. Sow seed in April, May or June. Use a sandy peaty mixture and keep the seeds near the
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surface. Many people find a difficulty in germinating the seed, and though it may often be erratic in its behaviour, I suspect that the chief trouble is that the seed becomes temporarily dry after it has been sown. Avoid this trouble by daily inspection of the soil and keep the temperature at about 55–60°. Pot on seedlings as soon as they can be handled, being especially careful not to bury them a fraction lower than they were previously. This applies to all subsequent pottings. Humeas are cool house plants and must never be grown in a moist heat. The final pots are usually the 8-in. size and the great point to remember is that the soil must be lumpy so that it is well drained. The slightest sourness in the soil will lead to a premature end. Never overwater, especially during winter. Soil should consist of two parts lumpy loam and one part broken peat with coarse sand and a little bone meal added. These plants may cause an irritation to some skins and it is best for such people to avoid them, as the results can be very annoying. Actually, however, most people can handle them with safety. The species used is *H. elegans*.

**Hydrangea.**—The most popular type for pots is *H. macrophylla*, which gives the upright spreading head of bloom, while the other useful species for summer greenhouse decoration is *H. paniculata*, whose pointed bunches of flowers, creamy white and perfectly shaped, should be used much more extensively.

Culture of the two varieties is distinct. *H. macrophylla* begins its life as a cutting taken during May, June or July from plants in growth. The cuttings must be about three inches long, fairly stocky and taken from the lower part of the plant. Thin cuttings are of no use. Use a mixture of half loam, half sand or a third peat-moss, a third loam and a third sand. Best method is to put one cutting into a small pot, but if this is not convenient, use boxes. They strike easily, but need a moist frame with a little artificial heat running below it. If a propagating frame is placed on a greenhouse staging, this will usually answer admirably, if shade from bright sun is given. Give air immediately rooting begins. Such cuttings may be potted on into 3-in. pots in a mixture well on the loamy side with about one third of peat-moss and sand added. Once rooted into this, stand in frames and give plenty of water and air. The earliest struck cutting may be pinched to give bushy plants for the next year, but late struck ones, if not pinched, will give an extraordinarily good head of bloom on the terminal point when potted on to the 5-in. size. Early cuttings which have been pinched should be
potted on to the 6-in. size as soon as the roots are seen running around the sides of the smaller pot. Use a very rich compost for all such potting. During winter keep them in frost-proof frames giving only very little water.

The fact that all the leaves fall off need not worry the grower as this is the normal habit, but when cuttings are kept in a warm house they will, quite frequently, retain their foliage.

In early spring, say February, the plants can be soaked and in a temperature of 50–55° will soon break into growth and must be kept watered and sprayed from then on.

The easiest way to 'blue' the pink varieties is to use one of the Hydrangea 'Colourants' or 'Blueing Powders' sold at seed shops, or add aluminium sulphate at the rate of 1½ lb. to each half-hundredweight of compost. White varieties do not 'blue' and the best reds should also be grown naturally.

*H. paniculata* is a hard-wooded plant which flowers on the extremities of growth made during the same year. Its success depends entirely on having the previous year's wood pruned hard back each spring, to within two eyes of the base of each growth. Only thick robust shoots must be retained and these will bloom during August if kept perfectly cool. Forcing is not recommended. A rich turfy loam with plenty of rotted manure and some bone meal is the potting mixture. Best purchased as plants, which will last several years.

**Impatiens.**—This is the greenhouse type of the balsam and is one of the easiest pot plants to grow. At the same time it is one of the most floriferous, seeing that it blooms from spring till late autumn. Grown from seed sown in spring or from cuttings taken any time they are available, the Impatiens rapidly becomes bushy. A certain amount of pinching is necessary, but they break so quickly and symmetrically that it is easy to control their shape.

Best temperature is 50–55°; soil, an open rich loam, but do not give too much shade.

The flowers are flattish, single and rather fleshy. Some of them remind one of the Orchid, Miltonia. The best species are *I. holstii*, bright vermilion; *I. Sultanii*, carmine; and the hybrids. These are all half hardy and can easily spoil in too warm a temperature.

This makes a lovely window-plant.

**Lantana.**—Most of the Lantanas are half-hardy and for that reason they may be used in cool houses to provide a good standby for summer. They are hard-wooded and may be kept for many
Zonal Pelargoniums, commonly known as Geraniums, are one of the most popular and easily-grown greenhouse subjects. The variety above is Queen of Italy, and that on the right, Mary Boorman.
The scented-leaved Pelargoniums should be far more widely grown, especially as they all vary in their perfume. Above, *P. capitatum*. Below, left, Lady Plymouth. Right, *P. crispum variegatum*.
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years, if the soil is rich enough, or if periodical top-dressings are given. There are many colours and combinations of colours, the blooms reminding one of the Verbena.

Their culture is fairly easy after the initial steps are taken. They may be grown from seed raised in a high temperature, say about 70°-75°, as a great deal depends on the quick germination. Allow plants to grow to about half an inch high, then put them into small pots, keeping them still warm (65°) till rooting freely. After that they will grow happily in 60°. Pot on and pinch as required. During winter rest the plants but keep them in a dry temperature of 45° till February, when they can be slightly forced into bloom if one wishes. Perhaps the better method is to keep them cool and allow them to break into growth as and when they wish.

Cuttings root very easily during spring, if placed in a warm propagating pit, subsequent treatment following that of seedlings. Soil must be a rich loam with bone meal, or hoof and horn manure added at the rate of two ounces to every bushel of compost. Use a sharp grit to keep this soil open and crock the pots rather well, as drainage is important.

Leschenaultia.—There is one species _L. biloba major_ which may be considered as amongst the loveliest of blue greenhouse flowers and this should be grown rather than the red and orange varieties. Leschenaultias need a dry atmosphere and a particularly open soil. They may be all right for weeks and then suddenly die, if damp gets at them, so this must be guarded against.

Grow them from cuttings, which are best taken in late spring or early summer and rooted in pure sand or peat-moss in a close propagating frame.

Marguerite.—An easily grown plant with daisy-like flowers, very popular once, but now considered of secondary value owing to the room it takes up and the amount of watering it requires.

Cuttings should be taken from old plants and struck during August and September in cool frames. They root quickly and easily and if potted up, pinched and grown in a temperature of 50° during early spring, will make quite good plants in summer. May be kept for two years, but after that should be destroyed, new stock each year filling the gap. A rather heavy loamy mixture with bone meal added suits them. During the growing season they need a tremendous amount of moisture at the roots and weekly feeds of a good soluble manure. Leaf-miner has a disfiguring effect on the foliage and will sometimes spoil the whole plant.
Frequent syringeings with insecticide and occasional fumigation are essential if plants are to be kept clean.

**Metrosideros (The Bottle Brush Shrub).**—So named because its red flowers radiate from all parts of the flower stem, the chief species is *M. floribunda*. I use the old name as it is still popular, but the botanists now class it as *Callistemon lanceolatus*.

It is a shrub belonging to the Myrtle family and therefore only requires a cool house to grow in. Cuttings root in sand under a bell glass in a normal temperature and can then be grown on into shapely shrubs by pinching. In the later stages very little is required but periodical pottings and annual top dressing. Any good loamy compost suits them. May stand outside during summer after their blooming season is over.

**Myrtle.**—Grown mainly for sentimental reasons and its scent. At the same time it makes a decorative subject in a cool house and for that reason is included here.

Propagated from ripened cuttings put in during the autumn into sand. The following year plants grow slowly and need pinching once or twice to make them bushy. A loamy soil with just a little sand and manure will suit them. Plenty of syringing is needed during spring and early summer to keep the foliage clean. Old plants can be pruned in spring, top dressed or potted on as required.

**Nerium (The Oleander).**—These are shrubby plants, quite decorative apart from their blooms and of fairly easy culture. They bloom in early summer and after that may be stood outside until the approach of frost, when they can be wintered in a temperature of 40° or thereabouts. They are propagated from cuttings, taken from the tips of the growths and rooted in pure sand which must, at all costs, be kept quite wet during the whole of the rooting period. Pot the cuttings when rooted into a general potting compost, first into 4-in. pots and later into larger sizes. Keep well syringed during the growing season but avoid heavy shade, which tends to weaken new shoots and so make them useless. Oleanders would be far more useful in greenhouses if they were pinched or pruned with the object of keeping the plants short and bushy. There are four or five colours and all have a perfume.

**Pelargonium (Zonal).**—This plant is too well known to need any description, as it is the Geranium. In the original text of this work I stated that this plant had sunk into partial retirement but expressed a hope that one day it would be recognized as one of
our best greenhouse plants. I am glad to state that it has now returned and is assuming its old popularity. It has so much to commend it, is easy to grow, not too exacting, has few enemies, and with good cultivation can be showy at all seasons.

For pot work, cuttings should be taken from plants which have made some firm short-jointed wood near the base of the plant. Root these in loam, peat-moss and sand. Such a mixture stops the cuttings from weakening as they root. Strike in a cool house or frame and endeavour to get the cuttings potted off into 3-in. pots as quickly as possible after roots have formed. Use a mixture of four parts loam, one part peat-moss with just a little sand. When rooting well into the soil, pinch the tip of the plant to encourage branching. Keep these plants growing slowly through the winter in a temperature of about 50°. In spring they can be potted on to the 5- or 6-in. size and given every bit of light and warm air possible. Greenhouse shelves are the best places for Zonals. Feeding must never be done until the pots are full of roots, otherwise too much foliage will form.

During summer, keep dying blooms picked off and the plants will go on for months. Grow them on the second year, but in this case, partially rest the plants through the winter by keeping them nearly dry and then repot or top-dress them in the spring. If given only just as much moisture as they can use, together with plenty of light and air, their culture calls for no special knowledge. There is an infinity of varieties in almost all colours. These should be looked up in a specialist catalogue.

Neither must the Scented-Leaved Pelargoniums be left out. They are mostly variegated in foliage and have a mixture of perfumes among the several varieties. They must be treated in the same way as the Zonals. A light periodical fumigation will keep down aphides—which in some cases attack these sorts. These species may be grown on for years and form an interesting group for the collector.

Petunia.—Well worth consideration because of their brilliant colourings and continuity of flowering as a pot-grown subject.

Single varieties, of which there are many in all colours, may be grown from seed, sowing in February, March or April.

Double varieties may also be grown from seed, but are usually propagated from cuttings taken either during autumn or in spring. Easy to cultivate, they are very adaptable, being useful as bushy plants, the result of pinching when young; or as basket plants by being allowed to ramble as they wish. Soil must be an open
Rehmannia.—An easily grown perennial, but best treated as a biennial. Seed should be sown in May and this gives the plants a chance to become well rooted and make strong crowns by the autumn. They are nearly hardy so only cool house treatment must be given. By potting the young plants on into 6-in. pots during the autumn and keeping them in a temperature of 45° during winter they are ready to be started into growth in March. If given a warmer house they will at once respond to such conditions and begin to throw up their flowering stems. Should only one stem appear, cut this out so that flowering side shoots may be encouraged. These will all bloom together and thus make a more imposing plant. The flowers remind one of the Foxglove though the tube is more pointed and the lip much wider. There is one good species *R. angulata*, rose-pink in colour. Culture is very easy, depending mainly upon the attention given during the first summer. Soil must be on the loamy side with a little mortar rubble added. Four ounces of bone meal to every bushel of soil is a great help in the last potting. Green and white fly will attack them and both must be stopped while in the young stage, by fumigation or by occasional spraying.

Rochea (*Crassula coccinea* or *Kalosanthes*).—A succulent leaved plant which is very useful on account of the length of time its blooms remain in good condition. The flowers are carried on the tips of growth made. They are tubular, bunched together with sharply angled petals and of vivid red colouring.

Take cuttings from the non-flowering tips of plants. These should be two or three inches long and are best taken when the plant is dry and therefore not so full of sap. Take off enough leaves to allow the cutting to be placed firmly in the rooting medium.

Half sand and half loam will do to strike these cuttings in. A cool greenhouse is the best place for striking, for unlike most things these cuttings do not need moisture in the atmosphere while rooting. Use 2-in. pots and put four cuttings in each. After rooting has begun, move the whole (intact) to a larger size, say the 4- or 4½-in. size. A good open soil is essential. Three parts loam and the other part made up of mortar rubble, sand, with a little bone meal will do. Give plenty of water during summer but keep almost dry in winter. Temperature in winter 45°. Single plants can be grown into large specimens by systematic pinching during spring when growth is free.
PLANTS THAT BLOOM IN THE SUMMER

Sunshine is essential at all times, especially after flowering, to ensure that new growths are well ripened.

Saintpaulia ionantha.—South African Violet. A plant for the warm house belonging to the same family as the Gloxinia and needing identical treatment. The flower is flat and open like the violet but is much more fleshy, the golden yellow stamens in the centre of the bloom adding much to its attractiveness. It can be grown from seed sown in very warm conditions, during the early part of the year and treated as suggested, like the Gloxinia. The best examples, however, come from leaf cuttings. These are leaves taken off with about an inch of stem, this, and a quarter of an inch of the leaf being put into pans of silver sand and the pans then put into a very warm propagating pit. Roots soon form and at the bottom of the leaf young growth appears. In due course these new plants must be potted off or placed in pans of good peaty soil. If pans are used several plants can be grown in each and the effect is a cushion of dark velvety foliage covered with deep violet coloured blooms. In winter the temperature must not be lower than 50°. There are many varieties of this species.

Statice.—A large genus which offers a number of good species for the greenhouse. Most of them are of easy culture and all require a loamy soil, cool conditions and plenty of water during their growing season. Most of them can be grown from seed, though the most beautiful of all, S. profusa, can only be propagated from cuttings. Such cuttings must be taken from old plants which have been started into growth during February and March and must be rooted around the side of small pots filled with half sand and half peat-moss. A warm propagating pit is essential. Even when rooted, the plants must still be kept in a warm house till they are established in their first small pots. After that stage is reached, gradually harden the plants to cooler conditions. During late summer the plants should be ready for the 6- or 7-in. size, the soil consisting of three parts loam, one part peat, one part rotted manure with plenty of sharp sand. Great care must be taken at all times when watering, as an overdose is more than likely to kill them.

Another species, much easier to grow, is S. puberula. It is very much like S. profusa in shape though not quite so large. Seed is available and it germinates with the greatest ease. It is a perennial and may therefore be grown from year to year by taking cuttings, although seed raising is the simpler method. The plants should be grown in 5-in. pots the first year, carried through the
winter in a cool house and then placed in 7-in. pots to give another show the second summer. From a January sowing the plants will bloom in the following August.

Some of the annual Statices make very good pot plants, the outstanding variety being *S. Suworowii*, or as it is sometimes called, *S. candelabrum*. Its tall flower spikes covered with tiny flowers look like pink candles and a well-grown potful is a most decorative subject. Any of the annual sorts will make equally useful plants if sown in March and grown under cool conditions all the season. It is best to grow three plants in a 5-in. pot.

The correct name of this genus is *Limonium*, but I use the more popular one.

**Streptocarpus.**—Though this plant belongs to the same family as the Gloxinia, it is of far greater use to the man who only has a cool greenhouse. A misconception seems to prevail as to what heat the Streptocarpus really wants. Actually a temperature of 50° during winter and 55–60° in summer will suit it well. Streptocarpus seed is one of the smallest in the world and for that reason it must be handled with the greatest care. Sow either in January or July. The former sowing gives blooms during the autumn, while the latter will give fine blooming plants all through the following summer.

Sow in pots rather than in boxes, making the surface of the soil very fine and very level. Moisten this soil before sowing the seed. Place in a temperature of 65°, keeping the seed dark till germination takes place. Though the seed is so small, it germinates very easily, therefore thin sowing is necessary. Prick off the seedlings as soon as they can be handled, with a small forked stick, putting them into another fine and very peaty mixture and still keeping them in warm conditions. They will grow rapidly once they have reached this stage and in about three weeks will be ready for their second prickling off, this time needing a similar but coarser soil. Space out so that they are two inches apart, being extra careful to ensure that the tiny heart of the plant is not buried. If it is, it will damp and die. At this stage the temperature should be in the region of 60°. Shade and moisture are both necessary. The next shift must be into 3-in. pots, again using a peaty soil without any artificial manure being added. At this stage the plants need a moist atmosphere but as they root they must be given some fresh air if the weather allows. As the January-sown plants will by that time be growing very freely, the next potting will be needed in about five weeks, but the July-
sown plant will remain in the small pots right through the winter. In both cases the final potting soil will be the same. Three parts loam, one part peat and one part sand will suit them, with an eighth part of decayed manure added if the loam is on the poor side. As a general rule Streptocarpus do not want a very rich soil.

Grow in a temperature of 55° and avoid very bright sunshine. Winter the plants in any cool house where the temperature never goes below 45°, but in such a low temperature the soil must be kept rather dry, especially during frosty weather. Their great enemies are aphides, which must be kept down by fumigation or by spraying. Mealy bug sometimes attacks them but if this happens, I suggest throwing the plants away. Streptocarpus plants can always be kept for two years, but are never worth keeping longer. They can also be split up, but seedlings make better plants.

Sparmannia.—An evergreen shrub useful during early summer because it is very free-flowering at that time. Strike cuttings taken from the half-ripened shoots, which root easily in a warm frame. It grows in any open loamy soil and a little peat is quite helpful. The only species worthy of note is S. africana, which is single white, and its double form. Only requires a cool house but makes a good subject for rooms.

Torenia.—A delightful greenhouse annual which needs sowing in March in about 60°. Prick out and keep in warm and moist conditions till large enough for small pots. Pot on into any peaty mixture and still give warm air. After potting into their final pots, which should be the 5- or 6-in. size, they can be slowly cooled off to a 55° night temperature. Grows about nine inches high or may be allowed to drop over the sides of the pots. Also a good basket plant. Flowers are somewhat tube-shaped with prominent lower lips and partly recurving upper petals. Hundreds of flowers are out at the same time.

Best species: T. Fournieri, blue with yellow throat; T. Ballionii, yellow.

Trachelium.—Though this is really a hardy plant I include it here because it is such a beautiful flower if pot grown. It makes a splendid display during July if sown the previous summer. Sow in pans or pots of very fine soil as the seed is very small. It germinates very easily in a cold frame. The after culture is simple, prickling out being followed by potting into small pots as soon as possible and, if they will allow it, on into the 5-in. size before the winter. Place in 7-in. pots during spring, using a mixture of
five parts loam and one part decayed manure with only just enough sand to keep the compost open. Pot firmly and grow all the time in cool conditions. Pinch out the leading shoot to make the plants bushy and feed heavily all the summer till blooming begins. These plants need tremendous supplies of water in summer, therefore, to overcome any difficulty about this stand them in saucers of water. The flowers are small and of a mauve-blue, but a head of bloom with thousands of flowers looks like a blue cloud. The best species is a *T. caeruleum*. 
CHAPTER VI

PLANTS THAT BLOOM IN THE AUTUMN AND WINTER

THE autumn is as important as, if not more important than, summer time in the greenhouse, yet it is during autumn that many gardeners fail to keep their houses really gay. They rely to a large extent on the Chrysanthemum which is, of course, the most prominent of all autumn subjects, but in doing this they miss the beauty that might be theirs, were the choice of plants more extensive. As I have written a chapter on Chrysanthemums I am not dealing with them here, but I am giving a list of plants which are equally important and fascinating.

**Begonia (Gloire de Lorraine).**—This is one of the popular autumn flowers, for when it is well grown and in full bloom, all one can see is a pyramid of colour, the flowers actually being thick enough to cover up every bit of foliage except just at the base. This Begonia can only be grown from cuttings. These are taken from the previous season's plants which have been cut half-way down after flowering and kept in a warm house or pit. Such cuttings are usually at their best in April. Three inches or thereabouts in length, they must be cut immediately below a joint and have the lower leaves stripped from the stem. Root in half sand, half peat-moss and plunge the pots into some material like coconut fibre or peat in a warm propagating pit. This should have a bottom heat of 70°.

When rooted, the cuttings must be transferred to small pots of very light soil. *Half* good loam, *half* peat-moss and plenty of sand will do. Once root action begins, reduce temperature to 60° but as so much depends on giving the plants a really good start, it is wise to be certain root action is in full swing before dropping the heat. After a time, when the young plants are growing rapidly, pinch out the tip to encourage a bushy habit and shade from bright sunshine. Atmospheric moisture is essential if clean but firm leaves are to develop. The subsequent pottings will be into any pot up to the 7-in. size, choosing the larger and earliest struck plants for large pots. The compost in which these Begonias grow must be right or nothing worth while will result. Three parts turfy loam (broken up about the size of a walnut) one part peat-
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moss, (or one part flaky leaf-mould), one part decayed manure and half part sand, will give ideal results. Water liberally once roots have filled the pots, if the weather is warm, but towards the end of the hot weather, water with the greatest care.

A certain amount of staking and tying is needed, and if this is done thoroughly, an ordinary plant may be made to appear twice its size.

Until blooming begins, shade and atmospheric moisture are necessary and daily syringeings underneath the leaves will help to keep down the Begonia mite, which is a great enemy. Once rooted through, feed with soot water and liquid manure. After flowering is over, cut the plants half-way down and allow the soil to become almost dry for a month. This rests the plants, so that when they are watered normally in February or March, they soon show activity and begin producing cuttings.

There are a number of old varieties, such as Mrs. Peterson, carmine-pink; Turnford Hall, white; but there are also many improved sorts grown to-day which have made this hybrid even more useful, Solbakken, Marienne and Marjorie Gibbs being notable.

Other Begonias for autumn and winter blooming include the semi-tuberous varieties which, though rather difficult to cultivate in cool greenhouses, are easy to grow in warm houses. Cuttings are usually later in appearing but if struck and grown as Gloire de Lorraine varieties they will give an even more brilliant show. They must never have an overdose of water and it is imperative the mixture be very light and open. The best of these varieties are Exquisite, Optima, Elatior and Mrs. John Heal. There are many others, all of value to the clever cultivator, who has the necessary warmth.

Bouvardia.—A beautiful greenhouse shrub which blooms from September to January. Being a cool house subject, it is a pity it is not more popular. Young shoots which can be taken as cuttings, appear in April. Must be rooted in a warm pit. Grows in a light loamy soil which must be well drained and on the rich side. There are several named varieties in white, scarlet, rose, one of the best being the double white, Alfred Neuner.

Browallia.—An easily grown autumn blooming plant. Only one species is really worth while, B. speciosa major. Its flowers are a rich blue and these will practically cover the whole plant during September and October. They are about an inch across and rather flat, so its decorative value may be imagined.
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Sow seed in March in any growing house and immediately it has germinated give enough light (but not bright sunshine) to keep plants sturdy. Prick out into an open loamy mixture and keep the atmosphere on the moist side. At this stage these plants will sometimes stagnate, but will suddenly be seen to grow again. Next, pot off three around the side of a 3-in. pot. The idea of this is to ultimately get a better potful. From this size put into 5- or 6-in. pots and grow them in ordinary greenhouse conditions with daily syringleings when weather allows. Soil should be three parts loam, one part peat-moss with some sand and decayed manure added. As the plants grow, some attention must be paid to feeding, otherwise the foliage will turn yellow prematurely and spoil their appearance. Soot water should be given twice a week and, just when the buds are beginning to swell, a weekly dose of a concentrated fertilizer will keep the plants in good form. Growing three plants in a pot impoverishes the soil rather quickly of course, hence the importance of feeding. There is a white form of this which may appeal to some people. Thin stakes are needed to support the plants as they reach maturity. The other annual species B. viscosa and B. americana also make splendid pot plants if sown in March and June.

Coleus.—While the majority of the Coleus species are grown for their ornamental foliage, one or two notable sorts are grown for their winter flowers. Two of these are important. The first is C. thyroideus. It has bright blue flowers borne on a strong flower-spike and anything from ten to twenty spikes may be grown on one plant. Grown from seed or cuttings, usually the latter. Take these cuttings from rested plants during April, May or June. They do not require great heat in which to strike but they must be given close conditions. Once rooted, grow in rich loam and peat, first in 3-in. pots, then in 5-in. and ultimately in 7-in. One of the secrets in the culture of this plant is to give plenty of food, so add four ounces of hoof and horn manure to each bushel of compost at each potting. Cool conditions are all it requires during summer, but as autumn approaches it must be given a warm greenhouse and some atmospheric moisture. It blooms from November onwards.

The lovely C. Frederici is a much more decorative variety than the former, but does not bloom over so long a period. It is very easy to grow from seed and in fact, does so, much more readily than from cuttings.

Sow in April and give ordinary warm house treatment until
the plants are in their final pots. Then reduce night temperatures to about 55° but in November, when the first buds are seen, take the most forward plants into a warmer house, but not over 60°. Here they will develop long spikes of bloom, the stalks carrying the flowers, branching away on either side of the main stem, so giving a particularly graceful plume-like appearance. The flowers are gentian-blue and very beautiful. Pinch the plants if certain growths appear to be running away at the expense of others. As *C. Frederici* blooms from the axil of every leaf, it will be gathered that a plant in full bloom during December is a very lovely thing. Feed continually, especially as buds develop.

**Cyclamen.**—Though I deal with this plant amongst the spring subjects, it is also easy to have a very fine display throughout the autumn from plants sown in the July or August of the previous year. The cultivation follows the same pattern I suggested previously.

**Eupatorium.**—These include a few greenhouse herbaceous perennials which are worthy of cultivation because they bloom during autumn and give a great number of flowers. They are usually increased by spring-struck cuttings and these will root easily in any close frame. They do not want anything in the way of artificial heat once they are rooted and can be grown quite happily in a cold frame through the summer. In fact, unless they are grown slowly the stems become so soft that they make the plant useless. From time to time during summer the plants need pinching to ensure a bushy habit. Generous pot room is needed and 7- or 8-in. pots are not too large. Soil must be a rich loamy mixture and all potting must be done firmly. Plenty of soot and manure water must be given as the plants grow and the slightest yellowing of the foliage must be taken as an indication that the food in the soil is being used up. When this occurs feeding must be liberal and frequent. By pinching in late summer, plants may be made to bloom right through the winter. Best species are, *E. riparium* (white); *E. ligustrinum* (white); *E. odoratum* (white or blue); *E. atrorubens* (red or purple).

**Euphorbia.**—There are two important species of this plant, both being of very great value in the warm greenhouse and both being at their best during December.

The first is *E. pulcherrima*, better known as the Poinsettia. This is grown for its brilliant scarlet bracts, eight or ten inches across, which are at their best during Christmas time. It is grown from cuttings taken in April. To obtain these in good condition
the old plants must be cut down to within six inches of the base, after the bracts have faded. Such plants must be kept in a temperature of about 55° and very little water given them till March. During that month, water the soil well and if possible, give the plants a warmer temperature, say 65°. This will encourage them to throw shoots which will make cuttings. Cuttings must be taken off with a slight piece of the stem adhering to them (this is called a 'heel') and inserted at once in pots of half sand half peat-moss. Placed in a sharp heat of 70° and in a close pit they will root fairly rapidly and the new growth at the tip is an indication of roots being formed. Pot on into small pots using a mixture of half loam, half peat-moss with a liberal addition of sand. Still keep warm and grow close to the glass as any tendency towards 'drawing' may spoil the plant. Immediately roots have filled the small pots, move on to the 5-in. size. Use a rich mixture three parts loam one part leaf-mould or peat-moss and one part decayed manure, with plenty of sand and a generous dose of bone meal. Pot firmly and keep growing in a night temperature of 60°, but after rooting has taken place this can be dropped slightly if the plants look healthy. Anyway, they must be kept close to the glass. Put back into a warm house during October and feed with manure and soot water once a week.

Once the bracts have developed, cool the plants to 55° in which temperature they will last in full beauty for weeks. Much depends on the plants never becoming dry or being starved.

The other important Euphorbia is *E. fulgens*. It has long slender shoots, with narrow foliage and bracts of intense orange-scarlet growing in clusters from the axil of the leaves. These make splendid subjects for cutting purposes. Needs similar treatment to *E. pulcherrima*.

**Exacum.**—A very useful and much neglected plant, whose prettiness and great quantity of bloom should make it far more popular than it is. It has small blue flowers with orange yellow stamens, a flower is produced at the axil of every leaf. The foliage being small and the habit of the plant very branching, the developed specimen is nine or twelve inches high and perhaps as far through. At the peak period of blooming it will be a mass of blue. The scent is particularly pleasant being exactly like that of Lily of the Valley.

Sow in February, March and April, temperature about 60–65°. Use a very sandy and peaty soil. Prick off as soon as large enough and still keep warm. When potted into first small pots, cool to
60° and after the final potting to 5- or 6-in. pots, a night tempera-
ture of 55° will do. A small proportion of peat or peat-moss must
be added to all potting soil and the final compost should contain
some well decayed manure. Feed the plants as they grow with
soot water and fertilizer and grow them in a fairly moist atmo-
sphere until blooming begins.

There are two species grown, *E. affine*, which is small-flowered
and very easy and *E. macranthum*, which is best treated as a
greenhouse biennial, keeping it in a warm house through the
winter. This has larger blue flowers than the former but it does
require more heat.

**Jacobinia.**—This genus is still known and grown under its old
name *Justicia* and is a very useful plant during early autumn,
requiring only cool house treatment all its life. May also be used
as a climber, but in small greenhouses is more serviceable as a
bush. Take cuttings from old plants during March and April,
root them in a propagating pit and then pot off into small pots,
cooling off the cuttings as soon as roots are formed. Any good
loamy compost suits them, but when they are placed in 7- or 8-in.
pots this compost must be enriched with fertilizer or decayed
manure. Frequent pinching of the shoots will induce bushiness,
and flowers will be produced during September and October.
The best species are *J. carnea*, which as its name implies, is
fleshy pink, *J. coccinea*, crimson and *J. pauciflora*, scarlet and
yellow.

**Moschosma.**—A very handy subject for late autumn and
winter blooming. Cuttings are taken from old plants which have
been cut down and rested—then started into growth in a warm
house about March. Cuttings root easily in any propagating pit
and must be potted off at once into small pots of ordinary soil.
When ready, and before the plants can be in any way starved,
move on into 6- or 7-in. pots. Use a rich mixture keeping it well
on the loamy side, but adding something lasting in the way of
manure, say bone meal or horn and hoof. Grow in airy conditions
and feed copiously when in full growth.

This plant loves sunshine and air during summer and will grow
happily enough in frames.

There is only one species, *M. riparium*, whose flowers are ivory
white, and last for a considerable time.

**Pyenostachys Dawei.**—A plant hailing from Uganda and worthy
of cultivation for its spikes of blue flowers.

Raised from seed, which germinates easily in a temperature
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of 65° the seedlings grow rapidly and can be cooled off while in their small pots. A mixture of three parts loam one part leaf-mould or peat-moss will suit them well but in the last potting, which should be to 7- or 8-in. pots, an eighth part of rotted manure should be given. Grow near the light and keep the atmosphere rather on the dry side during the misty days of autumn.

It will become very weak if too far away from the light. It hates fog, so slight warmth is essential.

Salvia.—Amongst the Salvias there are species which give long and brilliant shows in the autumn and they are all of very easy culture. Usually grown from cuttings struck in March or April, the resulting plants are happy enough in a cold frame all the summer. They must on no account be starved or they will fail. They all like a loamy soil, not so rich as to encourage rank growth but with just enough slow-acting manure in it to keep them growing steadily. Bone meal or horn and hoof is ideal as a food and should be given at the mixing of the final compost. At all times, water is needed in quantity and soot water twice a week is a great help. Most of the Salvias need 6- or 7-in. pots in which to finish. Pinch shoots to induce a bushy plant.

Species.—S. splendens and its varieties, being mainly vivid scarlet in colour, are the most popular. S. Pitcheri is one of the loveliest of blue flowers and particularly pleasing as a pot plant. It has long spikes of small light-blue flowers and will do very well in a 6-in. pot. S. rutilans, the Pineapple Salvia, so called because its foliage smells of Pineapple, has long thin tubular red flowers in November and light-green foliage. S. Bethellii is a rose-pink and quite useful. All require much the same treatment. S. patens is a deep blue with a larger flower and is tuberous, so can be stored dry in winter, repotted in March to bloom in June and July or potted later for autumn flowering.

Zonal Pelargoniurns.—(For autumn and winter). One of the most popular of all autumn and winter blooming subjects in years gone by, but after a period of neglect by greenhouse owners is returning to favour. This is all to the good, because few other plants go on giving such a wealth of long lasting bloom as these. Something in the way of special treatment is required to fit them for autumn flower production. Actually the best time to strike cuttings is late the previous autumn or in the spring. Having the cutting in a small pot, well-rooted by April, gives one a chance to build up a shapely well-branched plant all through the summer.
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The soil must be practically all loam with just enough sand and leaf-mould to keep the loam from binding. A little bone meal may be added, but rich nitrogenous manures must not be given. Pinch the plant while in the small pot and then pot on into the 6-in. size. The ideal place for such plants all through the summer is on a greenhouse shelf in full light. This induces short-jointed, strong growth. As buds appear, rub them out, but allow those forming after early September to grow as they wish. Always keep near the light and in an airy spot. Zonals hate dampness in the air, but otherwise are not fussy. To avoid starvation feed occasionally with soot water. A little well balanced artificial food will help if given only infrequently and in weak doses. There are many varieties specially grown for winter flowering and these will be found in any good greenhouse catalogue, and these deserve much more attention.

The temperature at night during winter and autumn should be about 45–50°.
Streptocarpus should be a summer subject in every greenhouse, seeing that its flowering season and its colouring both suggest its use amongst other plants.

The African Violet, *Saintpaulia ionantha*, has many hybrids and is quite easy to grow in a slightly warm house.
A winter greenhouse display in which Cyclamen and *Begonia Gloire de Lorraine* figure prominently.
CHAPTER VII

GREENHOUSE CLIMBERS

No greenhouse is ever complete unless it possesses some of the many climbing subjects which lend themselves to general decorative purposes.

Many climbers can be planted out permanently and then will go on for many years with nothing more than an annual top-dressing of rich soil. Such plants are of particular value in a lean-to house where a back wall has to be covered and they are also of great value in tall houses with supporting posts around which such climbers can be trained. Actually, climbers can be divided into two groups—those which are planted permanently in beds and those which are grown in pots, more or less as temporary subjects which can be moved at will.

In any case all climbers need a rich soil and plentiful supplies of water and food. Otherwise the result is starvation which becomes very evident, first of all in the foliage and then in the immaturity of the blooms.

**Bougainvillea.**—A glorious climber, covered in summer with brightly coloured bracts, these being generally in pendulous bunches of rich mauve. Good for planting out and needs hard pruning every winter as the plants age. If grown in pots and trained around wire balloons is most effective, but everything depends on keeping the soil well supplied with food. Rest during winter and keep the night temperature above 45° during this period. The soil should be almost dry all the resting period, but begin normal watering in late February or early March.

The best sorts; *B. glabra Sanderiana*, *Mrs. Butt* and *Russell's Orange*. Spray daily in the growing season.

**Cestrum.**—Known also as Habrothamnus. An easily grown evergreen climber for a house that does not fall below 45° in winter. Best planted out but will do in pots if these are large enough to prevent starvation. Established plants need hard pruning in spring to encourage new shoots which will give blooms all the summer. Propagated by cuttings taken during July or August. *C. aurantiacum* (orange-yellow); *C. purpureum*, reddish-purple, and *C. Newellii*, a variety of *C. fasciculatum* make the
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best show. Spring cuttings will strike in a temperature of 65-70°. Feed generously in spring and summer.

**Cissus.**—A climbing plant with brilliant foliage. Best grown in a large pot so as to be under control. Soil, peaty but with loam and sand. A night temperature of 50° is needed to do this plant justice. Ideal for training up the iron work in greenhouses. The best species for such a house are *C. antarctica* and *C. rhombifolia*. *C. discolor* needs a slightly higher temperature, but it is the best of the species.

**Clematis.**—The variety *C. indivisa* is a very useful climber and only needs a cool house to do it justice. Best planted out in rich well-drained soil and given plenty of water during the growing season. Propagated by grafting. *C. Armandii*, an evergreen, is ideal for a cool house.

**Clerodendrum.**—Several species are useful for training along wires, over trellis work, against a wall or over wire balloons. They bloom in summer and are not much trouble to cultivate. During winter they must be partially rested, preferably in the warm end of a greenhouse. Where they can be planted out, make sure the spot will be reasonably warm in winter. Soil should be lumpy peat and loam with a good dash of broken crocks or sand. Add dried cow manure and a little bone meal if possible.

The most beautiful species is *C. Thomsonia*—better known perhaps as *C. Balfouri*, which in summer is covered with what looks like red and white flowers, but only the red is the flower, the white parts being the calyx. *C. splendens* is another good sort with crimson flowers. *C. fragrans* is white, and though it can be trained, it is not by any means a robust climber. All these can be propagated by cuttings.

**Cobaea scandens.**—One of the swiftest growing of all climbers, and if sown in March will cover many yards of wall or trellis during summer. Raise seed in a temperature of 60° and cool plants off immediately they are put into their first pots. Must only be grown in an airy cool house. The green and white leaved *C. s. variegata* should be chosen. It has deep mauve, bell-shaped flowers, something like a large Canterbury Bell.

**Hoya (The Wax Flower).**—True enough, the little bunches of flowers look for all the world like wax. A very easy climber to cultivate. Purchase young plants and grow them on, not over-potting them the first year. A soil of half loam and half peat with something in the way of food added will see them growing freely. A cool house suits them admirably and they are safe even if down
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to 40° in winter provided they are quite dry at the roots. It is best, however, to keep the temperature at 45° if possible. The plants need plenty of light at all times. Best species is *H. carnosa*, blush-white, but it has a sister, whose foliage is variegated. *H. bella* is purple and white, and both are well worth attention.  

**Ipomoea** (The Morning Glory).—Easily grown from seed sown during March. It usually germinates very freely and when the plants begin to climb they must be put into pots large enough to carry them right through the season. A good plan is to sow three seeds in a 2-in. pot and pot the three young plants into an 8- or 9-in. pot of rich loamy soil. Water will be required twice a day in summer and if the plants are to be kept free of thrips and red-spider mite they must be syringed at least once a day, sometimes with a little insecticide in the water. One of the most beautiful of all greenhouse climbers. The best variety is *I. rubro-cerulea*, Heavenly Blue, with silky Cambridge blue flowers. *I. Learii* is a deep blue and is a perennial.  

**Jasminum**.—There are three of the Jasmines useful in greenhouses. One is *J. officinale grandiflorum*, which blooms through summer and the second is *J. primulinum*, now called *J. Mesnyi*, which blooms during the winter. The former is white, the latter being a rich yellow. The beautiful Chinese Jasmine *J. polyanthum* is a white-flowered, sweetly scented species of easy culture, blooming in February and should be grown in every frost-proof greenhouse. A beautiful plant!  

They do well in pots or planted out. Soil needed is an open well-drained loam, enriched with old manure and a little bone meal. Keep the plants very clean and to achieve this, give a weak syringing of insecticide every fortnight during the growing season. Propagated from ripened wood inserted as cuttings.  

**Lapageria**.—A climber which is nearly hardy and therefore of great value in cool houses. It has thick fleshy leaves, a cord-like stem, and the flowers are waxy and bell-shaped. There is only one species *L. rosea* but its white counterpart, *L. r. alba*, should be used as well as the pink form.  

Lapagerias should be grown in very porous soil either planted out or in large pots. A mixture of rough loam, rough peat, with plenty of broken brick mixed with it, is ideal. Some old cow manure and bone meal is useful. Syringing is essential, especially during the spring and summer and a keen watch must be kept for aphides, mealy-bug and scale insects.  

**Passiflora**.—These rapid climbers are usually very easy to grow
but do best if planted out, rather than in pots, though some restriction of roots will often cause the plants to give more flowers. They need a great deal of water when growing and may suffer if ample water is not given. Best in large houses where plants can be allowed to become established. Some cutting back is required in spring, and weak and thin shoots must be removed.

The best sorts are the varieties of *P. caerulea*, (blue), like Constance Elliott, white, and *grandiflora*; *P. racemosa*, red, purple and white; *P. Watsoniana*, white and purple and *P. coccinea*, red.

One of the best of all greenhouse climbers, known for so long as *Tacsania Van Volxemii*, with its vivid scarlet flowers, is now included in this genus as *P. antioquiensis*. All do well in cool but frost-proof houses.

**Plumbago.**—A very useful climber, especially for a permanent position. The older it becomes the better displays it will give if hard pruning is practised every winter. It needs cutting back to the hard wood each year when well established. Young plants are obtained from cuttings and these readily respond to any training. Don’t allow the plants to make thin growths which cannot be ripened the first year. Better a short stem, well ripened, than a long thin sappy one. Give a good rich soil and if making a permanent bed, make it at least two foot six deep and fill up the bottom with smashed bricks. Over this put a mixture of six parts loam, one part broken peat and one part decayed manure, with enough sand to keep the mixture open.

Few enemies attack the Plumbago, but while the growth is young, greenfly may be a nuisance. Failing fumigation (which must be in weak doses) dust or spray with an insecticide containing B.H.C. or nicotine.

Two good sorts are all that is wanted, the Cambridge blue *P. capensis* and its white neighbour *P.c. alba*.

Rest all Plumbagos during the winter and keep the temperature about 40–45°. Give plenty of air during summer.

**Roses.**—As climbing subjects roses are useful in cool houses, but they cannot be considered as really decorative because of the time they are out of bloom, and the subsequent work entailed in keeping the plants clean. For beauty of flowers no Rose has superseded the two old favourites Marechal Neil and Niphe toes when well grown on a greenhouse roof. To do these well they must be planted in a bed of pure loam with bone meal added as a manure. The loam should be made very firm. The house must be a cool
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one and each year the growths should be taken off the training wires, some old growth cut out and the younger shoots retied.

Solanum.—Many species of this family make excellent climbers and none are very fastidious as to soil so long as it is well drained. Here again the majority are best planted out rather than kept in pots. One of the showiest is S. Wendlandii, which gives large bunches of blue flowers all the summer. These bunches, as they hang suspended from the plant, are a brilliant sight. Rather coarse in growth it therefore requires planting in a firmly made bed of loam with just a little peat-moss or leaf-mould added. Needs much of the growth cut out each year. Another excellent plant for a cool house is S. jasminoides. Particularly useful on upright pillars, as its Jasmine-like flowers hang in white bunches all over the plant and are most effective in summer and autumn. The Aubergine is a Solanum and may be included here, its name being S. Melongena, but it is usually grown for its fruit and not for decoration. Moreover, it wants a warm, moist atmosphere.

Stephanotis.—A climber for the warm house where the average night temperature is around 60° or higher. Its leaves are fleshy, firm and shining so that even when not in bloom this plant is beautiful. It sends out bunches of small white tubular flowers of exquisite sweetness and these last in full beauty for a very long time. It is easy to grow if kept clean, but soon spoils when mealy-bug or scale insects (its two great enemies) are allowed to infest it. Half loam, quarter each peat and decayed manure with some sand is the correct compost. Propagated from cuttings struck in heat.

Streptosolen.—An attractive climber for any cool house. It has orange-scarlet flowers produced in bunches and these are so numerous during summer that it should always be grown. Makes quite a good specimen whether in a pot or planted out, provided the soil is rich. Any reasonably rich compost will suit it. Grown from cuttings taken during summer and rooted in sand. This plant will also make a pot subject if pinched several times, but is undoubtedly best when permanently trained. There is only one species, S. Jamesonii, this being (to my mind) the finest of all greenhouse climbers.

Thunbergia.—These grow from seed and are quite simple in their demands. The most suitable type is T. alata and its hybrids. In these are all sorts of orange, buff, salmon and coral colours, nearly all having a dark black zone around the throat. Ideal for training over sticks placed around the edge of a pot. During the summer the sticks are soon covered and when in full bloom
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des these plants are very brilliant. Must be kept syringed to prevent thrips spoiling the foliage. Loamy soil and plenty of water in summer time, are all they ask.

Trachelospermum.—This is an easily-grown climber that will last for years, if planted out, and given annual top-dressing and pruning. It has cymes of white waxy-looking flowers and is summer-flowering. Can be trained just as one wishes. Slight cutting back each year is all that is needed. The best species is *T. jasminoides*. This genus was known for many years under the name of Rhyncospermum.
CHAPTER VIII

FOLIAGE PLANTS FOR THE GREENHOUSE
AND INDOOR DECORATION

FOR THE GREENHOUSE

MANY of our loveliest greenhouse plants are those grown for the beauty of their foliage. Some flowering plants look hard if not softened by the addition of foliage plants and in this chapter I give a list of easily grown things which are useful in this respect. The great mass of greenery is supplied by ferns, which I am dealing with in another chapter. Some of the families mentioned are warm house subjects and care should be taken to note this, when contemplating the purchase of any of them.

Acalypha.—Varied in form of leaf and colour, all grow well in a mixture of peat and loam. A. Godseffiana is propagated from cuttings and has a firm ovate leaf speckled with an olive green. A. marginata rosea is described by its name and A. musaica has large palmate leaves of brownish red, with patches of maroon. Both are varieties of A. Wilkesiana. Warm house.


Araucaria (The Norfolk Island Pine).—The only form suitable for greenhouse work is A. excelsa and its sub-varieties, which will last for years if carefully watered during summer. It is struck by inserting the extreme tips of branches as cuttings, which root easily in a moderately moist pit or under a bell glass. Grow on, in loamy compost, giving ample moisture during the growing season and frequent syringeings whenever weather is warm. Keep near the light. Cool house.

Asparagus.—This well-known subject is often referred to as a fern, which it is not. The fact that the asparagus blooms (though its flowers are inconspicuous) and gives seed, removes it from the fern tribe which bears 'spores' not seeds. All Asparagus species require an open loamy soil perfectly drained. A little crushed
brick in the compost is helpful. *A. plumosus* and *A. p. nanus* are the two very fine-leaved ones and should be given warm quarters during their growing season which begins early in spring and lasts to about August. Will grow quite passably in cooler conditions if kept in the cool all the time. *A. Sprengeri* is a coarser-leaved variety, useful for its lasting qualities. Grow in heavier soil than the former and give plenty of manure water during summer to prevent the foliage becoming yellow. Another excellent species for the amateur is *A. scandens deflexus*, which has a smaller leaf but will climb if one wishes. Cool house. All these are raised from seed.

**Bamboo.**—Any of the fine-foliaged sorts are worth growing in moist houses. Care must be taken to keep them within bounds and they should therefore be grown in pots. Use a soil made up of practically all loam and rotted manure, watering very frequently during summer. Plenty of syringeing is needed to keep down red spider. The most useful are the dwarf growing types. Cool house. Propagated by division and cuttings.

**Caladium.**—Large soft leaves of every conceivable colour, veined and spotted, netted and marbled in many shades, these are amongst the most brilliant of all foliage plants. Grown from tubers, started in a temperature of 65° during March, then potted on into a very rich peaty mixture. As plants develop, they must be potted on before roots are too numerous, to prevent starvation. Moist, shady, warm conditions essential. Needs the same treatment as Gloxinia. Long lists of named varieties will be found in nursery catalogues. A small-leaved variety covered with white spots is *C. argyrites*, (*C. Humboldtii*), very dwarf growing and useful in front of stagings. Warm house.

**Citrus.**—The Orange and Lemon make delightful plants once they have attained any size, for they give flowers, fruit and shining foliage. The plants are evergreen and because of that are very useful as decorative subjects. Sown early in the year in a warm pit they have the advantage of summer weather just when they want it. Grow in loamy soil, potting on as roots require more room. Slight pinching in the first year or two may be needed to create a bushy plant. Best species are, *C. taitensis*, the Otaheite Orange, *C. nobilis* (Tangerine) and *C. medica* (the Sweet Lime). Cool conditions after germination. Must be kept scrupulously clean by sponging and syringeing periodically with insecticide.

**Coleus.**—Bushy, soft-wooded plants with nettle-like foliage of all colours. Easily propagated by cuttings taken while shoots are
still young. If a good rich soil is given them the plants will, in summer, grow several feet high. For most greenhouses the smaller sized plants are the more useful. These should be finished in 6-in. pots, a useful size, giving reasonably compact plants.

A little peat and rotted manure added to the soil helps growth, without making it rank. Coleus can also be grown from seed, sown in a warm temperature during spring. When the seedlings are seen, pick out the green ones and throw them away, growing only those which give some promise of colour. Named sorts must be purchased as plants, because these will not come true from seed. When the plants are growing they like shade and moisture, but when nearing maturity will need less of both to bring out the colour of foliage. Grow in a warm house during their young life and in a cooler house later on.

**Dizygotheca.** The plants mentioned here were for years listed under the genus *Aralia*, but are now included in this one. They are rather beautiful foliage plants and of value for their lightness of foliage and their colourful tones. Grow in loam and peat with charcoal or crushed brick to keep the compost open. The following are all warm house plants. *D. elegantissima*, leaves spreading finger-like from leaf stalk, *D. Veitchii* and *D. V. gracillima* are all worth growing. Must be grafted on to a common Aralia stock.

**Cordyline.**—This group of plants is still thought of as Dracaena, but it contains many varieties of the species *C. indivisa* which make charming pot plants. The best are *Backii* (red), *Doucettii*, (variegated) and *Russelliana*, a delightful bright red. These are all of easy culture but will not tolerate anything in the nature of neglect. Good open soil, mainly turfy loam with plenty of drainage is required, and heaps of water during summer. Cool house treatment.

**Dracaena.**—The warm house Dracænas are all highly coloured and many are extremely beautiful. Their beauty depends on careful culture embracing well-drained soil, moist atmosphere and cleanliness. A list of these will be found in greenhouse catalogues, some of the best being *Victoria*, *Bruantii variegata* and The Queen. These are propagated by ‘toes’ taken from the roots and also by cuttings rooted in sharp heat.

**Eucalyptus.**—A much neglected decorative plant, seeing that it grows easily and quickly from seed. This is best sown during spring in a warm house. Plants several feet high can be grown during the first year. Well-drained loam, rather on the heavy side with a little bone meal added, suits them well. Being almost
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hardy, the plants must not be subjected to much artificial heat when growing as it will cause weak stems. Best species, *E. cordata*, *E. globulus*, *E. Gunnii* and *E. citriodora*. Cool house.

**Eulalia.**—(See Ornamental Grasses).

**Eurya.**—A shrub with hard variegated leaves which cover the whole plant and remain in first-class condition for an exceptionally long time. Rooted by means of cuttings of ripened wood struck in cool condition under cloches. The compost for growing plants should contain about a third of peat with just enough sand to drain it. Only variety worth growing is *E. latifolia variegata*. Cool conditions, with plenty of water in summer and many syringeings.

**Fatzia.**—Once known as *Aralia Sieboldii*, this greenhouse pot plant with its large palmately cut leaves of shining green which make it worthy of cultivation as it is so near hardy. Its correct name is *F. japonica*; is easy to grow and revels in a really rich loam and abundant watering.

**Ficus (India Rubber Plant).**—An easy plant to grow and worth while from a decorative angle. *F. elastica* has very large leaves six to nine inches long and four or five inches wide. These are very thick and glossy and therefore very showy. There are several handsome varieties of this species and a specially popular species is *F. lyrata*. Grow in turfy loam broken up roughly, with a little bone meal and some well-rotted manure to give something in the way of food. They like warm conditions when in full growth, but if carefully cooled are very useful in any cold house, where frost is excluded.

**Ftttonia.**—For a warm house, few plants are so lovely as the best coloured Fittonias, whose leaf markings and veins are so diverse in tone. The most popular species are *F. argyroneura*, green and white; *F. Verschaffeltii* and its varieties. Propagated by cuttings taken each year. Plants must have a very well-drained soil and shade from bright sunshine.

**Grevillea.**—The variety *G. robusta* is the best of the group. It has green ornamental foliage, rather like some of the Asplenium ferns and is really a shrub or small tree. Raised from seeds, which are sometimes a very long time germinating. Sow in a temperature of 60–65° in a sandy loam, which must be kept very moist all the time. Pot off when an inch high into a gritty loam. As they root, cool off to 50°, a temperature which suits them admirably. Cool house.

**Juniperus barbadensis.**—A half-hardy juniper with fine feathery
and slightly pendulous foliage, making a very graceful plant as it develops. Propagated from growing tips. Rooted under cloches during summer, the resulting plants requiring cool conditions, rather moist during spring, but drier in autumn and winter. They may be kept for years if good loamy soil is used in the first place and liquid feeding, especially soot-water, given during their growing season. Cool house. (More commonly known as J. bermudiana.)

Maranta.—These are plants with leaves of very mixed markings, curious greens and purples, many of them being speckled, margined and marbled with white and other colours. Loam and peat will suit them, but they will only do their best in warm moist conditions. Worthy of far more attention in warm houses.

Ophiopogon.—This plant is grown for its strap-like foliage which is dark green with white or yellow stripes running from bottom to top of leaf. Requires a light leafy soil and is best when given moderate heat in spring and summer; cool down after growth has been made. Propagated by division in spring. Best variety O. Jaburan variegatus. Moderate warmth.

Ornamental Grasses.—To this group belong several species of decorative value in any greenhouse or conservatory. I could give quite a long list, but will confine myself to those of the greatest use to the amateur. The most important grass is probably Miscanthus sinensis with leaves up to thirty inches long and about an inch wide, having a white marking all through the centre. It has several varieties including the Zebra Grass which has yellow markings. It is very easy to grow in loam soil and asks for little more than ample water and occasional feeding. It is still commonly called Eulalia.

Next to these I would place Carex japonica variegata, a much finer grass in the blade than the Eulalias. It is a cool house subject and will remain in good condition for many months. It is increased by division.

Two easily grown and very decorative Cyperus should be in every greenhouse collection. The first is C. alternifolius the 'Umbrella Plant', so named because its stalks have green grassy growths radiating from their terminal point. It is a splendid variety for all decorative work. The other variety is C. natalensis which has stiff shiny blades about nine inches long. Very hard and therefore very useful. Both are grown from seed, sown in spring, the plantlets being pricked out in groups and potted on when ready. Cool house treatment all the time.
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_Festuca glauca_ is a small drooping silvery grass, usually grown in small pots for placing along the edges of stagings. The other grass extensively used for this is _Isolepis gracilis_, which is a deep green and rather more free in growth than the Festuca. All grasses need a loamy and sandy soil. Most of them are easy to grow from seed or they can be increased by division. Plenty of water during spring and summer is essential.

**Palms.**—This is a very large and interesting family. It is impossible to deal with many species but the list which follows contains those of popular esteem and which can be grown by anyone having a warm greenhouse. It must be emphasized that though many palms will survive for long periods in cool conditions they do need something in the way of moisture and warmth during their growing season. As a general rule it does not pay to try and raise seed. Young plants can always be purchased and this saves a year or two of waiting. Palms must never be overpotted and they must be allowed to fill their pots with plenty of roots before being placed into the next sized pot. Soil should comprise turfy loam with plenty of fibre in it, some crushed brick, old manure and sand. Great care must be taken to avoid the leaves becoming yellow. This happens if the atmosphere is too dry or if the roots drink up all the nourishment in the soil and no more is given.

A fortnightly feed of any good fertilizer will help, especially during spring and summer. Plenty of syringing during warm weather and a moderate amount at all times will do much towards keeping the fronds green. The leaves should be sponged periodically, not only to keep them glossy, but to prevent scale insects attaching themselves to the plants. Old and diseased palms should be discarded, for they are seldom worth bothering about, once they are really old.

The most useful groups are:

*Areca lutescens*, the best of a group with stems all growing in a little tuft, more like a bamboo. Its yellow stems make this particularly beautiful amongst other foliage.

*Cocos Weddelliana*, notable for its narrow leaves and its beauty in very small pots. Needs a warm house. Other species are _C. flexuosa_ and _C. plumosa_ and both useful.

*Geonoma gracilis*, a warm house palm quite beautiful if well grown and _G. elegans_ makes a charming companion.

*Kentia*, the most popular group of all, because it gives two of the best palms for ordinary use, and these do quite satisfactorily
in cool houses. *K. Belmoreana* and *K. Forsteriana* are the names of these. The botanists now place these under the genus *Howea*.

*Phanix dactylifera* is the Date Palm and a good species in a large house, being at its best only when quite large.

*P. Roebeleanii* is by far the most useful of this group, its arching fronds and small leaves making it the most graceful of all palms for general greenhouse work. It makes a fine plant in a 6-in. pot and will grow in this size for years.

*P. rupicola* is similar but more upright in habit.

*Rhapis flabelliformis*, (*R. excelsa*), grows like the Bamboo, its upright stem carrying a wealth of small palmate leaves which seem to keep good under the most adverse conditions.

**Panicum.**—A plant allied to the grasses, with multi-coloured leaves, generally used to make an edging for stagings. Very easy to propagate and grow. Cuttings, made from the ends of the shoots, should be inserted in a sandy mixture during spring and rooted in warm moist conditions. If these are struck around the edge of a small pot putting four cuttings in each, the whole can be potted on into the next size—3- or 4-in. pots are big enough for this—without disturbing the roots, and a fine potful is soon at its best. Use a light soil and feed every fortnight. Warm conditions while growing—cool afterwards, and it can also be grown from seed. Familiarly known as *Panicum variegatum*, but botanically is *Oplismenus hirtellus*.

**Pilea muscosa** (The Artillery Plant).—Grown for its foliage which is fernlike and very decorative. Exudes a fine white dust when brushed with the hand. Easily grown in cool houses. Increased by cuttings from the tips of growing shoots. Useful amongst flowering plants instead of ferns.

**Rivina** (The Rouge Plant, or Blood Berry).—A plant having clusters of tiny berries the size of red currants during autumn. Grown only for its decorative value. Sow seed in March, prick off and pot on as required, using a very good loamy soil. A cool greenhouse suits it well. It is a great asset to any greenhouse if well grown. Needs similar culture to the tomato.

**Saxifraga sarmentosa.**—An ornamental form with trailing stems of very easy culture. The most beautiful form is *S.s. tricolor*, but this is not quite so easy and needs very careful handling and watering. Best grown in suspended baskets. Soil must be a sandy loam and during the growing period March/July requires plenty of water, but after that, only just sufficient for its needs must be given. In winter, keep almost dry and in a temperature of 50°
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or thereabouts. Propagated by means of the tiny plantlets which appear on the trailing stems.

**Selaginella.**—These are the Club Mosses and extremely valuable in warm moist houses and in cool ones after the growing period is over. They need a peaty soil and plenty of moist heat during spring. Increased by division, which should take place yearly. There are many species but the best and most useful one is *S. uncinata*, which has long bluish green sprays and is a particularly easy grower.

**Tradescantia.**—Almost like a larger edition of the Panicum, its trailing habit and colouring being similar. The leaves, however, are more fleshy. The more heat given during the growing season, the better the plants, but it can be grown quite satisfactorily in cool houses. Loamy soil and perfect drainage are wanted. Increased from cuttings. Now known botanically as *Zebrina tricolor*. Cuttings should be struck during April and May to procure really good plants.

DECORATIVE INDOOR PLANTS

Though in recent years there has been an awakened interest in foliage plants grown specifically for the decoration of rooms, it should not be imagined that these plants are new or of recent introduction. As a matter of fact many, if not the majority, were well known and very widely grown in greenhouse collections during the early part of this century and certainly up to the 1914–18 war, when the difficulty of keeping glass-houses warm saw the interest die and, with nothing of a revival between the wars, they gradually faded from memory as well as from the greenhouse.

Such plants had, however, been popular for many years in Scandinavia, Holland, Germany and other continental countries, for the decoration of rooms, and between 1947 and the present time there has been a very marked interest shown in using the same type of plant again for room decoration.

The majority of such plants are grown commercially and sent to markets, distributed to florists and ultimately to the housewife. The fact remains that they are all greenhouse subjects, which need only average skill to produce, but more important still, require varying degrees of warmth and (most of them at any rate) a humid atmosphere.

Some of these plants have already been dealt with so I will
confine myself to those which, besides being very useful for growing as decorative greenhouse subjects, are at the present time accepted by many people as being of special value as house plants.

First of all a few notes on how to look after such plants under the somewhat exacting conditions found in most rooms. The one big snag is the dry atmosphere and one must do something about conditioning the new plant—straight from the warmth and humidity of the greenhouse—to its new surroundings. A daily spraying in the kitchen-sink or bath will help, as well as keeping the plants out of direct draughts and away from sunny windows in summer (or draughty ones in winter) yet avoiding darkness or stuffy conditions. Above all, great care should be exercised in watering, giving just enough to keep the soil moist. Too much water will, as I have already explained in previous chapters, turn the soil sour, and then it is good-bye to the roots and soon afterwards, to the plant itself.

The art of watering does not differ in the case of house plants from that of those grown in the greenhouse, and most certainly no one can lay down any rule but one to use as a guide. The rule is to fill the pot up to the brim once the soil is dry and then leave it until the soil begins to dry out again. Driblets of water are useless.

Next, one must remember that in the case of foliage plants there is a tendency for the leaves to collect a layer of dust, which will block up the breathing pores by which a plant lives. Systematic spraying will, to some extent, prevent much dust settling, but in the case of smooth-leaved plants it does pay to sponge them now and again to prevent this clogging of the pores. It also makes for cleanliness so far as pest and disease are concerned.

After newly-bought plants have become acclimatized to room conditions it will be found that they will do well in lower temperatures and with less moisture than they had been given in the nursery, but even so, it would be unwise to risk them to extremes of either.

For the man or woman who owns a greenhouse, the ideal procedure is to try and work up a collection of such plants, so that every fortnight or three weeks, those which are in the rooms can be transferred to the greenhouse for a similar period, thus ringing the changes and so, by nursing the plants and reviving them, the time of their usefulness can be increased, perhaps by years.

As to potting, it should follow the principles already laid down for pot plants in general, and in the majority of cases this re-
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potting must be done in spring or early summer. It would be very unwise to re-pot or disturb the roots of any pot-plant in autumn or winter—unless one had special facilities of heat and a genial atmosphere.

As to propagation, the majority are struck from cuttings, though some divide quite easily and a few can be raised from seed. Others are increased by removing a ring of bark near the tips of shoots, binding the wound with an inch thick wrapping of wet moss and then covering with polythene film and tying this top and bottom to prevent air drying out the moss. Generally speaking, all propagation is best done in the warm frame, and here again the greenhouse owner scores.

House plants are then, nothing more nor less than greenhouse subjects which, with a little care, can be well grown and then made used to room conditions; while if one is to make the most of them, they must be given a holiday in the greenhouse every now and then in more natural conditions that will ensure their good health over a very long period. This will also keep the plant up to a degree of perfection which will ensure its progeny being worthy of propagation.

In giving a list of house plants I purposely omit those which (though often offered for sale as room plants) are difficult or short lived, and rather pernickety. Some have already been mentioned and their cultural requirements given.

Asparagus.—The well known A. Sprengeri and A. scandens deflexus are the most adaptable, with A. plumosa and its dwarf form nana as second best.

Araucaria.—The one useful species is A. excelsa which makes an excellent room plant.

Begonia Rex.—All the hardier variants of this species can be used in rooms, provided the plants are well hardened and made to stand dry conditions before being placed indoors.

Cissus.—These are climbers and must be given something to cling on to or trained up fine trellis. The most suitable species is C. antarctica, though the smaller-leaved A. striata is a useful and long-suffering species. C. discolor is not happy in a room and I do not advise its use outside a greenhouse. Others such as C. rhombifolia are sold under the name of Rhoicissus.

Chlorophytum.—The long, green and white striped leaves of C. elatum variegatum, give one a plant of special value, simply because it is so long-suffering. Give it some food and plenty of
One of the most popular of the house plants, *Rhoicissus rhomboidea*, very easy to grow.

A bowl of house plants in which *Beloperone guttata*, *Pilea Cadierei* and *Ficus pumila* figure prominently.
This species of the India Rubber Plant, *Ficus decora*, is probably the best of them all because of the brilliance of its leaves.

A useful house plant because it will grow almost anywhere is *Chlorophytum elatum variegatum*. This will grow in any room or greenhouse.
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water and it will reward you well. It does not mind a dry air but should be given a spray now and then. Use rich loamy soil.

Cyperus.—These will grow well in rooms also, but they want more water than most things. See previous notes on the genus.

Dieffenbachia.—The variegated leaves and the rather stately bearing of a well-grown plant make it useful and ornamental in any light and draught-proof room. The best species is D. picta.

Draëcena or Cordyline.—Perhaps the former name is still more widely used and many good house plants are sold as Dracëna instead of the more correct Cordyline. So long as the plants are hard before they leave the glasshouse they do well, but should be given a change every few weeks in the moist air of the greenhouse.

Eurya.—I have already mentioned this plant and I recommend it here, because it is so long-lasting, even in a hot dry room.

Fatshedera.—A cross between Fatsia and Hedera (Ivy) has given a particularly useful species in F. Lizei, with large ivy-like leaves which do not seem to mind room conditions at all. There is a variegated form. It is a cool-house subject and very adaptable. I suggest that more people should grow this.

Ficus.—To the species already mentioned I would add F. decorata, F. benjamina and the variegated-leaved sorts of F. elastica. It is important to keep these leaves specially clean. Remember too, that they like a heavier soil than most things.

Fittonia.—This has for a long time been considered a warm-house plant and I still think its full glory and beauty can only be achieved in such conditions. Once having reached its full development, it is then possible to harden it off and by careful watering and keeping it out of draughts, it will retain this beauty for a long time. The only useful one is F. Verschaffeltii argyronoma, with oval leaves, veined with red.

Grevillea.—An excellent room plant so long as it never becomes dry, and gets a spraying now and then.

Hedera.—This is the Ivy and furnishes the house-plant grower with many fine species, all easily grown, but must never be allowed to get dry at the roots, while a daily spraying in summer helps considerably. In fact a few months outside during the warm period will do them good.

The best species are H. canariensis variegata, H. Helix and its many varieties, especially Chicago.

Maranta.—All the varieties of M. leuconeura can be used, but they must first be brought to perfection in a warm, moist house
and certainly should be returned to the warmer and moister conditions of a greenhouse from time to time.

**Monstera.**—The most generally grown species is *M. deliciosa*, an old-time favourite, so often used by the gardener who had to keep a conservatory looking good. These are plants with large leaves which are often perforated or split, and have the good habit of putting up with a great deal. Actually it is a climber but makes a good plant in any room. I would, however, suggest that it spends its spring in the greenhouse if possible and is repotted and well-fed during that period. Its aerial roots suggest its liking for atmospheric moisture.

**Peperomia.**—There are one or two species which, with care, can be made to do a good job in the house, but being tropical plants, they must be reared in a warm greenhouse and taken back when the rich and varied colours of the leaf begin to look dowdy. The varieties of *P. Sandersii* seem to be most ready to stand indoors, best and longest.

**Philodendron.**—A genus of woody or semi-woody tropical climbers, which have been found most adaptable to room conditions, the more commonly grown species being *P. scandens*. There are many species and all seem to respond to cool house treatment before being taken inside the house. Again I stress the need of a spring overhaul and a holiday in a moist greenhouse.

**Sansevieria.**—These make fine decorative plants, providing they are well grown, for unless they are, they are useless. They are certainly easy to grow and have been used as house and conservatory plants as long as I can remember. They love a loamy mixture plus firm potting. Incidentally, there are ten species, and some of them boast several varieties.

The growth is fleshy but firm, and the form of each leaf is that of an upturned sword. The markings which make the varying varieties so attractive are in bands of cream and yellow across the leaf. In some species the leaf is edged with these colours. The most popular species is *S. trifasciata*, which has several varieties.

**Selaginella.**—Though I would not recommend any of the species as being good permanent house-plants, yet if well grown in moist conditions, they do make a decorative subject for some weeks. They will do even better when grown in heat and then, when at their best, placed on a shelf near the glass to ripen this growth. Only then are they of real use in the house.

**Syngonium.**—There are only two species of this genus which is
really a creeping vine, with rather shiny green palmate and sagittate leaves. Both make good house subjects if (as so often in this type of plant) the preliminary stages are spent in a warm greenhouse. They are *S. podophyllum* and *S. Vellozianum*.

**Tradescantia.**—The silver and golden markings of the creeping species make excellent room plants and are well known, but I do wish amateurs with a greenhouse would realize how much better young stock is and how very easy this is to procure by taking cuttings two or three times a year, four cuttings placed around the side of a 3-in. pot.

**Ferns.**—Only a few ferns are really happy in a room and of these I choose the following as being most likely to survive for any length of time. They are *Cyrtomium falcatum*, *Davallia canariensis*, *Pteris cretica* and its varieties, *Adiantum Capillus Veneris*, *A. cuneatum*, *Asplenium bulbiferum*, *Nephrolepis exaltata*, *N. e. todeaoide* and *N. e. Hillsii*. 
CHAPTER IX

SHRUBS AND ROSES

The forcing of hardwooded shrubs has always been done in greenhouses, and during the last few years there have been some interesting developments in this respect. It was found by many people who could not afford much in the way of firing that a brilliant show might be obtained from shrubs all through the spring. Even in an unheated house these things bloom far in advance of their outdoor neighbours, and it is with every confidence that I recommend such shrubs to all greenhouse owners. Culture is simplicity itself and, providing the right type of plant is bought, the rest is easy. I must make it quite clear to would-be purchasers that all such shrubs must have been grown in the nursery, with forcing as the objective. They should ask for plants that have been specially prepared for forcing. This indicates that pruning or training has been done in such a way as to cover the plant with buds while root restriction makes it possible to put such plants into reasonably sized pots.

Plants for forcing should be ordered early in the autumn and must be potted or boxed up during the months of November or December. No special soil is needed for this, but they must be given something in the way of crocks for drainage. Pot very firmly, ramming the soil well. Immediately after potting, water the soil and then put the plants in some more or less sheltered position outdoors, where they will not blow about.

To avoid this blowing about, the pots can with perfect safety be plunged into the ground, otherwise if the plants are blown over frequently, some of the flowerbuds will break off. It must be remembered that in many of these shrubs the buds are already there.

The early forcing of shrubs depends on two things for its success; one, the gradual starting into growth, and the other, well-ripened wood of the previous season. This means that specially good, early ripened plants must be procured and that these must be brought into heat by easy stages, never taking plants direct from outside to great heat indoors.

The majority of growers will probably be perfectly satisfied
to get their earliest blooms in February and after that, there should be no difficulty, even in cool houses, of keeping up a continuous supply of flowering shrubs. As the majority of subjects used prefer cool rather than hot houses, their cultivation should appeal to all greenhouse owners.

Once the turn of the year comes, take a few of these things into a cool house where they will have a chance to begin pushing up their sap. Then after a week or two they can be put into warmer temperatures. Realizing that most of my readers will not have anything in the way of an intermediate temperature, I suggest that if the plants must go direct from a cool house to a forcing temperature, it would be wise to keep them in the cool another fortnight. By that time they will be more ready to respond to the greater heat without the danger of buds dropping.

Once in the warm, syringing twice a day will be necessary, for nothing helps buds to swell and break naturally so much as moistening the stems. Be sure that the roots do not get dry, as this will bring disaster—dropped buds, shrivelled growth and general loss of vitality. Some of these things will need cooling off before the buds actually open, when much heat is given, notably Ornamental Cherries, Crab Apples and Azaleas. For very early work it is well to limit the selection of subjects to those which will stand heat without harm to the flowers. The best are Lilacs, *Prunus triloba*, Deutzia, Acacia, Camellia, Forsythia and Ribes.

For all general work, with cool houses as the only means of hurrying these things, there is a vast number of species and varieties at one’s disposal. It is essential to bring the plants in by relays—a few each week—and so extend the season as long as possible. In all cases the syringe should be used whenever the weather is warm and especially if the day is sunny.

In a previous chapter I have already dealt with some of these things; Acacia, Azalea, Camellia, Deutzia, and Spiraea. These are very important plants and of especial value where there is no great heat. If one has to bear one’s soul in patience for a little longer, the ultimate result is worth it, because the slower these things are forced the more beautiful they are. It is the same with most of the shrubs used for pot work in spring. The many delightful species and varieties should encourage all those who have not yet grown these plants to do so. Beside the groups already mentioned, I would suggest the following list as being of great use in every greenhouse during spring.
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Acer.—The Maples are worth growing for the lovely colours of their spring foliage, which, after it has graced the greenhouse for a month or two may be used in the borders. Plants of suitable size for pots can always be bought in the autumn. Coloured varieties belonging to the Japanese section are used for this work. When breaking into growth, beware of hot suns doing damage to the tender foliage. At such a time all foliage should be dry.

Ceanothus.—Of use in late spring, because if they are forced the flowers lack colour and will not last long. A plant that has yet to be recognized as a valuable greenhouse subject. Best species are *C. dentatus* and its sub-varieties, *C. hybridus* Gloire de Versailles, and *C. divaricus*. Best grown cool all the time.

Cerasus (Ornamental Cherry).—A large group of plants, which furnish some of the best of all spring forcing subjects. If the plants are well set with buds, subsequent culture is easy, for they only require little heat and plenty of syringing to bring them into bloom from early March onwards. The best of a great number of varieties are *C. Hisakura* or *Kwanzan*, double pink; *C. Mount Fuji*, semi-double white; *C. incisa*, blush; *C. subhirtella*, pink when opening, passing to white. These belong properly to the Prunus family but are included here because they are so often sold under the name of Cerasus.

Choisya ternata.—This is the Mexican Orange Blossom and a splendid pot plant. Its foliage is glossy green and is almost as ornamental as its blooms, which do actually resemble orange blossom. Loves a little peat in the soil and must be encouraged to make short-jointed growth after blooming by being carefully watered and syringed throughout the summer, while standing outside.

Daphne.—Two species are worthy of attention. *D. Cneorum*, a dwarf-growing evergreen with deliciously scented flowers produced in cool houses in March, and *D. Mezereum* whose leafless twigs are covered with purplish-red flowers from the end of January. Both will be found very easy to grow. There is a large number of very beautiful species, of special interest in the Alpine house, but they do not like a lot of heat.

Diervilla (Weigela).—The flowers of this well-known plant make a fine addition to the spring grown subjects. If small and shapely plants are dug up or purchased in the autumn, potted and put into a growing atmosphere during January, they will come into full bloom in five or six weeks.

Forsythia.—One of the easiest of all plants to force. Dig up
compact specimens from the garden in January and put them into a house of 50°. They will soon respond to such a temperature and be in full bloom.

**Fremontia.**—The varieties *F. californica* and *F. mexicana* have yellow cup-shaped flowers and make an interesting change from the ordinary subjects. Best grown in a cool house and allowed to flower at will. Should be more popular, as they bloom for months.

**Hamamelis** (The Witch Hazel).—If small plants are potted up in the autumn, the bright golden flowers will appear in January even in a cold house. One of the best early blooming subjects.

**Kerria japonica.**—The double form is quite beautiful as a pot plant, but must not be subjected to much heat. The yellow flowers last a considerable time if in a cold house.

**Laburnum.**—Specially prepared plants should be bought for forcing and if put into the warm during February will come into bloom a month or five weeks later. Needs plenty of syringing to soften the buds, and a good deal of water at the roots. Must be cooled off as the first buds open. Best species, *L. Vossii*.

**Lilac.**—May be forced into growth quite early but it needs sharp heat to do it. Much better if forced into bloom at a temperature of 60°. Scent, colour and lasting qualities are then better. There are many double and single varieties to choose from. Loamy soil.

**Magnolia.**—Plants, if full of buds, make worthy subjects in large houses and conservatories but cannot be recommended for small houses. They are no trouble to force but should be grown in a cool rather than a hot house. Best species *M. Soulangeana* and *M. stellata*, though practically all the genus is useful.

**Malus** (Crab Apples).—Here is another group, used very largely for greenhouse work in spring. If plants are kept year after year and pruned when flowering is over, they make wonderful specimens. Pot up in loam and add a little bone meal to the soil, then they need nothing more than top dressing for two or three years. There is a very long list of species, but I confine my selection to those which are not too rank in growth and therefore make the best pot plants. *M. aldenhamensis*, wine red; *M. Eleyi*, red; *M. floribunda*, blush; *M. purpurea*, wine red; *M. Sargentii*, pure white; and *M. Scheideckeri*, semi-double flowers, half pink, half white (perhaps the best of all for pots).

**Prunus.**—This group is as important as any, because it gives some of the best and showiest of all the spring flowers. *P. triloba*, which has flowers like pink rosettes all up its leafless twigs, will
bloom in January and February with only moderate warmth, and
during March in cold houses. This is one of the best subjects and
certainly the easiest to grow. *P. persica* is usually known as the
double peach and very beautiful it is. There are several varieties
of it, Clara Meyer, with deep rose-pink flowers, being the most
popular. The outstanding variety is Russell’s Red, its semi-
double flowers being bright Carmine red.

**Rhododendron.**—Most of the hybrid varieties can be grown in
pots and some are particularly easy to force. Should be potted up
in January and placed in a cold house till the beginning of
February. Then give more heat and daily syringeings to soften the
buds. A temperature of 60–65° is quite high enough even for
those wanted early. Syringing is the great essential—not sharp
heat.

Only small plants covered in buds should be chosen for forcing,
but if big specimens are wanted, these will only give their best
when grown slowly in a temperature of 55°–60°. The best of the
named varieties for this work are Pink Pearl, Alice (pink),
Cynthia (rosy Crimson), Christmas Cheer (pale rose) and Doncaster
(crimson).

Besides these, there are several of the species quite useful for
early work. *R. praecox* blooms in early February in an unheated
house and is very attractive at that period. Most of the dwarf
species are also very happy in cold houses, but are no use in
heated houses.

Mention must be made of the Java Rhododendrons, which are
true greenhouse plants and make small bushes in pots giving a
wealth of bloom each year. As they bloom in winter they are
more than useful. There are about sixteen varieties of varying
colours; scarlet, orange, yellow, crimson, buff, primrose, rose,
pink and pure white.

Nowadays many more people are taking an interest in the
smaller growing of Rhododendron species, which make such
excellent flowering subjects in spring. The Azaleas too come into
this family (see p. 53).

**Ribes** (Flowering Currant).—Always attractive when dug up
and potted or boxed for spring flowering. Naturally early, it
only needs a temperature of 50–55° and a few syringeings during
February to have plants in bloom by the end of that month.

**Viburnum.**—Several of the Viburnums make lovely plants for
conservatory or greenhouse and may be pushed into bloom with
the greatest ease. Pot up in loamy soil and leave the plants in
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the same pots for at least a couple of years. The four best are *V. Carlesii*, which has rounded clusters of white flowers, very highly scented (it should be grown on that account alone), *V. fragrans*, *V. carlcephalum* and *C. Burkwoodii*. To get the best from these, grow them in cool houses.

Roses.—These make a fine early spring feature in the greenhouse if properly grown and tended. Too many people dabble in this growing of pot Roses instead of taking their culture seriously. It is quite wrong to suppose that one can dig up any rose from the garden, put it into a pot and expect a wealth of flowers to follow.

The Roses which are to be used inside must be carefully selected, cared for and treated in a correct manner. There is only one proper way and that is as follows. Choose a few very young Roses and pot them up during spring. Use a compost that is practically all loam with a very liberal addition of rotted farmyard manure. A sixth part of the compost can be manure, so long as it is thoroughly decayed. A small quantity of bone meal will also help. Pot the Roses into 6- or 7-in. pots, making the soil quite firm. Do not put the plant deeper into the soil than it was in the open ground. If potted too low it will not help; if too high, the plant may be a 'swinger'. Once potted, stand these Roses in a cold house. No attempt should be made to force them the first year. As buds begin to swell, prune these Roses. Prune them with the object of getting several strong growths rather than a lot of flowers. Being in a cold house the Rose will grow for a few weeks ahead of its outdoor neighbour. Thus it has already started its career as a 'forcing' Rose. In May stand such Roses outdoors and if possible plunge the pots in ashes. This keeps the roots cool and saves a deal of watering. Here they must remain all the summer. Take a few flowers from them if you wish, but do not encourage a lot of bloom. This first year must be considered as the building up period. Let the plants remain outdoors till autumn. In November bring them into a cold house, keeping them watered in the normal way but not overdoing it. January will be the time to begin the first true forcing.

During this month put the plants in a house of about 50°. Immediately the buds are seen to be swelling, prune the Roses, the same as would be done in March outside, only do not prune quite so hard. As the lower buds break into growth the Roses may be given a higher temperature, say up to 58°, when in full growth. All this time keep them syringed and moist. Dryness at the roots,
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even for a day, may spoil them. When flower buds are forming, liquid manure may be given in quantity and a certain amount of Rose manure in solution will be helpful. Ventilate freely as the days lengthen so as to keep the Rose stems hard. Beware of burning sun scorching the foliage, which is likely to happen if syringing is carried out too late in the day. Reduce artificial heat as the weather becomes warmer and try to keep the Roses growing slowly rather than fast, once blooming begins. After flowering is over put the plants outside again for the summer.

Any potting can be done then if wished, or it can be left till the autumn. When they have reached the 8-in. pot they will last several years in this size if something in the way of top dressing is given each autumn. You will see that in this way you have a collection of Roses distinctly prepared for forcing, and if brought in a week or two earlier each succeeding year, the result will be that the collection blooms as early as January if grown under suitable conditions. Certain varieties are more suitable than others and the best and easiest to force are Richmond, Liberty, Hadley, Southport, Mrs. Hoover, Roselandia, Madame Butterfly, Tango, Katherine Pechtold, Heinrich Gaede, Autumn, Speks Yellow, Talisman, and Golden Ophelia.

At the same time we must count as excellent pot plants many of the Polyantha or Floribunda Roses. These make good plants in small pots, and for this reason they must be considered as valuable. I do not recommend hard forcing, but rather putting them into a cool growing house and leaving them to take their own time.

Greenfly is very troublesome, but a puff or two of tobacco powder will usually check it from becoming too bad if the powder is put on immediately the fly is seen, while many of the newer insecticides containing B.H.C. will be found both safe and effective. Never spray when the sun is shining on the foliage and after using insecticide it is often wise to spray a few hours after with clear water.
CHAPTER X

CHRYSANTHEMUMS

No glasshouse collection of autumn plants could possibly be complete without Chrysanthemums. They are the one great glory of autumn. Few growers would think of omitting them, but others grow far too many. In both cases some adjustment of values is necessary. The man who does not grow any Chrysanthemums is certainly losing one of the greatest gems in the floral world, whereas the man who grows too many seldom gets the full beauty and value from them, because he has not the adequate space to allow full development. At the very beginning, then, it would be a wise proceeding if one determined just how many plants are required and then set out to grow that number particularly well.

During recent years there has been a decided change in the class of Chrysanthemum grown by the amateur. Instead of putting all his energies into the culture of large-flowered varieties, he finds it more profitable to grow fewer of these and more of the decorative varieties and singles. These give smaller flowers but in much greater numbers. At the same time they provide a far more useful cut flower and are not quite so prone to damping off as the large blooms.

It would be a good thing to understand the various classes of Chrysanthemums and make a choice of those which suit individual tastes or facilities.

There is an official classification of the various groups of Chrysanthemum issued by the National Chrysanthemum Society and everyone who is interested in exhibiting must have a knowledge of this and the varieties which are accepted as worthy of the Society's commendation.

This Society classifies the greenhouse Chrysanthemum in seventeen sections, which include Exhibition Incurved, Large Exhibition, Medium Exhibition, Reflexed Decoratives, Incurved Decoratives, Anemone-flowered, Pompons, Singles and two sections in the October-blooming varieties.

For the amateur, the Large-flowered type, the Incurved and the Decoratives will be those mainly grown. The two former will give
the mop-head blooms, still treasured by the exhibitor, while the smaller Decoratives will be of greater use both for greenhouse display or for cutting.

The Incurving types are so good these days that they do really make an outstanding ball of colour without any 'dressing' or help from the grower.

Single-flowered varieties are, in my opinion, worthy of a far greater following, because of the generous quantities of bloom they give, their brilliant colourings and their value as a cut flower.

I also think the amateur should experiment with the Pompons which are now so varied in colour and have the virtue of being somewhat dwarf in stature. The newer varieties are brilliant.

Another type is the Feathery- and Spidery-flowered, once so popular but worth a revival. There is something very charming about the flowers and they are just as easy to produce.

In one respect all these Chrysanthemums are alike—it depends on how good a start they get as to how they will shape in after life. This means that the plants which are to supply the cuttings must be as healthy as it is possible for them to be. So much depends on this that I strongly advise something better than such plants usually get in the way of treatment, after flowering is over. Immediately the blooms have died the plant should be cut down to within a foot of the surface and put into cool airy conditions. A frame is ideal, if frost can be excluded; otherwise put them near the glass in a cool house. Water the plants sparingly, but never allow them to become really dry. Syringe them if the weather is mild and do this early in the day so that the plant dries before night.

Cuttings may be taken from the beginning of January onwards, when a start should be made with the Large-flowered sorts, the Incurved and the late Decorative varieties. Note this last point. It sounds wrong, but the late-flowering types require a much longer season than the average Decorative varieties. During February and March the majority of Early and Mid-season Decoratives must be struck.

Cuttings should be firm, short-jointed and clean. They must be one to two inches long and after having the lower parts of leaves removed and a clean cut made immediately below the lower joint, are ready for insertion. Details of how to take and make cuttings have been given in a previous chapter. Owing to the small number of cuttings of each variety which the amateur
grows, pots will be more useful than boxes. 2-in. pots are large enough, putting three or four cuttings around the edge. Soil for striking these must be sandy and yet not too much so. A mixture of equal parts loam, peat-moss and sand will be quite all right. The John Innes Potting Compost No. 1 can also be used. Stand the pots in a cool propagating pit 40–50° and keep the pit closed, opening it at least once a day to allow all moisture to escape. Should cuttings flag or wilt, spray them with a very fine sprayer, using lukewarm water. As the cuttings must be watered in, when inserted, they will not need much more until they are rooted, but of course it is up to the grower to look out for drying and to water the cuttings at once. Never coddle Chrysanthemum cuttings. When it is seen that the stem begins to grow, look at the roots (by turning the ball of soil out carefully) and if these are forming satisfactorily, begin admitting air to the pit until the plants stand up firmly without wilting. Remove them to a greenhouse staging and from that moment keep them as cool as possible.

Pot the plants off singly into 2-in. pots a week or so after this, taking care not to break any of the newly made roots if you can help it. Use a much more loamy soil with only just enough sand in it to ensure drainage. After a few days in these pots, with systematic syringing and a rather moist atmosphere the plants become erect and healthy, a signal for increased ventilation, so essential to plants at this stage. If the weather is kind, put them into the frames, but avoid any cold draughts which can, and often do, give these plants a check. By April all plants should be ready for the 5-in. pot, the earlier struck ones being ready perhaps in March. Anyway, the chief point to remember is to move the plants on before the roots get too numerous in the small pots. No fixed rule can be set down as to dates but the grower with average intelligence can soon see for himself just when the move is required. Soil counts for much and as a rough guide for mixing composts at this stage I suggest four parts of good stiff loam, one part leaf-mould or peat, half a part rotted manure, half a part sand or burnt ballast, or John Innes Potting Compost No. 2. During the time plants are in 5-in. pots, when the weather becomes genial enough, such plants should be given full air. This will strengthen the stem and foliage.

An alternative to potting the cuttings is to put them into frames in two inches of soil (as above) and after soaking, plant the rooted cuttings into this until potting time, but if this is done the
potting into final pots must be done before the roots in the frame become entangled or the growth becomes too long.

By the beginning of May the plants in pots will be capable of taking the weather as it comes, but at the same time remember that high winds will undoubtedly do some damage. With this in mind, put your Chrysanthemums in a place that is not too exposed, or if you can, leave them in the frames with the lights off. Of course, they will have to be staked with short thin canes when they are about eight inches high.

By the end of May the final potting must take place. This is one of the very important operations in Chrysanthemum culture, for not only must it be done before the soil in the 5-in. pot is impoverished, but it must be given precedence over the many other important tasks which face all gardeners at that period. I attribute more Chrysanthemum failures to the delaying of this final move than to any other cause. Soil for this should be mixed up some weeks before, certainly before the pressure of work makes composting a hurried task. The loam chosen must be organically rich. Thin starved loams from poor pastures or the average garden soils are worse than useless. The type of loam should be what is termed a ‘fat,’ rather heavy fibrous one. Surrey and Kettering loams are an example, though there are other districts giving very good loams. Break all loam up into a rough state and then add the other ingredients. Six parts loam, one part leaf-mould or peat, one part decayed manure, half a part sand or burnt ballast will make a splendid mixture. To every bushel of the mixture add four ounces bone meal or hoof and horn or a proprietary Chrysanthemum manure, used exactly in the proportions the makers state. Lime, too, must be added to most composts, and in this case four ounces to each bushel should be the maximum required. It is always wise, however, to obtain an analysis of the lime content in the loam, which will avoid mistakes or miscalculations.

I am quite certain that for the amateur the fertilizers scientifically made especially to suit the Chrysanthemum are the ones to use.

Mix this several times and store for a few weeks. The pots for this final shift must be at least eight inches in diameter, or, better still, nine inches. Crock them well and put a little rough soil fibre over these before putting in the compost. When potting, the soil compost should be half-way between wet and dry. Remove the crocks from the five-inch ball of soil and place the
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ball on a comfortable depth of compost in the new pot, so that it will be neither too high nor too low when the operation is finished. Firm potting is required and nothing is so helpful as a good thick rammer, bluntly pointed at one end and rounded at the other. The flat tapering point assists in getting the compost worked evenly between the ball and the edge of the pot, while the rounded end is used to firm the surface. It is vital to water the plants thoroughly the day previous to potting. In such large pots leave at least two inches for watering and for ultimate top dressing. About two days after potting, water the plants in, and to make sure that every particle of the soil is moistened, fill the pot up twice.

Stake plants as soon as possible after this, with large stakes which will remain all the time. Then such stakes must be tied to wires, strained to stout posts. This is essential, otherwise winds will continually blow the pots over. All pots should be stood on boards or slates to prevent worms getting into the soil.
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The site chosen as summer quarters and usually termed 'the standing ground' must be open and away from heavy shade. It must also be level and as close as possible to the water supply.

Watering plays a very important part in Chrysanthemum culture and on summer days they will need watering twice to keep them moist. Beware of soil that looks wet on top but is dry underneath. This happens—especially in wet weather. A pot tapper is a handy tool for determining how dry or how wet these plants are and all experts growing for exhibition would never think of doing the job without the aid of such a tapper. Very often a plant, though looking very wet, will give the bell-like ring which denotes dryness.

A month after potting, root action will be pretty free and the first feeding must take place. This should be soot water, which can be given with perfect safety once a week from that time. Six or seven weeks after potting, the first top dressing should be added. It need not be more than half an inch of rich compost to which has been added some Chrysanthemum fertilizer. This encourages the working of surface roots which will soon be like a white mat on top of the soil, if the plants are really healthy. Top dress again when the new roots are visible on the surface and continue to give liquid feeds twice a week, especially if extra large blooms are wanted. Syringe twice a day, morning and late afternoon whenever the weather is dry, and one evening each week some insecticide should be added to the water, this being applied with force so that every bit of foliage is wetted.

'Stopping' Chrysanthemums to secure flowers on certain buds has always caused a deal of perplexity. Some writers become involved when dealing with it but it is quite simple. The first bud seen is called the break bud, but this can be ignored as it is the growths which surround it, that are important. Rub it out as it appears.

Following this bud a number of shoots or 'breaks' develop and some of these are chosen to give the flowers. Thus these shoots give natural or 'first crown' buds because no further stopping or pinching is necessary. It is the flowers from this bud which are usually the largest and contain most petals.

In some cases, however, it may be that a later flower is required, or for some other reason a 'second crown' must be chosen. To achieve this object, the growth bearing the first crown is stopped, so that new shoots form and one of these is chosen to give the flower—one then has a second crown bud.
CHRYSANTHEMUM PROPAGATION

1. Stools lifted from frames, showing cuttings.
2. The cutting as taken from the plant and (right) prepared for inserting in box or pot.
3. The box filled with soil, surfaced with sand, and ready for the cuttings.
4. A box of rooted cuttings ready for potting.
5. Plant partially cut down to encourage stem cuttings to form where basal cuttings are not very free.
For growing in small pots
the dwarf bushy Denise is one of the loveliest yellow-toned, small-flowered Chrysanthemums.

A new race of winter-flowering Chrysanthemums has been recently raised. Most of them flower at Christmas-time and this one is named Paramount.
CHRYSANTHEMUMS

This in turn may be pinched to give yet another bud which is called the terminal bud.

The grower will learn from any good catalogue which varieties require certain 'stoppings' but the majority of sorts will do best on first crowns.

In some cases one hurries the natural break by pinching the growing tip of the plant—but here again the catalogues generally give a clue to this.

During the whole of their lives all Chrysanthemums must be kept free from disease and this can only be done if one is systematic in this respect. Leaf-miner is one of the particular troubles, but if the plants are syringed with some insecticide such as
D.D.T. or nicotine, this does help to keep away the particular fly which lays its eggs in the leaf. These eggs hatch out and the maggot burrows its way between the upper and lower surface of the leaf. In this way much of the life blood of the plant is stolen, while the unsightly state of the leaves is annoying to all who see them.

Rust, a brownish powder-like fungus, forming on the under part of the leaves, will never get a real grip on the plants if it is checked by thorough syringeings of sulphide of potassium used at the rate of one ounce to two gallons of water, or one of the proprietary sulphur sprays.

Mildew may also be kept down by the same method, but if mildew occurs late in the season, use a very finely ground sulphur—preferably the green sulphur, which does not look so ugly as the ordinary yellow form.

All plants growing in pots should be put under glass in September and only the very latest should remain outside at the beginning of October, and even these should be brought inside as early as possible.

Having gone to a lot of trouble all the summer, it is up to the grower not to be casual about his plants once they are housed. In fact, it is during that time that his skill will tell its tale. The main point is to keep the atmosphere dry. Water the plants only when they require it, but do this thoroughly and then, if on a stone floor, mop up every drop of water afterwards. Continue to dust with sulphur if mildew is persistent. Give some ventilation all the time and especially on bright days. Keep the pipes just warm, particularly during the night and on wet or foggy days.

If tying has been done every fortnight or so, little more should be required once the plants are inside, but when some of the large blooms develop, their very weight may make a thin support necessary to hold them upright.

Decoratives and Singles may carry anything from ten to twenty blooms and may be disbudded to carry one flower on each stem, or left to develop all the buds that come. This is called 'spray bloom'. Disbudding is, of course, the best method where quality is wanted.

To obtain the requisite number of flowering stems means leaving more shoots to develop at the first or second 'stopping': thus one must decide on the number required at the time of the first stopping. No support other than the stake should be necessary.

A method of growing the Large-flowered type suitable for
CHrysanthemums

folks with small houses is as follows: Take cuttings in April and strike them singly in small pots in cool frames. As they fill the pots with roots very rapidly, repotting must be done into 4-in. pots rather more quickly than usual. Pot on from this size to the 6- or 7-in. pot, giving the same compost as recommended for the final potting of the earlier struck sorts. Take up only one shoot and keep the first crown bud when it appears. Such plants are never very tall and as a rule give a fine quality flower.

Cascade Chrysanthemums are struck in the usual way and when the growth is six inches high it is pinched back to the fifth pair of leaves. From this, one may take three of the shoots which form, and while the centre one is allowed to grow on unchecked all the time, the other two must be pinched again.

After the final potting put a cane into the pot, sloping it at an angle of 45° towards the north, and tie the chrysanthemum shoot to it. All the side shoots must be continually pinched at the third pair of leaves up to the middle of July. The plants must be taken inside during September and stood on a shelf, the tip of the plant being tied downwards to a string fixed in the ground. Growth kept tied in the downward direction ultimately shows buds from every shoot, and in the end you have a 'cascade' of bloom.

A few sorts of the Decorative types make suitable plants in very small pots. One frequently sees these sold during November. Cuttings are struck in early May, three around the edge of a 2½-in. pot. When struck (in a cold frame) give more and more air until the lights can be removed altogether. Pot on into the 6-in. size and pinch each growth to make a bushy plant. Feed well as the pots become filled with roots. The best varieties for this type of work are usually detailed in all the good Chrysanthemum catalogues.

To sum up this chapter: I suggest that the grower or potential grower would be wise to realize before all else that good Chrysanthemums are worth all the trouble one takes with them, and if the plants are cared for, fed, kept clean and in every way assisted to be really good, they will give a reward of rich beauty and great utility.

I do not propose to give a list of varieties, because every year there are so many good novelties that a list made at the moment might not be so satisfactory next year. Now that so many Chrysanthemum specialists exist, it is an easy matter to procure their latest catalogues and study the subject. I suggest that one keeps to those which are suggested in the Register published by
the National Chrysanthemum Society, because they have been chosen for their quality, their good health, and their good breeding.

It is not very wise to spend money and time growing a second-rate variety when there are so many good ones.

All amateurs should interest themselves in the new Decorative group of Chrysanthemums which have been developed to produce plants giving a wealth of bloom at Christmas. The flowers are not large, but the petals are crisp and shell-like, a point to note, seeing that this means a less likelihood of clamping-off.

These are grown in the manner described for Decoratives, but all are allowed to grow in a natural manner—thus giving what is known as ‘spray’, indicating that one gets a whole spray of flowers at the top of each strong growth.
ONE of the most important greenhouse flowers is the Carnation. Every year it becomes more popular and as it is more or less always in bloom, this popularity is not to be wondered at. I am frequently asked if Carnations are easy to grow and reply with an emphatic 'Yes'; if (and a very important 'if' it is) they are given Carnation treatment. So often I hear of people who try to cultivate Carnations in a mixed house of plants. It can be done of course, but never really well. This brings me to the first important point regarding Carnations—they need specialized treatment. I would go further and say that Carnations need a house to themselves where they can be treated correctly, instead of having to put up with a compromise between their needs and the requirements of ordinary greenhouse subjects. Amateur growers who fail to get the best from their Carnations should be frank enough to ask themselves if they are not expecting too much, where these have to be grown in a mixed house. What sort of conditions, then, do Carnations require? First of all they need a well ventilated house; secondly, they require drier conditions than most plants and very little heat. Given plenty of light and what is called 'cool house treatment,' the rest should be easy. A Carnation house should have side ventilation as well as top ventilation. It should be as large and airy as it is possible to make it and away from the shade of trees, walls or a dwelling house. Much depends on the right type of house and I would urge any one taking up Carnation growing seriously, to procure a suitable structure at the beginning.

Carnation houses need never be generously heated, for at no time of the year is it necessary to get the houses over 50°, and during cold frosty weather the plants are perfectly safe around 40–43°. On that score it cannot be held that Carnation growing is expensive.

Many amateurs now invest in a house where the Carnations can be grown in raised borders—the latter filled with the right type of soil—and for cutting, this system is an excellent one and is of course only a smaller copy of the commercial method of growing this flower.
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There are two important groups of Carnation which will give the greenhouse lover all he asks. The first is the Perpetual Flowering group and the second is the Perpetual Malmaison group. The first is of great utility and in it are the best modern Carnations. This group blooms continuously from the beginning to the end of the year. No plant that I know continues to bloom over such a long period without showing signs of weakness, but with generous treatment and under proper conditions a Carnation plant will bloom more or less continuously for two years.

The Perpetual Malmaison blooms all the year, too, but its flowers are fewer though much larger and are, to all intents and purposes, a free blooming type of the old Malmaison.

There are others, but these two groups will give all that any amateur requires, while the Perpetual Flowering will in itself be all that most people will grow.

Let me take the year's work and try to prove that nothing more is asked than the ordinary greenhouse lover can give. I must emphasize one vital point at the very outset and that is, the necessity of beginning with a healthy stock of plants. Too often one has seen the tragedy of the beginner who failed in all he did, simply because he began with an inferior stock. In view of the fact that Carnation specialists spend their lives in creating high grade stocks free from disease and possessing high vitality, it is a little curious that buyers should go elsewhere for their stocks.

Choose the varieties carefully, so that you obtain a fair range of colour; a glance through a Carnation catalogue will satisfy most tastes in this respect. The ideal time to begin a Carnation collection is in April, when it is possible to procure plants in 3-in. pots already pinched and well rooted.

Afterwards the Carnation year may be said to commence in January. During this month cuttings may be taken in quantity from old plants. Cuttings must be procured from that part of the plant, usually about the middle, where the cuttings are full of life, and are not in any way drawn or spindly. A cutting must be firm, short-jointed and perfectly clean. Make a sharp horizontal cut below the bottom joint, remove a pair or two of leaves to allow the stem to be placed in the rooting medium. Sand is the best for this, nothing else being quite so satisfactory. This should be placed in shallow boxes, or if one wishes, direct into the propagating pit. An inch and a half or two inches of sand is ample. Dibble the cuttings into this, and if boxes are used, put these into a close pit. A temperature between 50° and 55° will
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cause them to root quickly and once they are known to be making roots, add a little more ventilation each day until the plants are in a normal atmosphere.

During February these rooted plants must be potted into 2-in. pots, for to leave them too long in the sand is to weaken them. There is no food value in sand.

Loam is the chief ingredient of Carnation composts and therefore in all serious attempts to grow them it will pay to purchase the best type of loam procurable. It must be a good meadow

loam, fat and fibrous, with some natural richness in it. Mix up some such loam, adding just enough crushed mortar rubble, granulated peat and sand to keep it open, for this first potting.

Never attempt to use a compost which is on the wet side, for it will have a bad effect on rooting if pressed firmly while in a wet condition. Rather have it well on the dry side so that gentle pressure can be given without injury to the roots when potting.

Lift the cuttings out of the sand carefully, remembering that a sudden jerk or careless handling will break the fine roots, at this stage very delicately attached to the stem. Pot equally carefully and then stand the plants in a house where they can be sprayed each day if the weather is warm enough.
Do not coddle, but gradually inure the plants to ordinary ventilation. Keep them near the light so that growth is not drawn or thin. By the end of March or beginning of April these plants should be ready for pinching, which is done at the seventh or eighth pair of leaves. Such pinching must be done in a clean way, getting hold of the growing point and breaking it off well into the pair of leaves chosen.

Encourage growth by slight syringeings on warm mornings, but do not deprive the plants of air. Once these pots are normally full of roots, prepare for the next move. A similar soil to the one previously used will do, but it should be rougher and richer. This latter can be assured by the addition of bone meal, a Carnation manure, or some decayed farmyard manure. Nothing is quite so suitable as a specially prepared Carnation fertilizer. Crushed brick or mortar rubble is invaluable and the sand used should be the very coarse type. Put into 6-in. pots and pot firmly, having made certain that the pot is well crocked. When finishing off the surface be sure that the soil around the stem of the plant is slightly higher than that near the edge of the pot.

Once this is done and the plants are rooting freely, they can be stood outside, though frames are a better proposition because one has the plants under control in wet weather.

In June a second pinching will be necessary, and this should cause a bushiness which will ensure a great number of flowers during autumn and winter. The more shoots, the more blooms. Some further pinching will be necessary, but this should be finished by the middle of August. All this time particular attention must be given to watering, and remember this—if you over-water a Carnation you are killing it. No plant shows resentment of over-watering more quickly than the Carnation. Its foliage turns yellowish or a sickly green, its growths become thin and flabby, and nothing you do afterwards will put this right. If Carnation soil is mixed correctly, it should be fairly retentive, therefore it is easy to over-water such compost without quite realizing it.

During September take all plants from the frames, or from outside, into the greenhouse, keeping the conditions very airy and rather on the dry side. The night temperature should be somewhere in the region of 45–48°, but on no account allow the house to get hotter. Ventilate night as well as day, and if slight shading was put over the roofs during summer, wash this off before the plants are taken in. Light, air, careful watering and
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periodical feeding are all required to bring these plants to perfection, but not for a day must the grower relax his vigilance.

During the whole life of a Carnation the grower must ever be on the watch for enemies. These will most certainly appear, and their complete eradication depends on whether the battle against them begins early enough. The greatest enemy is red-spider mite. Apart from special proprietary cures—which I heartily recommend—one may to some extent keep this pest at bay by thorough syringeings of general insecticides. Every part of the plant, especially the undersides of the leaves, must be thoroughly wetted to ensure success. Dusting the stages with a little nap.

FIG. 36
THE ALLWOOD CARNATION SUPPORT WIRE
A and B clip round central cane, C and D clip together. Slight pressure by the fingers easily disconnects these.

FIG. 35
A WELL-BALANCED PLANT
thalene (grade 8) also acts as a deterrent. Greenfly will most certainly make its appearance, and here again a general insecticide or fumigant must be used to rid the plants of such trouble. I would like to point out the great value of keeping plants clean in the young state, for if pest or disease gets firmly hold of them it is a very difficult job to get rid of the trouble afterwards.

Rust is a disease which brings disaster. Its appearance may occur any time during summer and autumn and even if it is not suspected, I would urge growers to make an inspection of their plants every now and then to see if any rust is present. It is found on the undersides of the foliage in the form of brown powdery spots. Finding it should be a signal for the most drastic treatment right away. A thorough syringing with sulphide of potassium (one ounce dissolved in two gallons of water) or one of the proprietary sulphur sprays will probably stop it in summer time, but during autumn, use a powder instead. Some of the finely ground sulphurs are the most suitable. This spraying and dusting will also keep down mildew, another trouble, particularly in autumn. This should remind the grower of the necessity for keeping the air buoyant and dry the whole time.

Correct ventilation will do more than anything else to prevent mildew; so be generous in this respect.

Watering plants during winter must be done as sparingly as possible, and though I urge great care in this respect during summer, I emphasize it even more when the weather is cold and dull. Avoid dampness in the atmosphere at all times.

During the summer, plants should have been staked, and nothing is more useful for this than those specially made rings of wire which fix on to a central cane. This saves many tedious hours of tying. These wire supports are made in varying sizes, so that, as the plant becomes wider and more bushy, rings of greater diameter can be added as required. The flower stems should require no further support if good high-class, up-to-date varieties have been chosen.

During winter the plants should be blooming and a temperature of 48° should be aimed at during this period, but if the weather outside is particularly severe then a drop of even five degrees would not matter. All the same, aim at 48° at night.

The following March or April, these plants should be potted on into pots about eight inches in diameter using a still richer soil than was used before. They should then be encouraged to make growth all through the summer, either outdoors or in perfectly
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cold and slightly shaded houses. Plenty of syringing will be needed and a particularly keen outlook kept for insect pests, which are rather more annoying if they attack old plants. Second-year plants must be well fed with liquid manure and soot water from the time they begin to root into their new soil until blooming is over. A little cutting back of old growth is needed, but the idea of cutting a plant hard back is certainly not necessary. If an early supply of plants is required, strike cuttings in October, so that the young plants are ready for 6-in. pots in March.

Perpetual Flowering Malmaison types are best rooted in late February and March.

There is also a possibility of growing high-class Carnations from seed. This should be sown in a light loamy mixture during January, and the pans or pots placed in a temperature of 45–50°. Do not hurry germination, or the seedlings will be weak. Even when they are up, keep them growing as slowly as possible near the light and in very airy conditions. Their treatment afterwards follows that of the cuttings; but remember, you can never be certain of what is going to appear when they are grown this way.

All the same, I have seen wonderful specimens in full bloom from a sowing made nine months previously, and practically all the plants had quality. This was from a strain raised by a firm of Carnation growers of repute—which rather suggests that the main essential is breeding a fine strain.

One can, however, grow many types of Carnations or Dianthus in pots beside those I have dealt with, and most of the Allwoodii, that beautiful group which is half-carnation, half-pink, the so-called 'Annual' Carnations and the Chabaud types, all do well in cold structures, though the flowers of the two latter do not reach the high quality of the P.F. Carnations.

Border Carnations were once widely grown inside but to-day they are (I think quite rightly) grown in the open.
FLOWERS grown from bulbous plants are a very important item in the greenhouse, especially the spring greenhouse. The majority of them are easy to grow; they require cool conditions and only take up very little room, because for the greater part of their lives they are grown in cool frames.

For the majority of subjects, including the Narcissus, Tulip and Hyacinth, a hothouse is quite unnecessary. It is a well-known fact that most bulbs grow and bloom better in a cool house. Because of this they are rather important to all owners of such houses. Though I say they are easy to cultivate, I do not mean that they will tolerate careless treatment. Too often greenhouse-grown bulbs of this description are spoiled by neglect, over-watering, poor and imperfectly-drained soil. This is a great pity because, if they are treated well and given the conditions they require, they will certainly produce fine flowers, perfectly formed and full of vitality, which will last in full beauty for a long time.

In every case I urge the purchase of high quality bulbs. If the trouble one expends on their culture is worth anything, it is worth a good class article to start with. This is especially true of the Narcissus and Daffodil varieties.

Why go to the trouble of growing the commoner varieties when for a few pence more a much superior article may be had?

Another point is soil. So often the idea is that because a subject is easy to grow, any soil will do. This is certainly not the case with bulbs. A mixture which I have found most suitable for the general spring flowering bulbs has been half old potting soil and half new rich loam, with a barrow-load of manure to every six of the compost, and just that small quantity of sand necessary to keep the soil open.

If new soil is used entirely, a general mixture may be made of three parts loam, one of leaf-mould or peat, half a part of sand and brick rubble, with manure added, should the loam be on the poor side.

Some of the bulbs I shall mention are purely for greenhouse culture, but this will be pointed out, and as a rule these need a
BULBS FOR GREENHOUSES

little more warmth during winter than the ordinary spring-flowering bulbs of our spring gardens. The list given is by no means complete, as I do not include many greenhouse bulbs which are difficult to obtain, or those which demand specialized culture. The list is, so far as possible, composed of useful and popular bulbs whose culture is well within the scope of the ordinary amateur.

Amaryllis (Hippeastrum).—Definitely a greenhouse bulb. One of the most regal of all flowers. Large Lily-like blooms of dazzling brilliance appear in spring or early summer, often before the foliage is more than an inch or so high. Culture is by no means difficult for if there is any secret about getting good flowers it lies in leaving the plants undisturbed for three years and having heat.

When bulbs are at rest (from November to February) they must be kept cool but well above freezing point. Do not allow them to be in a temperature of less than 40°. Any potting that is needed must be done in February and the plants put into a warm house (50°-55°) immediately after. Purchase bulbs while in the dormant state. Soil for potting must be practically all loam. To every two bushels add a third of a bushel of cow manure, a 5-in. pot of bone meal and some very coarse sand or burnt ballast. Remove all old roots at potting time, but keep those which are still white and fat. Spread these out when filling up the pot. Raise temperature to 60° as the season advances, for every encouragement must be given, to make the foliage grow. All the summer they need shade and moist heat to ensure this. Much liquid-feeding can be given during May, June and July, to encourage well-developed foliage and help subsequent bud development.

When the foliage begins to show signs of going to rest, decrease moisture and temperatures until by November the plants can be placed in their resting quarters. Do not let them become dry even then, but very little water is needed.

Established plants should be placed in a warm house in relays from February onwards. Pick those which show their buds first, and if these are put into a house of 65° they will be in full bloom in five weeks. Should be syringed frequently during the period
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of leaf making with insecticide to keep down mite, which is their chief enemy.

Of all colours white is the most expensive, but the self colours of red, rose, crimson and pinks are not cheap either. These self colours are considered to be the gems of the species.

Babiana.—These are small bulbs from S. Africa which if grown six in a 5-in. pot, will make a most brilliant show in April or May. They will not force and so a cool house suits them well. The flowers, which remind one of Ixias, are carried on wiry stems about nine inches high and are mainly orange or red. The most intriguing species is *B. rubro-caerulea*, red with a ring of rich blue around the centre.

Chionodoxa.—Well worth growing for the earliness of their blue flowers. Pot up five bulbs in a 3-in. pot, place outdoors, cover with ashes and let them remain till the pots are full of roots. Remove to a cold frame and leave there till the turn of the year. A few pots brought into a cool house each week will soon give a mass of blue flowers which are very beautiful.

Crocus.—The secret of growing good Crocuses in pots is not to hurry them. Pot in September, plunge in ashes or peat-moss for six weeks, then treat to cool conditions till the beginning of February. Never put into hot houses, 55° being the ideal temperature for bringing bulbs into bloom. The yellows are the shortest lived of the group, and the varieties suggested for pot work are those giant sorts such as Remembrance, Queen of the Blues, King of the Whites, Mikado, Purpurea Grandiflora and Paulus Potter.

Eucharis.—A warm house bulbous subject with a very rich perfume and a purity of colour which is rarely found in other subjects. The popular species *E. grandiflora* is one of the most beautiful white flowers in existence.

It must be given a rich loamy soil well drained and capable of remaining sweet for a long time. Grow in moist hot temperature (65°) all the summer, resting the plants during winter in a house of 55° or thereabouts. Water sparingly but on no account allow the plants to become really dry. In February transfer to the higher temperature again and give as much water as the soil will take. Blooming should soon begin, after which a slightly lower temperature will preserve the flowers. When blooming is over, the plants must be put back into the warmer house and any potting on that is necessary, carried out. Large potfuls of established bulbs will often bloom twice a year. The leaves of this plant are rather large and should be sponged frequently to keep them

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clean, for they are an easy prey to brown scale, mealy-bug and thrips. Red-spider mite is also a very troublesome pest and, unless checked by insecticides and perfect cleanliness, will often spoil the whole crop.

Eucomis.—There is only one variety worthy of cultivation, *E. comosa*, so long known as *E. punctata*. Its flowers are closely huddled together up a central stem and are a mixture of green and brown. Single bulbs are grown in 5-in. pots, or three can be grown together in a 7-in. pot. Pot on in March once every three years. Like most greenhouse bulbs they require plenty of water during the growing season of spring and summer, then less and less during autumn until the soil is dry by the time winter comes. Winter in a temperature of 45°.

Freesia.—Beautiful flowers in all shades of colouring have recently made the Freesia a far more important plant than it used to be. Specially attractive are the newer hybrids. The plants are always best if given cool treatment and are perfectly happy in a temperature as low as 40°.

Pot in August or September eight or ten bulbs in a 5-in. pot, using a soil that is almost pure loam. Should this be very heavy, add a tenth part of peat-moss, and in any case add enough sand to keep the loam from binding. Avoid leaf-mould.

Sit the bulbs on half an inch of sand and just cover the nose of the bulb with soil. Put them into a cold frame and do not shade them except to keep the sun from drying out the soil. Let them remain in frames until November, when they should be placed in a light spot in an airy greenhouse. If given a temperature of 50° after the turn of the year, it will be found ideal for their development. Greenfly may become a nuisance during the young stages, but a little tobacco powder, fumigation or weak insecticide will usually check it.

Four thin sticks placed around the edge of the pot with an encircling tie will be required to keep the 'grass' or foliage from falling over. This support must be given when the plants are about three inches high. The older varieties of *F. refracta alba* are being superseded by other good whites and even these are now taking second place to the great variety of colour and strength found in the hybrids. May also be grown quite easily from seed sown early in the year.

Gladioli.—The early flowering types are diminutive compared with ordinary garden varieties but this makes them all the more valuable as pot plants. The varieties used are The Bride, Peach

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Blossom, Ackermanii and all forms of *G. Colvillei*. Pot these bulbs into good ordinary compost during October or November. Use 6-in. pots. After potting, stand in cold frames till the turn of the year. There is no need to cover these with ashes, but frost must be excluded.

During January or February take the earliest into a cool house and gradually give them warmer conditions until the blooms are seen. Then cool off again. Feed with soot water from early February onwards.

The large-flowered type are sometimes grown in pots to give a supply of cut flowers during June. Pot the bulbs in large pots, not less than the 8-in. size and put five or six bulbs in each. Soil must be very loamy, and quite rich, if extra good spikes are wanted.

Grow cool at first, giving more heat as roots become numerous. Artificial feeding with some complete fertilizer will be needed when buds are forming.

**Hyacinth.**—These may be flowered at Christmas if ‘prepared’ bulbs are used, but this necessitates a fairly high temperature, say in the region of 65°. For such early flowering, grow them in boxes about three inches deep or singly in pots. Pot at the end of August and cover with ashes or peat-moss till the beginning of November. Remove from plunging material to frames and keep dark for a week. Then put into a warm house, giving a still higher temperature about the first week in December. Darken again to encourage stems to lengthen, but with developing blooms give full light.

Roman and Italian Hyacinths are easy to force, because they do not require much heat to make them bloom. Treat as for the ‘prepared’ sorts.

Exhibition sorts need good culture but are worthy of it. Procure top-sized bulbs by the end of September and pot one in a 5-in. pot with its nose just out of the soil. An inch of sand at the base of the bulb will encourage and protect young roots. Water in after potting and put into a plunge of ashes or peat. This covering should be four inches over the pots. Six weeks is the limit of plunging. Remove to a cold frame and keep them there until February. The slower they are brought into bloom the better the spike, so avoid high temperatures. Bedding Hyacinths may be grown this way also, but it is usual to put three bulbs in a pot. When in bloom, all Hyacinths will need support and a stiff wire pushed down beside the spike and into the bulb is the neatest method, a tie being given half-way up the bloom.
The Carnation lends itself to greenhouse culture in many ways, but the most popular type is the Perpetual-flowering Carnation because it is so aptly named and has its full flush of blooming during the winter and spring.
In the newer Freesia hybrids, size of flower as well as scent and a delightful sheen compels the greenhouse owner to grow it.

The new Freesia hybrids have revolutionized this flower, and few subjects make a more brilliant display than these when grown in pots for spring blooming.
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Irls.—For greenhouse purposes there are several species quite useful early in the year. Irises are very easy to cultivate and grow in practically any soil so long as it is well drained. They should never be covered with plunging material, as this weakens the base. Neither should they be subjected to great heat. Cool conditions give a more lasting flower and a fuller colour.

The earliest to bloom is *I. tingitana*, growing two feet high in pots and blooming at Christmas time and through January. Five bulbs should be put in each pot, 6-in. pots are best. Pot in September and grow in cold frames until November, after which they are happier in an airy part of the ordinary greenhouse. Slight heat will speed them on if required, but this is much better kept below or about 50°. Next to this come the miniature Irises, the best known being *I. reticulata, I. Susiana, I. histrioides, I. alata* and *I. Danfordiae*. These are best grown in pans and must never be given more than cool house treatment.

The well known Spanish and Dutch varieties are useful during April and May, when they bloom profusely, if potted in October and given cool treatment till February. The best of the group is Wedgwood, a delightful blue with plenty of substance in its petals. It forces rather better than the others, though *I. filifolia* is widely grown for market too.

*Ixia.*—Mentioned here because they give a variation to the majority of bulbs grown in pots. Pot up in September as suggested for Freesia and always keep the soil just moist and no more. Grow in full light all the time; do not attempt to force them or the flower spikes will become thin and thereby spoil the effect. Will need full sunshine to get the best from their remarkable colourings. The brightness of the many varieties should cause them to be more popular.

*Lachenalia.*—These are South African bulbs and only require cold house treatment to bring their blooms to perfection. Stems six or nine inches long with drooping tubular flowers during February and March make them particularly useful when flowers are scarce. The many good new varieties have given a larger range of colour, and as people get to know these better so will their cultivation increase. Early potting is an essential, so every effort should be made to get this done in August. Use a soil that is fairly open, loam of the best quality being 'opened' with peat-moss rather than leaf-mould. Enough sand to keep the drainage correct is also required. Only just cover the nose of the bulb when potting. Pot moderately firm but do not harden the lower
soil too much. Stand in shady frames after potting and water in. Here they can remain until November or later, if the frames are kept free of frost. The best place is a shelf in the cool house. Water only when they require it, especially if the weather is cold. No great heat must be given, for these are happiest in a night temperature of 45°. May also be grown in hanging baskets filled with a good compost, the bulbs being pushed into the soil at intervals of three inches all around the basket, and on the surface. Water such baskets by immersion, using lukewarm water.

Leucoecoryne (Glory of the Sun).—One of the colourful gems introduced from Chile. Its flowers are a glorious blue and if grown in 5-in. pots, five or six bulbs in each pot, it is a most captivating subject. Only needs a cool house in which to bloom and a good open loamy compost in which to grow. Like most bulbs, it will not respond to high temperatures, but will give a grand show in March in a house of about 55°. Needs much the same treatment as the Freesia. The only species available is L. ixioides odorata.

Muscari.—Easy to grow and worthy of any greenhouse because it is different from anything else, and the variety Heavenly Blue is outstandingly valuable for its colour.

The secret of getting good potfuls of bloom is to keep them cold as long as possible. Pot in October, plunge for a month, then grow in cold frames until February when they will come into bloom rapidly if placed in a temperature of 50-55°.

Narcissus and Daffodils.—These, when pot grown, are often spoiled by the limited root room given. All Daffodils need 6-in. pots to give good results, and the larger Narcissus the same size. For extra big bulbs I always use 8-in. pots and try to get four bulbs in each.

Poor soil is useless for this group. Make a rich loamy mixture if you want good quality results. Pot firmly and get this finished by the end of October. Cover the pots with four inches of ashes or peat-moss and let them remain in the plunge for five or six weeks. Lift out and put into cold frames, taking them into the warmer air of a greenhouse in relays, beginning in December with the earliest potted and earliest blooming sorts. Never give great heat or the buds will shrivel while still in the bulb. Will always give a better (if later) bloom in 55° than in 65°. Early flowering bulbs should be planted in August and early September. Early varieties: Paper White, Soleil d'Or, Cragford, Spring Glory, Winter Gold,
BULBS FOR GREENHOUSES

and following these come Golden Harvest, Magnificence, Mrs. E. H. Krelage, King Alfred, Carlton, Damson, Halvose, John Evelyn and Brightling.

It is wise to grow some of the Poeticus varieties which bloom much later and of these I suggest Actea and Sarchedon. If one is interested in the most beautifully scented of all Narcissi—grow the double Gardenia-flowered variety, but never try and force it.

This list is only given as a help to those who are wanting guidance on forcing varieties though there are probably hundreds of others which might also be used.

Nerines.—These are a group of autumn blooming bulbs of great brilliance and are quite easy to cultivate. Somehow or another, amateurs think they are difficult and this idea has spread to such an extent that I wish to correct it.

Pot the bulbs into a very rich loamy mixture, putting two or three into a 5- or 6-in. pot. This must be done while the plants are at rest—usually in June, July or August. Growth will commence about August, the flower appearing first. Once growth is seen to be pushing, water the plants well and keep them watered all the time the foliage is green, which will be till the following May. From then till August, stand the pots on a shelf in full sun to keep the soil perfectly dry. This baking period is an important part of the Nerines’ life, and a watch must be kept for the moment when the first sign of growth appears.

Soak the plants immediately in a tank for an hour or two and continue to water afterwards in the ordinary way. Nerines will make offsets and can be kept in the same pots for three or four years, so by the end of that time one has a pot containing many bulbs which, when in bloom, are a most gorgeous sight. There are a large number of varieties, chiefly in pink, rose, cerise, scarlet and crimson shades.

Ornithogalum (Star of Bethlehem).—An easily grown bulb and of particular use to the person who has no heat at all in his greenhouse.

Bulbs may be placed three or four in a 5-in. pot during September and October, the pots being put in some sheltered spot (not necessarily under cover) till January. This is another of the bulbs which does not need plunging.

Brought into any cool house in the New Year, they will soon come into bloom. This bulb should be more extensively grown than it is at present.
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**Ranunculus.**—The florists’ varieties of this genus are mainly varieties or hybrids of *R. asciaticus*, but their brilliant colouring and their silky sheen makes them rather popular both for cutting and for greenhouse decoration. Being something out of the ordinary many greenhouse owners find them a colourful change.

A light sandy soil is essential. The bulbs are like a bunch of claws and when potting, *these claws must point downwards*. They are better if encased in a little sand when being potted. Crock the pots extra well, and put the bulb in so that it is only just covered with soil. Bulbs can be potted during autumn or in spring, but of course you will have to wait longer for results from the latter. Grow in cool moist conditions after February, but up to then a frame will suit them. They do not want covering with any kind of plunging material.

**Scilla.**—Another bulb of particularly easy culture. *S. sibirica*, the tiny blue Squill, can be made to bloom in January without the slightest trouble. Put half a dozen bulbs into a 3-in. pot during the autumn in any kind of soil. Leave them in the frames till December, then bring them into an ordinary greenhouse and they will bloom within a month.

*S. campanulata* is a form reminiscent of our woodland bluebell, but it has a very hard wiry stem which carries much larger and more fleshy bells. There are several colours, in various shades of pink, blue, white and mauve, but undoubtedly the finest variety is Excelsior. These will take their own time to bloom and will not respond to forcing. Pot up in October, and keep in cold frames till February when they must be taken into a cool house where there is plenty of light.

**Snowdrop.**—Pot up as early as bulbs can be procured, usually in August, and place the pots in a shady frame. In December they may be taken into a cool house or left in the frames. No attempt must be made to force them. Very easy and very worth while. Best species are the lovely single Elwesii and the giant form called byzantinus. Usually sold under the botanical name of *Galanthus*.

**Tritonia.**—These bulbs bloom in May and are one of the most neglected. They are allied to the Montbretias and are only seen at their best when grown in pots. The flowers are carried on eight- or nine-inch wiry stems, eight or ten flowers an inch or so across, on every one of these stems.
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Pot bulbs in October and grow in frames or cool houses till March, when they can—if early blooms are wanted—be put into a temperature of 50-55°. On the other hand they can be left in the cold house and will then bloom in May. This bulb is almost hardy but not quite. The best variety is the vivid orange, Prince of Orange which belongs to *T. crocata*. Soil, potting and general culture are similar to that given to Freesias.

**Tuberose.**—A deliciously scented flower of creamy white, at its best in summer. When bulbs come to hand, usually in early spring, they should be potted at once, two or three being placed in a 5-in. pot. The soil must be a loam with plenty of sand added for drainage. Put the pots directly into a fairly high temperature (65–70°) and water the soil at once.

When growth begins, cool the plants down very gradually to about 55-60°. Here, in plenty of light, they should develop normally. Great care must be paid to watering, for should the soil dry out, the plants will immediately suffer, and probably never recover. Incidentally, only the best bulbs should be purchased, for inferior bulbs are useless.

**Tulip.**—Now considered as one of the great spring subjects from the turn of the year till May. First to bloom are the Duc van Thol varieties, these being in flower at Christmas. Put the bulbs in shallow boxes of ordinary soil during August or early September. Cover them with ashes or peat-moss and leave these till November, when they must be removed to a warm spot in the greenhouse. Put them under the staging or cover them, so that, in the darkness, the flowers are drawn out of the bulb. When the bloom is developing, put the box into a lighter place to harden the petals and the short stem.

The Earlies and Darwins, together with the Mendel and Triumph groups, are all extensively grown in pots, but for early blooming there are now many 'Prepared' varieties which with a temperature of 65° can be had in bloom by Christmas.

The ‘Earlies’ should be potted in September and plunged till late November. Four bulbs in a 5-in. pot is the usual number, but if the flowers are to be cut, then boxes four inches deep are a much better proposition, no more than an inch being given between each bulb. Use any open potting soil so long as it is sweet and leave the nose of the bulb well out of the soil. Press the surface soil firmly or the tulips may push themselves out of the compost. Plunge in ashes till December and if the blooms are wanted extra early, treat as recommended for the Duc van Thols. Early
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Tulips, once rooted, will stand a very high temperature—up to 75°, but for most ordinary purposes, 65° should be high enough if the tulips are darkened. This darkening is done to help lengthen the stems and then only in the early part of the year. After all, they are far better if grown in a cooler temperature, say 50–55° and allowed to develop naturally. They last much longer, too.

The other groups must be potted after the Earlies, first the Mendels, then the Triumphs, and last of all the Darwins, but all potting should have been done by the end of November.

Plunge all varieties and only take them out when the pots are filled with roots and the top growth is an inch or two in length. Darken for a week on taking out of the plunge and keep them in a cool frame for the first part of their life after this. Take into the greenhouse in relays, each week, but try to avoid a glut of flowers at the same time. Frequent syringeings are essential, as aphides always make an unwelcome appearance in the young growth of tulips. For the later flowering sorts a little feeding may be helpful, but in a general way I would suggest nothing more than a watering once a week with soot water.

A list of forcing and pot varieties will be found in any good bulb catalogue.

Vallota (The Scarborough Lily).—One of the Amaryllis group, especially useful because it can be grown in cool houses. Unlike the Amaryllis, it does not lose its foliage each winter, but has a few straplike leaves always upright and green. It blooms in late summer and autumn, though one can never be certain when a flower spike will decide to push up its buds.

The flowers are scarlet and there are several of these small trumpets on a stem, which is usually eighteen inches high.

Bulbs are best bought and potted during autumn and winter into a mixture similar to that suggested for Amaryllis. Like these latter, the Vallota does not need disturbing for two or three years. Give cool conditions at all times and plenty of water during summer, but reduce this to the minimum in winter, without allowing the soil to become dust-dry. The only species worth growing is *V. purpurea*, so frequently seen at its best in cottage windows, emphasizing its love of an undisturbed rooting medium. As it is one of those bulbs which seem to enjoy being treated casually, it should be far more frequently used in greenhouse collections. Its correct name is *V. speciosa*, but I use the one by which it has been known for so long.
CHAPTER XIII

LILIES

The value of Lilies to any greenhouse collection should be apparent to everyone. They are, perhaps, the most regal of all subjects grown under glass, and the immense variety of form, colour and type should make them far more popular than they are to-day. For some unexplained reason many people seem to think that Lilies are very difficult to grow under glass. Generally speaking, most species are quite easy and very adaptable as greenhouse plants.

To begin with, the stock must be good and purchased at the right time. It should be clearly understood that all Lily bulbs, when in a dry condition, must never be exposed to air. That is why good-class merchants seldom show dry Lily bulbs in quantity. When bulbs are purchased, they should be placed in sand or dry soil as soon as they come to hand, unless of course they can be potted straight away. As a matter of fact, one can be pretty safe if one decides to pot on bulbs immediately on arrival.

In the case of all greenhouse Lilies soil plays a very important part in any success achieved, as an incorrect soil also accounts for most of the failures. The fleshy roots of a Lily like a soil into which they can penetrate easily, but if they do this too easily there is a danger of weakness in the stems. The aim must be to give them a rich and well-broken soil into which the roots can slowly find their way. Choose a really good rich loam as the basis, and if it is full of fibrous roots so much the better. Break this up and mix about a quarter part of leaf-mould or peat-moss with the loam, together with a good sprinkling of sand. Artificial manure and farmyard manure are best left out, because all feeding can be done more profitably and with greater safety when the pots are filled with roots. Crushed brick rubble and burnt ballast may be added without fear, if the soil is on the close side.

In preparing the pots, special attention must be paid to the drainage crocks, which must allow the water to pass away quickly without the slightest hitch, all the time. It is a wise proceeding to place over these crocks, a thin layer of moss or fibre out of the soil. This makes certain that none of the potting soil gets washed in amongst the crocks and so stops or checks drainage.
The next important point to observe is that many of the Lilies are what is called 'stem rooting'; that is, after the stem has grown out of the bulb, roots begin to form on it near the soil. It is these roots which mean so much to Lilies just when they are developing their buds. It will be seen at once that such roots need soil. To get over what at first appears a difficulty, the bulb must be placed low down in the pot at potting time, and the pot only partially filled with soil. When the stems have become a couple of feet high, the new stem roots will begin to push themselves out.

**Fig. 39**
HOW TO POT LILIES

This is the time to fill the pot up with similar soil to that used for potting. Lilies which are not stem-rooting must, of course, be potted in the ordinary way, namely, by just covering the top of the bulb with soil. Always examine bulbs before potting and, should any of them show the slightest suspicion of rot or disease, clean the affected parts and then dust with powdered charcoal. Put each bulb on a small portion of sand when potting, as this encourages roots and also helps to drain water away from the base of the bulb. It is at this base where trouble frequently begins. Most Lilies only need cool conditions to bring them to perfection, so avoid undue heat at all times. Potting usually takes place in spring, and, when finished, the pots can be placed in any cool, frost-proof structure with safety. When growth begins, a little
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heat must be given. This should be done gradually and never on any account must Lilies be taken suddenly from low to high temperatures. They must also be kept near the glass, or at least be grown in light houses. If a Lily stem 'draws' too much, it is so weakened that it becomes liable to a sudden attack of disease, which will spoil it at once. No Lily needs a hot house, and therefore Lily culture is possible for the man who has only frost-proof houses. In fact, he will probably be able to grow far better specimens than the man who is tempted, simply because he has heat, to use it on such subjects.

During the growing period the chief enemy is aphid. This makes its home in the growing tips amongst the clustered young leaves, and for that reason is difficult to dislodge. In any case it must be dislodged and killed otherwise the plants will be crippled. The ways and means of doing this in order of their effectiveness are: by fumigation, spraying with liquid insecticides, and by dusting the tips with tobacco or derris powder. The slightest toleration of greenfly will spoil the plants. As already stated, top dress as soon as the stem roots are noticed but water the plants before doing so, and again when top dressing is finished. Lilies in pots are always impatient of artificial manures if these are too strong, but as a rule most Lilies like—and thrive on—soot water and weak farmyard manure. I would prefer either of these to any artificial manure. It may be that this latter is the only kind of manure which the grower can procure. In that case I would suggest it being used at only half strength. During the spring, Lilies benefit by being sprayed twice a day, but not with cold water. Any water used for spraying should be at least the same temperature as the house, and, better still, a few degrees higher. Staking is necessary, but the sticks or canes need not be thick. The slightest support is all that is wanted.

After blooming, cut off any seed-pods and let the foliage die down naturally, but do not withhold water until the foliage has all withered. Even then I consider the bulbs are better and more healthy if the soil, though dry, is never allowed to become dusty. Winter such bulbs in the pots, if possible in some place out of the way of frost, only turning them out and repotting them in the early spring. Here are some of the most useful Lilies for greenhouse cultivation.

L. auratum.—This is the Golden Ray Lily of Japan; it has enormous open flowers, gold-veined and heavily dotted with deep
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red. It is highly scented and blooms in August and September. There are now many beautiful varieties of this species with red markings over much of the petal and these I recommend for greenhouse growing. Height four to five feet.

*L. Brownii.*—A large white trumpet Lily with a purple or brownish exterior. Only seen at its best if grown outside. Grows three feet six inches high. Stem rooting.

*L. candidum.*—The Madonna Lily. Best grown undisturbed for three years in large-sized pots. Will stand slight forcing so long as heat is gently applied.

*L. chalcedonicum.*—Brilliant scarlet flowers with reflexed petals on long stiff stems growing about three feet high.

*L. croceum.*—Of great value where bright orange colour is wanted early. It is an easy Lily to grow and its vivid orange flowers covered with black spots may be bloomed by gentle forcing from April onwards. Now listed as *L. bulbiferum.* Stem rooting. Height two feet.

*L. elegans.* The many varieties of this species are all worthy of pot cultivation, partly on account of their easy culture but mainly because they are dwarf and embrace some of the richest of colours, especially the dark-spotted *atrosanguineum.* Height two to three feet.

*L. Hansonii.*—An easily grown lily for June and July. Yellow flowers, spotted black, the petals recurving very beautifully. The large number of blooms out at the same time is remarkable. Stem rooting. Height three to four feet.

*L. Henryi.*—This is worth growing for August displays owing to its gracefulness and its quantity of orange blooms. Very easy. Best grown in cold frames till July. Stem rooting. Height six to seven feet.

*L. japonicum,* often known as *L. Krameri.*—A beautiful pink Lily from Japan. Depends on the quality of the bulbs as to how they will bloom. Poor bulbs are a waste of time to cultivate. Do not overpot this variety. Stem rooting. Height two to three feet.

*L. longiflorum.*—The Easter Lily. Several varieties of this Lily are known by their names—*giganteum,* *eximium,* etc. This is the popular Lily used in church decorations, etc. One of the easily forced Lilies and valuable on that account. *L. eximium,* sometimes called Harrisii, is undoubtedly the best of these for pot culture.

*L. Martagon.*—Turk’s Cap. Many colours now exist in this group owing to the increased hybridization of later years. It is a
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lovely Lily, especially if grown in pots with no forcing at all. About forty or fifty blooms can be seen in bloom at one time on good spikes. Best potted in the autumn. Height four to five feet.

L. monodelphum.—A beautiful yellow Lily with reflexed petals, spotted black. Makes a very lovely pot plant. Pot in autumn in very open loam. Height three feet.

L. philippinense.—A large trumpet Lily of pure white. Has thin grassy foliage and is better grown in a cold house than in a warm one. It is very easily raised from seed and often blooms within a couple of years. Height two to three feet.

L. regale.—One of the loveliest of all the group. It has wide trumpet-shaped blooms, white on the inside but with a tinge of cream in the throat, while the outside of the petals is flushed with rose. It is sweetly scented but not overpowering. Ideal for pots, and if potted during the autumn and grown in a temperature of 50° during February, can be taken to 60° during March and the flowers will then come out in April. A succession from that month till late July can be obtained by growing batches and introducing a few at a time to gentle heat. Very easily grown from seed. Stem rooting. Height four to five feet.

L. Sargentiae.—A Lily with a trumpet rather longer and more tubular than the L. regale, the inside having a deepening creamy tendency towards the base, the outside of the petals being purple. Very highly scented. Stem rooting. Height four to five feet.

L. speciosum.—The well-known greenhouse Lily with large reflexed flowers which blooms through late summer and autumn. Very easily grown either in cold or warm greenhouses. Bulbs should be potted as soon as received and grown for the first part of their lives in cold frames, only taking them into the house when the basal roots are growing freely. Stem rooting. Height three to four feet. Best varieties: roseum, rubrum, magnificum, Melomone and album Kraetzeri.

L. tenuifolium.—A lovely Lily for pot culture, with very bright scarlet flowers carried on slender stems and with grassy foliage. Three or four can be grown in a 6-in. pot. Height one and a half to two feet.

L. tigrinum Fortunei.—This extra good variety of the Tiger Lilies makes a very noble pot plant. Pot up in February and grow as suggested for L. speciosum. Orange flowers with black spots. Another good variety is L. t. flore-pleno. Stem rooting. Height four to five feet.
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*L. Willmottiae.*—A very free flowering orange-scarlet Lily with graceful reflexed blooms borne on stiff stems five feet high or more. Must not be heavily forced or flowers will be mis-shapen. A grand Lily for June and July.

It must be clearly understood that most of these Lilies are really hardy and I have given them as pot Lilies simply because most of them may be grown inside and not because they actually need the protection of a greenhouse.

For those who are interested, it may be pointed out that many Lilies can be raised from seed and bloomed without much trouble. Seed of most sorts can be obtained from any good seedsman. As the conditions required for raising it are those which most greenhouse owners possess—a cool, rather than a warm house—it is surprising that more Lilies are not grown this way. Make a beginning with one of the easiest of all, *L. regale*, which responds so well to ordinary care and attention.

Sow an inch apart in boxes or pots, covering the seed about a quarter of an inch, and make sure the soil never becomes dry. The time of germination varies, but with patience one can usually expect a generous return for one's labours. It may take anything up to four years to get a flower from some species, but *L. elegans* often blooms the second year and *L. regale* in the third year.
CHAPTER XIV

ORCHIDS

The increasing popularity of small collections of Orchids grown without expert aid, renders it imperative to devote a chapter to these greenhouse plants. The family is so large and varied that only the fringe of the subject can be touched; full details would demand more space than can be allotted in a book of this description.

One would have to fashion one’s Orchid growing after taking into consideration the facilities available, for I can assure any reader that there must be no hit or miss attitude in connexion with the growing of Orchids.

I must however try and kill a widely held idea that Orchids are more difficult than other subjects. They are not, but they demand that specialized care which is essential to success.

To grow a comprehensive collection four different minimum temperatures would be required, hence if only one house is available, the minimum winter temperature easily maintained must be decided on and no Orchid which will not withstand that should be included. The erroneous ideas, so prevalent in the early days of Orchid history, that all Orchids require intense heat, humidity to saturation point, constant attention and great skill have been entirely dispelled.

With a proper selection of clean, healthy vigorous plants suitable to the house and a common-sense study made of their different habits, flowering and growing periods, they require less attention than many other plants.

The following instructions should be regarded as hints rather than rules. The greater number of Orchids are very adaptable, though differences of locality, the structure and position of the houses often necessitate local modifications.

Houses.—It may safely be said that there is no greenhouse in which some Orchids could not be grown, provided it obtains a certain amount of sunlight and that frost can easily be excluded.

The ideal house should have brick walls, and a span-shaped roof with anti-drip wooden rafters. Side lights are unnecessary, but for the sake of appearance may be included, particularly if the
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house is large. The house can run due north and south, but is better inclined in a south-westerly direction. If of sufficient length, the house can be made in two or three divisions. Except for the paths, the floor should be of natural earth.

Ventilation must be provided in the roof by continuous or alternate ventilators on both sides of the ridge; in the brickwork by shutter or sliding vents beneath the stages, opening on to the pipes. Side lights above the stage, if present, should never be opened; there is too much danger of draught. All ventilators should close tightly.

Piping should be adequate, in excess of, rather than under, requirements. Temperature is best obtained by having several pipes moderately warm than by fewer with fierce heat. Pipes (four inch) should be placed at least a foot above the ground, where possible, so that the earth beneath them can be kept clean and moist. Control valves are a boon, and essential if divisions are made in the house.

Staging.—Side stages should be about three feet from the ground (central stages about six inches higher) and should be composed of wooden slats two to three inches wide, spaced as required, or of slate or tiles forming a solid surface covered with an inch of shingle. If of open slats, a narrow dummy stage should be fixed about a foot above the pipes and this covered with shingle. Whichever stage is used, the plants should be stood on inverted pots.

Airing.—Fresh air is vital, but draughts are dangerous. On quiet, moist and warm days it may be possible to have all the ventilators open, particularly in the cool division. Usually vents must only be opened on the leeward side. Moisture and heat readily escape by the top vents, which must be manipulated to prevent undue loss of either. On warm summer nights air can be freely admitted to the cool houses, with discretion to the intermediate, but often to the warm house by the bottom vents only. Outside conditions must be studied. In winter they may be baffling, but revitalize the air wherever possible. Watch the thermometer always.

Shading should be provided by blinds, fitted to pull up and down on the outside. Failing such, the glass may be stippled with whiting, and blinds of some light material may be tacked to the rafters inside. Outside blinds should be in position by the end of February ready for use. Permanent shading can be deferred and temporary substitutes used until the bright weather
demands more shade; then stippling and inside blinds can be used in conjunction. As autumn advances, reduce the shading gradually; extra light, judicious airing and slightly less humidity will prepare the plants for the winter.

**Humidity.**—All Orchids, when growing, love a sweet moist atmosphere. Careful airing will give the sweetness, the moisture being obtained by damping every possible part of the house, stages, walls and floors. Even in winter no corner should be allowed to become dust dry. On hot summer days the houses must be damped several times. In winter the fire heat used largely rules the frequency of damping. The cool house with its then lower temperature may not require damping every day, but while their temperatures are correct, none of the houses must be allowed to get aridly dry. Never damp so late in the day that heavy moisture is present on the plants through the night. With the plants on inverted pots the stages can be damped without unduly wetting the plant pots. Avoid damping in winter so that the pipes are made to ‘steam’, this being a cause of mischief in cold weather.

**Watering.**—The nature of the plant and its state of growth are the guides; there are no definite rules. Kinds with decided pseudo (false) bulbs and hard persistent or deciduous leaves, which make their growths in one season and then apparently remain quiescent, require infrequent waterings during the quiet period. In nature they would probably not receive any water, but artificial heat and conditions under glass must be taken into consideration.

Vandas and similar plants have no pseudo-bulbs and therefore require water in the winter, but not so frequently as in summer.

Broadly speaking, when roots and growths are active, water freely. When both are inactive, water infrequently.

Cypripediums, Masdevallias and similar kinds without pseudo-bulbs require water throughout the year.

Cymbidiums have bulbs, but are in growth throughout the year, hence require watering. Rain-water should be used when possible.

**Resting.**—This withholding of water for short periods is termed ‘resting’, and if possible should coincide with our winter. Given too often during the quiet period, water will cause decay of roots.

**Syringeing.**—In warm weather many orchids benefit by light overhead sprayings, especially Odontoglossums, Miltonias,
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Cypripediums, Cymbidiums, Dendrobiums, Vandas, etc., but water must not be allowed to remain in the leaf axils overnight, or in young growths. Plicate leaved kinds, e.g., Lycastes, Calanthes, etc., should never be syringed, except between the pots.

Potting and Composts.—As far as possible, potting by the amateur should be effected in the spring from March to May. The correct time is just as, or before, new roots or growths are seen. Avoid potting after September unless imperative.

Osmunda fibre is the popular compost medium to-day. It may be bought ready for use; if not, it must be chopped, cut and ‘teased’ to small pieces.

Composts. For Dendrobiums and Cattleyas mix one-fourth, or less, of clean, cut sphagnum moss with Osmunda.

For Odontoglossums, Miltonias and Ccelogynes, add a little more sphagnum and sufficient crushed potsherds to keep the compost open.

Green-leaved Cypripediums, with a few exceptions, require three parts of loam fibre, freed from most of the soil, to one part of Osmunda fibre, again with the addition of crushed red brick or potsherds. Cypripediums with mottled foliage should have two parts of Osmunda fibre, rather less of sphagnum, one part of loam fibre and the crushed crocks.

Cymbidium and Lycastes require two parts extra fibrous loam and one part each of sphagnum and Osmunda, with a little hoof-and-horn fertilizer added.

All composts should be well mixed, and opening materials fine or coarse, according to the plants, added to all. Moreover, the mixing of composts must be done very thoroughly before using them. A little dried cow manure added to most of them will also be beneficial.

When potting orchids a practical lesson is an advantage, but if this is not obtainable, start by seeing that the pots are clean and dry. Fill them to one-third with clean broken crocks and charcoal if necessary. For Calanthes and Cymbidiums pots should be ‘crocked’ in the ordinary way, as most of the pot will be needed for rooting compost.

When roots have developed and grown out of the compost, or when a pot is crowded with growth, one should consider that repotting is necessary.

Use as small a pot as possible; never ‘over-pot’ an orchid. Remove the plant from the old pot, and commencing at the back
One of the favourite Lilies for pot cultivation is *L. speciosum*, and the variety rubrum is particularly easy to grow. It blooms in late summer.

Amongst the white Lilies, *L. regale* is probably the great favourite, as it can be raised from seed and gives a wealth of flowers on every plant.
*Lilium speciosum* Melpomene is one of the most ornate of all pot-grown Lilies, its red spotting on its blush and white petals being particularly appealing.
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of the plant carefully remove the old compost, but leave some (if good) under the latest made pseudo-bulb; then cut away all dead roots and shorten any awkward good ones. Place some compost over the drainage, then a small quantity under the plant, fit the plant to the pot and add or remove compost as required; the rooting centre of the plant should be level with, or just below, the pot-rim. If a Cattleya or similar growing plant,

let the oldest bulb just touch the edge of the pot, thus giving greater space for the new growths as these develop. Insert more compost, pressing it in with a bluntly tapered stick till the pot is full or nearly so. It may seem sufficient, but again insert the potting stick vertically inside the pot-rim, fill the opening made with compost, and continue thus all round the pot. Surplus compost may be trimmed off with scissors. Do not cover the upper surface of the rhizome or the bases of the bulbs. Never place compost in horizontal superimposed layers, or the upper layer will float. Cymbidiums and Cypripediums usually require

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larger pots which give more freedom to the fingers. Slight
differences must be made when potting different kinds; large
Cattleyas require very firm potting; Odontoglossum hybrids,
Miltonias, etc., firm, but that is all.

After potting, plants should have a little extra shade and
occasional light sprayings, but do not water the compost until
the third or fifth day after potting.

Insects.—Thrips, red-spider mite and scale insects must be
watched for; sponging, light fumigations and insecticide washes
are the remedies. Cleanliness is essential.

There are three acknowledged kinds of houses with differing
temperatures used for Orchids and each has its own particular
genera and species which do best in that temperature.
The first is known as the 'stove' house, which really means a
very hot one, having a summer night temperature of 65–70° and
a winter minimum of 60°.
The second is the 'intermediate' house, which has a summer
night temperature of 60° and a winter night minimum of 52–55°.
The third is the 'cool' house, with a summer night temperature
of 50–55° and a winter night minimum of 45°.

In making suggestions of certain Orchids which will suit each
temperature and type of house, this may resolve itself into a
string of names, and even this can be very misleading as many
species of the same genus may require varying temperatures.
*Vanda teres* for instance, needs the hottest house but *Vanda
cærulea* will grow quite well in the intermediate one.

Again many of the Oncidiums are only happy in the inter­
mediate house, but there are quite half a dozen species which
will do splendidly in the cool house.

I therefore think it best to give just a few genera and species
for the intermediate and cool houses, as I feel that anyone really
spending money to fill either type of house would get the best
and most authoritative advice from the specialist Orchid growers
from whom he would have to purchase the plants.

Moreover, I feel sure that anyone intending to grow orchids
in the hottest or 'stove' house would be something of an expert
before starting, and would already be aware of those species and
varieties suitable for such conditions.

For the Intermediate House.—*Anguloa Clowesii, A. uniflora.*
*Brassia maculata, B. verrucosa. Cattleya labiata, C. Mossiae,
C. Skinneri. Dendrobium nobile, D. densiflorum, D. thyrsiflorum,
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*D. Wardianum.* (These Dendrobiums can also be grown in the warm end of the cool house.) *Laelia Digbyana, L. pumila, L. anceps,* and *Laeliacattleya* hybrids. *Oncidium crispum,* *O. Cavendishianum,* *O. Papilio,* *O. Forbesii.* *Sobralia rosea,* *S. Sandera,* *S. virginalis,* *S. xantholeuca.* *Vanda caerulea,* *V. cristata,* *V. Sanderiana.* The Vanda hybrids all do very well in this type of house, much better in fact than in the cooler one, which may indeed be the reason why some growers find such a difficulty in growing these very beautiful orchids.


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TOMATOES, CUCUMBERS AND MELONS

Tomatoes

THE best tomatoes are those which come fresh each day from one's own greenhouse. The culture of this plant is not exacting and anyone, having only an unheated house, can, if he wishes, grow tomatoes of the highest quality.

A sunny house is their main requirement, and next to that a sweet and not too light soil. I would like to point out that the idea (held by some people) of tomatoes doing well in poor soil is quite wrong. They actually need a rich soil which will nourish these hungry plants all the time. Too often tomatoes fail simply because they are starved, and therefore at the very outset I emphasize this point.

Another outstanding fact is the need for a slightly dry rather than an over-moist atmosphere. A continually moist atmosphere will mean disease and disaster long before the plants have given their crop. The grower should be certain of these points before beginning, as attention to them will undoubtedly save him many pitfalls.

In no place is a buoyant atmosphere more necessary than in a tomato house, hence the question of ventilation coupled with just that amount of humidity required, must be faced and understood from the start.

Though the tomato does not require much in the way of artificial heat during summer, it does need some heat to raise the seed. The lowest temperature for this should be 55°, but 60° is far more suitable early in the year when seedlings have to rely entirely on artificial heat. I would strongly advise those people with no heating apparatus at all to buy their plants in small pots during April, when there is a reasonable chance of keeping an unheated house frost-proof.

Seed is best sown in boxes during January and February and March. Cleanliness counts for a good deal with cultivation of tomatoes, so make sure that the boxes are clean and dry and the soil perfectly sweet and free from all impurities—such as pieces of stick, rotting vegetation, etc. Such soil must be light for seed
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raising. Half good loam, half peat-moss, with a generous dose of sand will make a suitable mixture. It should all be passed through a half-inch sieve. As young tomato plants are particularly susceptible to fungoid diseases, it is well to take precaution against this. A partial sterilizing agent called Cheshunt Compound is very useful in this respect. It is a powder and dissolves quite easily in water. This water must then be used to drench the soil before sowing takes place and it will be found of great value in checking the dreaded damping-off of seedlings commonly called 'black-leg'.

The safest method is to purchase properly sterilized soil, and the John Innes Seed-raising Compost should be used where there is any question of one's own soil being unsuitable.

Space the seeds out half an inch apart when placing in the boxes, covering them with an eighth of an inch of fine soil. Gently press this and damp the surface. Of course, great care must be taken not to disturb the soil or seed, so a very fine rose must be used on the water-can. Place the boxes in a moist warm corner and darken the surface by putting a piece of brown paper over it. The seed germinates very quickly and therefore this paper must be lifted every day (after the first day or two). To keep the covering on a day too long would spoil the seedlings.

Once up, give the seedlings all the light possible, but do not put them too near the glass during the early days of the year when the weather is cold. The temperature near the glass is often the coldest part of the house. At this stage, too, there may be a danger of the soil becoming dry, and the best way to water the box or pot is by immersion, but be sure that all water used is lukewarm. Once up, the plants soon make a lot of roots, so before these roots are too numerous and before the leaves of the plants are too crowded, prick them out into a soil which is about three parts loam and one part leaf-mould (or peat-moss) and sand. Some people prick out when the first two seed-leaves have developed, but this necessitates a very even temperature so that the youngsters never get a check, and where one is not very sure of a non-fluctuating temperature it might be wiser to wait until the first rough or 'true' leaf appears.

Once pricked out they should soon get over the shock of moving and will begin to grow quite quickly.

By this time the plants should be strong enough to endure a much lower temperature; 55° will be about right. It is a great mistake to leave tomatoes too long in the pricking-off boxes.
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To do so means that when they are moved, many roots get broken. Actually the sooner they are put into small pots the better. Use a similar soil to that suggested for pricking out, but let it be of a coarser nature. When potting, press the soil but not so hard as to make the compost solid. The roots want air and they cannot get this easily in a soil which is pressed too hard.

From this point everything must be done to ensure a short-jointed plant. This is done by giving as much light as possible and a temperature of between 50° and 60°. Higher temperatures, bad light and atmospheric moisture will ruin the plants. By this stage the weather outside will have become much warmer and therefore much more ventilation may be given. Provided the plants are not allowed to stand in a draught, such ventilation on warm days will do more good than anything. It is the sturdy plant that one requires.

From these small pots to the 5- or 6-in. size is only a matter of a month, probably less, but of course the soil required will need to be much heavier as the plants get bigger. Keep all soil well on the loamy side and try to mix up all such composts a week or two ahead of using them. During this part of the plant's life a great deal of trouble may be caused by cold draughts. This should put growers on their guard against this particular evil.

If for any reason the plants cannot be potted on when they are ready for it, give a dose of some good balanced artificial fertilizer to keep them going. Starved plants will never recover and they can so easily become impoverished at this stage.

There are several methods of growing tomatoes in the final stage. They may be planted out in a border inside the greenhouse, a ridge of soil may be placed on the staging, or the plants may be put into boxes or pots. No matter which method is used, a great deal depends on the quality of the soil used. While it must be understood that tomatoes are not fussy about soil, it is impossible to grow a reasonable crop in poor soil.

Moreover, the soil must be sweet and free from harmful organisms, and that is why commercial tomato growers rely on sterilized soil. The amateur can now buy such soil, and if he is wise he will choose it for a rooting medium. It is also possible to purchase the various John Innes Composts with the correct amount of J. I. Base Fertilizer incorporated. This at least gives a clean start and a very good chance of an excellent crop.

If, however, the amateur wants to grow his plants in the soil of the greenhouse floor, he must sterilize it with one of the sub-
stances sold for this purpose or use formaldehyde at the rate of one part to forty-nine of water, soaking the border with this in winter—preferably while the whole house is empty.

If he is to mix his own compost for the final planting, the loam should be sterilized before mixing.

An excellent compost can be made up of six parts loam, one and a half parts peat-moss, with sufficient coarse sand, broken brick or burnt ballast to ensure drainage. To every bushel of this should be added some base fertilizer. An excellent one is three parts superphosphate of lime, two parts sulphate of ammonia, two parts sulphate of potash, all mixed by weight and thoroughly incorporated with each other. This should be added to the compost at the rate of four ounces to the bushel.

Tomato soils are all the better for some chalk being added, and two ounces of ground limestone or chalk will be advantageous in most cases.

The soil should be turned at least three times and mixed well in advance of its being required.

Note, however, that while I suggest the use of sterilized soil, it is not absolutely essential and many excellent crops are grown with ordinary stacked loam as a basis.

The compost for this final potting should be on the rough side and rather dry at the time of using. The dryness allows one to ram it fairly hard without making it too close. Some people recommend that plants should be potted low and the stem covered well up with soil. I cannot agree with this, but I suggest placing the surface of the ball about an inch below the soil in the new pot, enough room between the soil and the rim being left to give one or two top-dressings later on. This is preferable to the old method of potting low, which I feel sure is one of the causes of much stem trouble.

From this time onwards nothing in the way of real dryness in the soil must be tolerated, though it is equally essential that only sufficient water should be given to keep the plant growing healthily. Too much water lying unused in the soil is likely to be a grave danger, for it will kill the roots more quickly than anything, especially if the weather is sunless and cold. Ventilation also plays an important part in the life of the plants and there should always be a crack of air left on the top ventilators both night and day. The lower lights of the house should also be opened on very hot days, so that a current of air is created to counteract the heat of the sun. Shading should not be necessary,
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but in an abnormal spell of hot weather it may be wise to spray the glass ever so slightly with whiting or distemper. Actually a temporary covering during the middle of the day is the best way out of such a difficulty—which only arises infrequently.

When the borders in the greenhouse are used as a rooting medium these must be dug and manured and if possible some fresh loam should be added yearly. The tomatoes should be planted in a slight trench, so that something equivalent to the top dressing recommended for pots can be given.

When the plants are grown on stagings the soil should be placed in a continuous ridge right along the bench as near to the front glass as is convenient. The depth of this should be about eight inches and the width about eighteen inches. An easy way of keeping such soil in position is to put two nine-inch boards (on edge) in two parallel lines along the staging, putting the soil in between—but only enough to allow a couple of inches top dressing to be given later on.

The training of plants is dictated by the type of house in which they are to be grown. In the case of span-roofed houses, with stagings, the plants must be trained up near the glass, but kept at least six inches away from it by wires. Wires can be kept that
distance away if 'vine eyes' are screwed into the rafters and the wires run through them. Make sure that all wires are strained when fixed. In lean-to houses there should be a border made along the back wall and another on the staging in front. Should the back wall be very high and the house rather dark it would be wiser to grow the plants in pots and raise these nearer to the light by means of a temporary shelf. Light is essential for cropping.

Plants grown in borders can either be trained up canes, stakes or strings.

Treatment is very simple once the plants are growing fast, for all one has to do is to keep the side shoots rubbed out as they appear. Care must be taken not to mistake the bunch of buds for a side-shoot when it is first seen. The 'setting' of the flowers is
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often aided by giving the plants a sharp tap in the middle of the day, for during that time the pollen is dry and the stigma receptive. To obviate any trouble at all a rabbit's tail on a cane may be used to move the pollen. Not a long job and quite worth while.

Once the fruit begins to swell, feeding may be commenced, and I think the amateur will be wise if he uses one of the specially blended fertilizers sold for the tomato. Any good firm's products can be trusted to contain all the elements necessary for the well-being of the developing crop.

![Fig. 45
SIDE SHOOTS OF TOMATO.
TAKE THEM OUT AT X.]

As the growth and root system develops, the top dressing must be done, and it is wise not to delay this. Use a similar compost to that for the final potting, but double the amount of fertilizer per bushel.

Next will come the question of how many bunches the plant will carry, and this can only be decided by the grower. If the plants are in large pots or planted in borders and were developed early in the season, then six or more trusses can be taken. Once this decision is made and the number of bunches required have formed, pinch out the growing tip of the plant and let all the energy go into the development of the fruit. I have seen ten trusses on well-rooted, generously-fed plants where a little artificial warmth has been available to ripen them in autumn.

Always pick tomatoes as soon as they are ripe, for to leave them on the plant is to cause an unnecessary demand upon the roots,
as the ripening process of the actual seed goes on long after the fruit is red.

Towards the middle of the summer the foliage may become so thick that some of it must be cut away. This 'defoliation' must always be looked upon as a necessary evil, for it is not a natural thing to do and the plants may suffer by it. If the proper distance apart is given at planting time, then only a slight cutting back of the leaf is necessary. Even this must not be done in one operation, but a few leaves cut each day until the whole batch has been treated. There is only one reason for defoliating plants and that is to let light and sun into the bunches. If this can be achieved with the minimum loss of foliage so much the better. Another method is to remove every third leaf entirely, leaving the others as they are.

Every grower will have to keep a strict look-out for the appearance of diseases, and though these are for the most part easy to combat it does involve attacking them at the very beginning.

The chief disease is Tomato Mildew (Cladosporium fulvum), sometimes called tomato leaf-mould, rust or blight. It appears on the undersides of the leaves in the form of a brownish mould or mildew, but only shows a yellow patch on the surface of the leaf. Watch for this yellow patch. It is always due to over-humidity combined with bad ventilation. Fire heat with a moist atmosphere will do more than anything else to cause this. Hot stuffy days should always be a signal to ventilate as much as possible, so that the air in the house is kept moving. July and August are the two months to watch for this. Nowadays sulphur is sold in dust-like powder, so that it can be used with much greater effect than of old. It is this finely ground sulphur which must be used on the mildew patches. Periodical summer spraying with Bordeaux Mixture or an ounce of sulphide of potassium to three gallons of water makes an effective wet spray for checking this trouble. Many proprietary sprays are sold to combat mildew and it is usually easier to use these; they are harmless to the fruit.

Foot-rot or damping-off can give a bad start but is not, as a rule, much found where soils have been sterilized. Seed sowing soils should be treated with Cheshunt Compound, which will give the vital protection against this in the early stages.

Verticillium Wilt causes the plant to flag or wilt in hot weather during the day and then recover by next morning, only to repeat this process until it ultimately dies. If only one or two are
affected take them up and burn them, but if there are a number, try shading the house, raising the temperature and keeping the house close for a time, by frequent damping, as the general watering is not done. Secondary roots may form and the plants recover, so a heavy dressing of peat, which must be kept moist, around each plant is necessary. This disease must always be looked upon as a signal for the changing of every portion of soil in the following season. It is also necessary to cleanse the house thoroughly and sterilize any borders with formalin or formaldehyde at the rate of one part to forty-nine of water.

Towards the end of the season the ordinary potato disease (Phytophthora infestans) sometimes attacks the tomato, especially late fruit indoors. The leaves and the fruit both show evidence of it, by a kind of rusty or crinkled appearance, and this in a short time turns dark brown. Affected fruits will soon rot, even after they have been picked.

The remedy is again the use of Bordeaux Mixture, and such a simple remedy might well be employed as a preventive measure.

The control of tomato pests is a much easier matter to-day than it was years ago. The chief offenders are aphides, red-spider mite, thrips and white-fly on the plant, but the use of insecticides containing B.H.C. and/or D.D.T., together with the new canister 'Smokes' with these elements in their make-up, will keep most plants free and clean.

The tomato with 'yellow back' (a yellow zone around the stem end of the fruit) indicates that the soil lacks potash. This must be added immediately the trouble is noticed, by the use of sulphate of potash used at the rate of one ounce to three gallons of water when watering once a fortnight.

To sum up, tomatoes require clean surroundings, ordinary care in watering, ventilating, feeding and common-sense treatment which any amateur can give. If they can be sure of these things, tomatoes give a splendid return for labour expended upon their culture.

As to varieties, there is an infinity of them and it is difficult to say in which way one is better than its neighbour. Some, of course, have their own individual characteristics. Some are earlier than others, some larger than the average. A catalogue of names is not likely to help the reader, seeing that he can find this for himself in any seed-list.

This much must, however, be said. The golden tomato ought to be grown far more than it is at present. It is sweeter and just
TOMATOES, CUCUMBERS AND MELONS

as easily grown as the red. There are also many forms of tomato, some shaped like red-currants, others like plums or cherries, and they all require the same kind of treatment as for the ordinary culinary red sorts.

I also think the smaller bush types of tomato might satisfy the amateur as a pot plant.

Cucumbers

The growing of cucumbers is not a difficult task, providing one point is borne in mind. At all periods the plants require a moist atmosphere. It is even more important than heat, but a combination of the two ensures conditions admirably suited to the growing of cucumbers. It is therefore a wise proceeding to ask oneself before beginning, if such conditions are available. Big houses are not required and the smaller and narrower the house the better. Small houses hold the atmospheric moisture much more easily than tall ones. A most economical house is a narrow one nine feet in width called a 'sunk house'. This is because the path is excavated. If two feet of soil is taken out and the width is two feet also, the soil on each side of the path becomes the staging. Such paths must have a wall built on each side to retain the soil in position. The house then consists of a roof only, this being fixed on a brick foundation a few inches above ground level. Nearly all cucumbers are trained on wires running along the rafters, but kept six or eight inches away from the glass by means of 'vine eyes'. In ordinary span-roofed houses the same method applies, but in the case of a lean-to house only the front staging must be used as cucumbers are not likely to do much trained up the back wall, unless the house is a small one and the light very good.

Only where a continual temperature of 65° is maintained can cucumbers be grown all the year round. They are, however, more in request during spring and summer and the majority of readers will be quite prepared to sow after the turn of the year. For raising the seed I prefer to put one or two seeds in a small pot rather than sow several of them together. This allows for an undisturbed period at the very beginning of their lives, when disturbance may, and often does, cause disaster. If both seeds germinate, pull out the weaker. Soil for seed raising must be very light. Half loam, half peat or leaf-mould will do, with sand added. Always crock the pots, no matter how small they are. Cover the seed with a quarter of an inch of fine soil and water it
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with luke-warm water. Stand the plants in a propagating pit where a temperature of 65-70° is available. Once the seedling appears, give this a little fresh air, gradually moving the growing seedling towards the airier part of the frame and ultimately taking it out and placing on the greenhouse staging. Whenever these plants require water, use it with the chill taken off. The same applies to spraying, which should be done every day if the weather is bright.

FIG. 46
CUCUMBER OR MELON HOUSE

As soon as these small pots get a normal amount of roots in them, move the plant to the 5-in. size. This time use three parts loam, one part leaf-mould or peat-moss, with some crushed brick or sand. Warm this soil before using it. After potting, keep the plants in the warmer end of the house and shade them if the weather happens to be very bright. All such shade in the early year must be temporary and very thin. Later on it may be permanent. Stake the plants with thin sticks about a couple of feet long. Always tie the plants with white raffia or soft twine. Coloured raffia will sometimes injure the soft stem of the plant.
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Though the fruiting plants can be grown in pots, it is far better to plant them out. Restricted root action is no use to the cucumber. The method most suitable to amateurs will no doubt be the simple one of making mounds and planting the cucumber on these.

First of all put a layer of partially rotted manure on the staging and then make mounds of soil three feet apart. A good pailful of soil is quite sufficient for a mound. This soil should be about the same proportion of loam and leaf-mould as that suggested for the last potting, but if any rotted manure is used, add also as much extra loam as manure. Plant the cucumbers after the soil has become as warm as the temperature of the house.

Make a hole in the centre of the mound deep enough to take the ball of roots easily. Knock the plant out of the pot, remove the crocks very carefully and place the plant in the hole. Fill in around it and give a gentle pressing to the soil. Leave a small saucer-shaped depression around the stem to facilitate watering. Should the soil be the slightest bit dry, water the whole mound thoroughly. Shade if the weather is sunny, or the leaves will 'burn'. Once the plants start rooting into the new soil, their growth will be very rapid at the correct temperature of 65°. Training therefore begins at once. Five or six wires along the roof, fixed with 'vine eyes', are ample. These wires must be six or
eight inches apart and should be strained very tightly at the time they are fixed.

The original stick given to each plant should be long enough to take the growing stem up to the first wire. After that no difficulty will be experienced about training. All tying must be done loosely, because the stem will still swell after the tying is done. The plant will need pinching to make it break and throw out side branches.

It does not really matter whether it is pinched at the second wire or is taken to the top wire and then pinched. If anything, I prefer the latter method. Side shoots will then develop in profusion and must be tied to the wire nearest to them. When such shoots are a foot or fifteen inches long, these also will need pinching. This will give a large number of other shoots called 'laterals', and it will be noticed that cucumbers are forming at many of the axils. Keep all such laterals well tied, or when the cucumbers begin to swell their very weight will steady down the growth.
One of the "bush" tomatoes, Dwarf Gem, grown as a pot plant, showing the adaptability of this type to pot culture.

An excellent crop of tomatoes in an amateur's greenhouse. The variety is Ailsa Craig.
A delightful display of pot plants, all grown from seed. These are all annuals which were sown the previous September to bloom the following spring. The hanging baskets are filled with trailing Lobelia.
Pinch all laterals again two leaves past a swelling cucumber. The sub-laterals will again need pinching in due course.

The difference between the female and male flower is easily seen, for the male flower has only a very thin stalk behind it, whereas the female has the tiny cucumber attached even in the earliest stages. Do not under any circumstances allow the male flower to come into contact with the female, otherwise your cucumber will swell like an Indian club at the extreme end and so have to be wasted. What happens is that the fertilization of the female fills the cucumber with swelling seed. The safest method is to pick off the male flowers as they appear.

Cut out any superfluous or unwanted growth. All this time great attention must be paid to keeping the soil and the atmosphere moist. Plenty of water at the roots is essential and the slightest drying out of the soil will cause the plant to weaken so quickly as to be open to an enemy attack within an hour or two. Spray the plant thoroughly night and morning if the weather is bright, but not if it happens to be very dull or cold.

Two, or perhaps three, top dressings must be given to the soil. Use the same sort of compost as was used for making the mounds, but add some artificial manure to it in proportions given by the makers. Give an inch of top dressing each time and make this very firm. Water the mound before and after top dressing, using a fine rose on the can.

Another effective way of top dressing is to cover the mounds
with thin turves which have been stacked for some time. Put the grass side downwards. Where this is done care must always be exercised in the watering, as such turves dry out very quickly. If these turves are dusted with fertilizer so much the better. Feed liberally towards the end of the crop and keep every fading or injured leaf cut out. Any old unwanted growth must also be cut away. Crops sown early may, with advantage, be limited and another sowing of seed made late in spring or early summer to take their place.

Red-spider mite is the dreaded enemy. It is up to the grower to do everything in his power to stop it getting a hold on the plants. Its alarming rate of increase should be sufficient warning, for if once it gets a real hold on the plants, not only the appearance of the plants but their very life is spoiled.

Thrips are equally troublesome but can be kept down, first by maintaining a moist atmosphere at all times and by the systematic use of such pesticides as I recommend for pests on the tomato. It must, however, be borne in mind that the foliage of the cucumber is much softer and consequently more easily damaged by strong insecticides or fumigations. So I warn readers that whatever they use, let the strength be considerably less than if it were being used on tomatoes. Always follow the supplier's instructions.

**Melons**

In some respects melons require much the same treatment as cucumbers, especially in the younger stages. They like warmth and some moisture to germinate but after that they differ from the cucumber in their atmospheric requirements. Whereas the cucumber likes a humid atmosphere all the time, the melon, after its first month of life, requires a much drier air. Soil, too, must be of a heavier nature. The method of growing them in mounds of soil is similar, though I always feel a continuous bank of soil to be the better method where melons are concerned.

Sow melons in February or March in single pots. Place these in a propagating pit with at least 65° available. When a few inches high, get them gradually used to the air of a warm house with not less than 60° as the night temperature. Pot on to the 5-in. size before the roots have become very numerous, as in melon culture the great thing to avoid is starvation. This can happen so easily unless one watches the root action.

A good fibrous loam is essential as the basis of all melon culture. For this first potting the loam should be broken up into small
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lumps and one part in four of leaf-mould and sand must be mixed with it. Some broken brick or smashed crocks instead of sand is a great help in keeping the soil open. A fairly heavy soil which will not become sticky should be the objective. Pot firmly but by no means hard. Water the newly potted plants at once if the weather is hot. Stand them in a light place and, though slight shading may be necessary when the plants are first potted, there should be no need to keep this on after the third day. Stake and tie the plants as they grow.

The soil for the bank or mound must be mainly loam and if the loam is fibrous it can be used without any additions at all. Of course, few loams come into this category, so usually a sixth part of leaf-mould (or peat-moss) and rotted manure, together with a little sand or burnt ballast, must be added to the loam. Turn this once or twice before it is taken into the house. Let it remain in the house for a week before planting. When really warmed through, planting can be done in the same way as advised for cucumbers, but if the soil is on the damp side it must only be pressed enough to firm it and under no conditions must it be rammed.

Unlike the cucumber, however, the melon does not want a saucer-shaped depression left near the stem. Actually water lying around the stem of a growing melon is likely to cause trouble. Finish the soil off in the usual way and then there will be no danger of the compost around the stem being over-moist. Train the melon right up to the top wire before pinching out the tip. It is a very great help if a thin cane is tied to the wires in the exact track of the melon. The plant can then be tied to the cane without danger to the tip. It is apt to get broken as it struggles from one wire to the next if there is no supporting stick or cane.

Once the tip is pinched out, the side shoots or branches develop rather quickly and on these first shoots, flowers, both male and female, usually appear. If they do not, then these shoots must be pinched to induce others and these will be certain to give flowers.

It is here that the vital difference between the cucumber and melon occurs. Whereas the cucumber must on no account be fertilized, the melon will never develop its fruit unless it is fertilized. The female flower bears the tiny melon at its base as it breaks into bloom, while the male flower has nothing but a short thin stalk. All fertilizing must be done in the middle of the day. At that time the female flower has a sticky substance on its stigma,
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which is then receptive. Take a male flower and break off its petals carefully so as not to dislodge the pollen clinging to the stamens. Insert this into the female bloom, so that the pollen falls on to the stigma. This action causes the melons to swell, and this they do rapidly once fertilization has taken place. Now some plants have an annoying way of allowing the melon first fertilized to swell at the expense of others. Thus it is best to wait until four or six female flowers are out on each plant and fertilize them on the same day. Most melon plants will carry four melons, but if

extra good fruit are wanted then three is enough. A small-fruited variety of course carries more.

All this time the treatment is what may be called 'dry treatment'. The atmosphere should be kept fairly dry and so spraying must be limited to once a day, and even then it must not be heavy. During the period of fertilization, the soil ought to be rather on the dry side also, but not, of course, anywhere approaching the dust-dry stage. Once the 'set' is obtained, much more water can be given and also heavier and more frequent syringeings. Feeding must also be done, and immediately roots begin to show on the surface, a top dressing of enriched loam must follow. As a general rule melons, when well grown, should not need anything in the way of shading, though there are exceptions, such as in very hot weather, when small houses can easily become over-

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heated, and in houses with glass near the soil bed. In the last case it is always best to keep direct rays from striking on to the soil. This can be done by a line of whiting brushed on to the front glass. Melons need ventilation on all warm days especially at the time of fertilization. Once the swelling period begins to reach its climax it is necessary to keep the house and plants drier and the top ventilators must be open night and day, if only an inch or so. A free circulation of air is essential from this time till the fruit is cut. Once the fruits are set the usual procedure is to pinch the tips out of all side shoots, two leaves past the swelling fruit, but those side shoots carrying no fruit at all must be pinched at about the fourth leaf from the main stem.

Melon plants may be fumigated up to the time the fruit begins to swell, but to do so after that time is dangerous. Pests, mainly thrips and red-spider mite, must be kept down by spraying or by the use of 'smokes'.

Fruit should be left on the plants until the stem which carried them begins to crack in a circle around the top of the melon. To ensure no harm coming to it, each melon must be put into a net to take its weight. These nets are made specially and must be tied to the wires when the swelling fruit is about half grown.

Melons and cucumbers cannot be grown satisfactorily in the same house, but divided into compartments it offers an ideal method for growing both, as in the question of fire heat their requirements are much the same.

Where one is tempted to try the two in the same structure, it is usually a case of giving the melon a little more humidity than it likes and giving the cucumber a little less.

There are several fine varieties of melon offered by seedsmen, but I doubt if there are any with better quality flavour than some of the older ones such as Ringleader (green-fleshed), Emerald Gem (green-fleshed), Superlative (scarlet-fleshed), Godden Green Queen (green-fleshed) and Hero of Lockinge (white-fleshed).

I also recommend the Cantaloupe types, especially for cold houses, so long as the sowing is delayed till early April.
THE growing of annuals under glass has now been accepted as one of the most important and rewarding methods of keeping cool and cold greenhouses gay—especially during early spring. The fact that they are nearly all of easy culture and require very little in the way of specialized treatment makes them appeal to the small amateur in a way that few other spring-flowering plants would do. They are also inexpensive to grow, seeing that seed costs so little.

All these annuals are sown in the autumn, kept very cool through the winter, and then finished off in slightly warm greenhouses during the months of March, April and May.

The detailed treatment for the majority of these would be as follows.

Seed is sown in seed-pans or boxes during September, the plants being pricked out when large enough, kept in cold frames until, say, November, when they are better transferred to the greenhouse because of the slightly drier atmosphere. Some of the plants may grow so fast during the months of September and October that by November they can be potted off into 3-in. pots. The aim of the grower should be to get the plants into these pots by the end of November, so that they carry on through the winter in this size pot. The soil used for all these pots should be fairly open with rather more sand added than is usual in such potting composts. The fact that the plants have to remain all through the winter in this compost makes it essential that drainage should be efficient. After all, it is the drainage of the soil which will account for very much in the lives of these plants in the next six months. In foggy or very misty districts it will be found essential to keep all such plants in very airy conditions, say on greenhouse shelves or open stagings, or in any case in some part of the house where air and ventilation can be given at every possible opportunity.

Having wintered these plants in a temperature of 45° or thereabouts (though a drop to 40° would not be very harmful), it should be remembered that a sudden freezing of plants that are known to be hardy annuals would in this case cause disaster. Though such
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plants are perfectly hardy outdoors, the fact that they are grown inside under artificial conditions does to a certain extent weaken them, their growth being softer than it would be outdoors.

During the months of January, February and March many of these annuals will require potting into larger pots. The soil must be made much more loamy than usual and in any case should be of a much heavier nature than previously. General mixture for potting should consist of four parts loam, one part peat-moss and half a part sand, with some decayed manure or fertilizer added.

During spring the majority of these annuals will need all the sun possible, and this, together with as much fresh air as the weather allows, will keep them sturdy, healthy and clean. Some of these annuals may be grown three or four in a pot to make useful specimens for decorative purposes. The charm of such subjects lies in the ease of their culture and the fact that they can be grown by anyone possessing an unheated greenhouse, as I have already explained. There are many beautiful things amongst these annuals which have not been attempted by the majority of growers, and I am therefore giving a list of annuals which I consider of value as pot plants, particularly those which bloom in the early months of the year. There are, of course, many others.

Ageratum.—A dwarf growing annual very handy for the front of any greenhouse group or staging. It is very easily grown, but to get good plants in the springtime one has either to sow seed in August and grow the plants on, or take cuttings during the autumn and grow in pots in the ordinary way. In any case these must be grown in small pots; they take up far too much room when grown in large pots. The 3-in. size is quite large enough.

Alonsoa.—This is a much neglected annual and yet it is one of the most easily grown of the whole group. Sow in September and keep the plants cool all through the winter; pot into 5-in. pots in very open loamy soil during spring. If the plants do not break of their own accord, one pinching is enough to make them do so. The best species for pot work is A. Warscewiczii. If grown well, these plants will be two and a half feet high, the colour of the flowers being a dark brick red.

Amaranthus.—The best varieties for pot work are those which are grown for their coloured foliage rather than those which are grown for their flowers. Some of the ornamental foliage is particularly beautiful and the shape of the leaves varies with the
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different sorts; there are dark red, green and bronze, others being yellow and green. The best varieties are from *A. tricolor*. Any good ordinary soil will do for these, but they are sometimes very difficult to manage in the depth of winter; for this reason they are much easier to grow if sown in January and grown on from that date. They do not want large pots and a 5-in. pot is ample for their requirements. They love sun.

**Anagallis.**—This is the pimpernel, and the beautiful grandiflora varieties, of which there are red and dark blue, make delightful plants in small pots. An ideal place to grow these is on a greenhouse shelf. They are very easy to cultivate. Sow in the early part of the year and raise in a cool house. Keep cool all the time. Put three or four plants in a pot.

**Antirrhinums.**—These well-known garden plants, though not annuals, make ideal subjects for pots and as they bloom in April and May from an August sowing they are worth considering.

Prick out immediately the plants are large enough to handle, so that they become strong at the outset. Pinch them when two inches high and when the new shoots appear, put into small pots. Keep them cold throughout the winter but put into 5-in. or 6-in. pots during February. Give only medium temperature (about 50° at night) during March if you want the best from them.

**Bartonia aurea.**—A very easily grown annual, usually about two feet high, covered with light yellow flowers, having a darker yellow eye. One of the easiest of all annuals to grow in pots and one of the most beautiful when done really well. Best sown in September and grown slowly through the winter in a temperature of 45°. Its botanical name is correctly *Mentzelia Lindleyi*.

**Calendula.**—This is the well-known Scotch Marigold and has long since passed the stage of being a common plant; the newest varieties are perfect in shape and beautiful in colouring. A splendid pot plant when grown through the winter in a cool greenhouse. To get really good specimens of this to bloom during the winter one must sow in August and keep the plants in a cold frame until the cold weather begins. Put them on a greenhouse shelf in a cool house and bring batches into the warm as they are required. Some varieties need pinching once and the resulting branches will be covered with bloom during the months of March, April and May. Some good varieties are Chrysantha, Tangerine, Radio, Golden King and Orange Cockade.

**Candytuft.**—Best sown in small pots, several seeds in a pot, these being reduced, after they have germinated, to four or five.
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Keep in small pots during the winter and re-pot into 6-in. pots early in spring. They must not be forced and, therefore, are particularly useful in cold houses. The Hyacinth-flowered sorts are those which I recommend. Sow in September or October in cold frames. Use a heavy soil for the final potting.

Carnation (Annual).—Many people have yet to learn that they can grow Carnations from seed which will begin to give them bloom within six months of sowing. These Annual Carnations are almost as large as some of the named Perpetual-flowering varieties, but none reach the same standard of perfection. At the same time I would impress upon those who have never grown them, that the Annual Carnation will give them a very great surprise, providing they are grown and tended with some care. Sow these in January and, from the moment of germination until blooming begins, give them cool treatment. The Annual Carnations, like their better-known counterparts, resent heat in any form. Sow the seed during February in very loamy soil, prick out the seedlings when large enough and get them into the small-size pot at the earliest possible moment, using a soil that is practically all loam and grit. These plants grow very quickly and within a month will need repotting into their final pots, which I recommend to be the 5-in. size. Again, soil must be of a loamy nature with just enough grit to make it porous. Pot firmly and, after potting, put them in the lightest spot possible, preferably a cold frame or a cold greenhouse. Nothing else will be required but some staking as time goes on. The best strains will give ninety per cent of double flowers, so I must insist that these good strains are the only ones worth growing and, though they may cost a little more, are well worth it in the end. One of the best known is the Chabaud strain.

Chrysanthemum (Annual).—There are several sorts suitable for growing in pots, especially those belonging to the 'segetum' group. They have glaucous green foliage and amongst them are some of the loveliest varieties in this group, the two favourites being 'Morning Star', which is a large primrose yellow, and 'Evening Star', which is a deep golden yellow. These are best grown in 6-in. pots of very rich soil. Like most other annuals they do not like heat, but will stand gentle forcing in a temperature of about 50°. Sow in September and October and again in January.

Clarkia.—One of the most beautiful of all pot-grown annuals. Sow in September, getting the plants into small pots at the earliest
possible moment. Use a very loamy soil, but be very careful that it is properly drained, otherwise the stagnation caused will probably kill the plants during the first fog. Winter the plants in small pots in the airiest spot possible, and be particularly careful never in any circumstances to over-water them, especially during foggy weather. No annual feels the bad effects of fog more quickly than the Clarkia. Pot into 5-in. pots during February and March, and pot on again if particularly large specimens are wanted. There seems to be no limit to what can be done with Clarkias in large pots, because in 10-in. pots they have been known to grow to a height of nine or ten feet and to be three or four feet through. In this latter case, of course, a tremendous amount of staking and tying is essential, as the growth is small and therefore not capable of holding itself erect without some tying. Some varieties lend themselves to this mode of treatment better than others, but it is lucky for us that the best varieties are those with pink, red and salmon flowers, the whites and purples seldom coming up to their standard of blooming.

**Cornflower.**—The common and beautiful annual which we all know. Well worthy of culture in pots both for cutting purposes and for growing for greenhouse decoration. Any variety will respond splendidly to good treatment, especially the double variety called Jubilee Gem. This is dwarf and well branched, but a well-grown plant will have as many as one hundred flowers out at the same time. To do this they must be grown in 6-in. pots and are well worthy of the little extra time and trouble. At the same time most of the Cornflowers will respond quite well in 5-in. pots. Sow during September and grow in cold frames the whole winter, keeping them on the dry side in cold weather. The soil for their final potting must be rich loam with just enough leaf-mould and sand to drain it. The pink-flowered sorts are very good for pot work and make nice companions to the blues.

**Cotula barbata.**—This is one of the lesser-known annuals and a pot of this in bloom looks like some pendulous Acacia, for its flowers are the exact counterpart of the well-known Mimosa. It is particularly easy to grow in pots and very useful for the front of greenhouse stagings. Sow in September and prick the plants out in small groups of four or five. These small groups must then be potted on into 3-in. pots, and it can be left to the grower's discretion whether they are flowered in these pots or potted on into 5-in. pots. For my part I would prefer leaving them in the
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3-in. pots and feeding them slightly once the buds are formed. To get really good plants they should be grown for the main part of their lives in full sunshine. They last a tremendous time in full beauty and I recommend anyone who has not yet tried them, to do so.

**Dimorphotheca.**—One of the South African annuals of particular brilliance. It reminds one of the Gazania in colour and shape. There are many hybrids, mainly from the two species *D. annua* and *D. aurantiaca*. They are of the easiest possible culture, provided they are kept rather dry during the winter. Pot on in spring-time to the 5-in. pot, growing three plants in a pot. Use a very loamy soil and keep the plants in full sunshine.

**Echium.**—There is one species particularly useful for pots called *E. plantagineum*. It has an unusual combination of colours, the flowers being rose-red and blue, reminding one of old chintz. This annual is best sown in the early part of the year and grown slowly in cold frames or cold houses in rich loamy soil; a light soil would only tend to weaken growth and therefore spoil the ultimate effect of the plant. At all stages it must be given plenty of ventilation, and sunshine when possible. Another excellent variety is Blue Bedder.

**Godetia.**—Godetias in pots are very beautiful, so long as they are grown slowly and in full light. Sown in October and grown through the winter in small pots, they must then be potted into 7-in. pots to get really good specimens; even then there must be no attempt to hurry them, their growth must be perfectly natural to produce a perfect specimen.

The best varieties are the dwarf Celestial, Crimson Glow, Double Sybil Sherwood and Kelvedon Glory.

**Gypsophila.**—One of the easiest of all annuals to grow in pots, and as a pot plant for cutting purposes it is equally valuable. Sow in January in small pots, a few seeds in each, reducing these to five as they grow. Pot them on without further disturbance into 5-in. pots. The best variety is *G. elegans* Snowstorm. Another species particularly useful is the small *G. muralis*. This is slightly pendulous and for that reason is very useful for the front of greenhouse groups, in cold houses, both these being particularly hardy.

**Hellophila.**—A useful introduction from South Africa that should become one of our most popular annuals. It is a pretty blue white-eyed flower, but is only seen at its best during the summer. For this reason I would recommend sowing to be
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made only during the months of February, March and April, growing the plants cool and in full light until they bloom.

Koehia.—This is the Summer Cypress and its name should convey something of its form. It is like a very feathery bush and, apart from making a very beautiful pot subject in summer, gives just that 'ferny' greenery that looks so well amongst flowering plants.

It likes a warm temperature when germinating and is best sown in March and April. The seedlings must be pricked out in the usual way and potted on, when ready, into 6-in. pots. Use a normal potting compost, but see that it is fairly rich and, above all, well drained. Grow it near the glass and when growing fast give ample air and light.

Larkspur.—These are grown by the thousand, in pots, for market work, but very few amateurs have realized the value of this particular annual. As a pot plant, three or four being grown in a 6-in. pot and well-fed until they bloom, this is a particularly handsome subject. There are endless varieties to-day in colours which range from white to the deepest crimson, from lightest blue to the deepest, and this subject I recommend to those who so far have not grown it. Sow in September and winter in very cool conditions. Autumn sown plants are twice the size of spring ones. Thin stakes will be needed for support.

Lavatera.—This is the Mallow and is well worth growing by those people who have a large greenhouse, but is of little use in a small structure. It needs particular care through the winter, as it damps off rather easily. To avoid this, keep in slightly warmer conditions than those recommended for the majority of annuals and do not over-water at any time. When growth becomes free in the spring-time, pot on into 6-in. or 7-in. pots and do not give any greater heat than a night temperature of 50°. Sow in September or October and again in January, and at all times use well-drained loamy soil.

Marigold.—The French and African Marigolds both make good subjects for pots, but the latter takes up a great deal of room as it must be grown in large pots to be effective. The former is more useful; it is not very tall and makes a bushier plant. These subjects do not like our dull winters and so I suggest sowing in February. Always use a rather heavy soil for them and give all the ventilation possible.

Mignonette.—Well known as a pot plant and worthy of far greater popularity than it enjoys. It presents no difficulty in
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culture, and if sown in August will winter quite easily in very cool conditions. Grow at all times as near the light as possible in a very open soil to which has been added a small quantity of lime rubble. If this is not available, a small addition of horticultural chalk will have the same effect. When potting, it is usual to grow three in a 5-in. pot. If this is done, the effect is more beautiful than where plants are grown singly. The old variety called Machet has been improved and there are now several forms of it. All the improvements of this particular variety are well worth pot culture.

Nasturtium.—I suggest that the best varieties of these are the semi-dwarf varieties which, besides being double or nearly so, are beautifully scented. For this alone they are splendid for pot culture, and as they are so easy to grow, no greenhouse collection of plants should be without them during the late spring and early summer. To grow them really well one must sow seed in October and November. Keep them near the glass all the winter and in a minimum temperature of 45°, otherwise they will become thin and drawn and be little use later on. During the spring, pot the plants on into 5-in. or 6-in. pots, using a very heavy soil, which need not be too rich. Again keep the plants in as light and sunny a position as possible, and do not, in any circumstances, hurry them into bloom. If they bloom naturally, they will go on for a very long time either as pendulous subjects hanging over the front of a staging or trained up thin sticks. I suggest that three plants are grown in each pot. Sow also in February.

Nemesia.—One of the best pot-grown annuals because of the amount of flower one always gets from them during the months of March, April and May. Sow in September and immediately the seedlings are large enough to handle, prick out into 2-in. pots, putting three plants around the edge of the pot. In this size they may perhaps, if the autumn is not too warm, remain throughout the winter, but if the autumn pushes the plants along too quickly, do not be afraid to put them into 5-in. pots during November. Great care must be taken through the winter to give them all the air possible without cold winds blowing on to them, keeping them rather on the dry side and giving them all the light available. During spring they may be put into a temperature of 50–55° and allowed to take their time in blooming. Though they can be made to bloom very early in the year, it must be remembered that the earlier they are in bloom the less time they will
last in beauty, whereas if allowed to come on in their own time they will be useful for many weeks.

**Nemophila.**—A very easily grown annual. Sow during October in small pots, four or five seeds in a pot, and allow four plants to grow. Do not pot on but just keep them growing slowly during the winter on a greenhouse shelf and they will come into bloom with the first warm days of March. This is one of the annuals that must not be hurried.

**Nicotiana** (The Tobacco Plant).—Another of the neglected pot annuals. Though grown extensively outside, it has yet to be grown in any quantity by amateurs in pots. There is no difficulty about its culture, but I recommend that seed is not sown until the last week in January or in February, for the time gained by autumn sowing is negligible. If seed is sown at the time suggested, the plants will be in full flower, provided they are grown without a check, during late April and still be useful in early June. One plant in a 6-in. pot is all that one dare allow, and the soil in which they grow must be very rich, well drained and not too close. They are best if grown in a temperature of 50-55° from the time of sowing until the time of blooming, but in cold houses they will be equally successful though of course correspondingly later in blooming.

In recent years a race of Nicotiana which keeps its flowers open all day (instead of looking sleepy) has been bred and brought to perfection. These are sold under the name of Sensation Hybrids. It is this type which should be used for pot work.

Even more important is the introduction of a dwarf-growing form about a foot high. Its name is N. White Bedder, which no doubt will be followed by coloured forms. This dwarf beauty is especially suitable as a pot plant and I suggest its use in every greenhouse, for it is one of the most effective varieties yet raised.

**Phlox Drummondii.**—Perhaps the showiest of all the annuals so far mentioned. Sow seed in boxes during August and September. Prick out, as soon as they are large enough to handle, into a fairly sandy soil. Growth at this stage is rather rapid, so that putting them into pots must be done the moment the plants have really established themselves in the pricking-off soil. The ideal way of growing this phlox is to put four plants around the edge of a 3-in. pot, and it is in this size that they will spend the winter. They must be kept fairly warm, say in a minimum temperature of 50°, during the whole winter. About February they will need repotting into 5-in. pots. Use a loamy soil that has about one-third
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leaf-mould added to it with sufficient sand to ensure perfect drainage. Keep the plants growing in the temperature as suggested and give them as much light as possible. They are big drinkers once the pots are full of roots, and therefore great care must be taken regarding the watering. Some slight staking may be necessary, but any thin sticks about nine inches high will do for this particular job. If the old flowers are picked off as they die, these plants will continue flowering for six or seven weeks or even longer.

Salpiglossis.—This is one of the most beautiful annuals when grown in pots, but a great many people imagine it to be very difficult. There is no particular difficulty providing one is ready to give it one or two special requirements; the first of these is heat through the winter, say in the region of 50-55°; the second is a very loamy, well-drained, open soil. A good deal depends on the time of sowing, and to get plants in bloom during May one should sow in early August. From the moment the seedlings are seen to the time of their blooming there must be nothing in the way of a check. Prick off the seedlings at the earliest possible moment; pot these on, as soon as they have made sufficient roots, into 3-in. pots. It is quite possible that during some winters plants can remain in these pots, but should the autumn have been warm and the plants therefore rather forward, it may be wiser to pot them on during November into the larger size; and it must be understood that if this is done, the temperature I have suggested becomes more than ever essential. Throughout the whole of their lives a great deal depends on the watering of these plants, and it is in this respect that most amateurs have failed. Keep them rather on dry side when the weather is cold, but once root-action is rapid during the spring they must not, even for an hour, be allowed to become dry. All such plants, when grown in pots, reach a height of three to four feet. Greenfly is a particular nuisance, and frequent fumigation is therefore necessary. Should dwarf bushy plants be wanted, the removal of the growing tip will cause side-shoots to develop and the effect is excellent, especially for small houses.

Scabious.—This annual is worth while growing if one has a roomy greenhouse, but it is useless in small structures. It can be sown in September and grown slowly, like the Clarkias, throughout the winter, or it can be sown in January and February, which are perhaps the best months for those people near towns or foggy areas; it needs a loamy well-drained soil and particular care as to
temperature at all times. Will grow three or four feet high if soil and conditions are good.

**Statice.**—There is a very large range of Statice useful for pot culture, but I would recommend that the amateur limits his selection to half a dozen varieties. Of these I would suggest the species *S. Suworowi* as the best of all. It has long candle-like flowers of bright pink colour, but it is not an easy plant to keep through the winter in damp places. It should be sown during January and grown in a fairly warm temperature of 50–55°F until in full bloom. Three plants in a 5-in. pot will make a much better display than when single plants are grown in a pot. A few other species, such as *S. Bonduellii* (yellow) and some of the *S. sinuata* varieties, especially True Blue and Rose, will give the amateur all he should require from this particular group of plants. They are easy to grow. Soil must be rather on the heavy side to cause the growth to be sturdy and rather slow. Full light, and sunshine when available, are absolutely essential.

**Sweet Peas.**—Can be grown in pots and made to bloom quite easily during May, though there are some varieties especially useful for winter flowering, but these are not in general cultivation by amateurs. Should be sown in early October and grown slowly throughout the winter, potting them into large pots, say 8-in. or 10-in., during January and February. After that nothing more is required than plenty of water, some feeding and, of course, the usual staking. Airy conditions are essential at all times, and sunshine during the winter months whenever it is available.

**Ursinia.**—Another of the South African daisy-like annuals. The species *U. anethoides* and *U. pulcra* should be particularly useful. Sow either in October or January; prick the plants out, three or four around the edge of a small pot, and when these pots are full of roots pot the whole on into the 5-in. size. Good culture depends entirely on the amount of light the plants can get, therefore the best place for them is on a greenhouse shelf as close to the glass as possible. If put into a temperature of 50°F during the month of February, they will be in full bloom about the middle of March providing there is sunshine, and the January ones should be in full bloom at the beginning of May. A fairly heavy soil is necessary to keep the plants from becoming too thin in growth. Copious supplies of water must be given once the pots are full of roots.

**Viscaria.**—Sow this annual for spring flowering during the
Salpiglossis make excellent pot plants and require sowing in July and August if they are to bloom the following spring.

The Zinnia, though an annual, adapts itself to pot culture and is best sown in spring to bloom in summertime. These flowers are of the Mammoth strain.
One of the loveliest of a large group of ferns known as Nephrolepis. This is *N. exaltata* Hillii.

The Bird of Paradise Flower, *Strelitzia Reginae*, is a warm-house subject and when in bloom has yellow flowers with a dark blue tongue and purplish bracts.
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month of August and keep the resulting plants as cold as possible until the turn of the year. Three plants put into a 5-in. pot of fairly heavy soil and these kept in full light will give a display of bloom during April and May. If dead flowers are picked off, they will remain in bloom for some considerable time. There are many varieties to choose from, but undoubtedly the blue varieties are the ones for the amateur to grow, especially the dwarf types.

Zinnia.—This annual should be sown in the spring-time, as it is a very difficult annual to carry through the winter, and only a very few people are successful with its culture when it is sown in the autumn. If sown in February and March and the plants grown on in a 5-in. pot, the result is usually a very good one. These want a soil which is practically all loam and, like so many other annuals, are dependent for success upon the amount of available sunshine. The treatment applies to all the varieties and the different groups of Zinnias. I would, however, make particular mention of the Lilliput varieties and the beautiful yellow species *Z. linearis*, which is one of the most beautiful for pots, providing it is grown slowly in cool conditions. I would also suggest that Zinnias are sown during June and July for flowering the following autumn, when annuals are rather scarce. Their development is so rapid that in three months from sowing the plants can be in full bloom.

If all the side-shoots are rubbed out and one flower taken, it will be as large as a Dahlia. On the other hand one can allow a number of side shoots to develop and take a flower from each. In either case pot culture is full of interest, because of the richness of colouring found in the up-to-date types of Zinnia.

The amazing number of varieties differing in form and colour repays a study of them in any good comprehensive seed catalogue.

This list of annuals suitable for pot culture is really a short one and there are many others which might well have been included, so I suggest a few others which the greenhouse owner will find quite colourful and most useful for his purpose: *Anchusa capensis*, *Browallia viscosa*, *Balsam*, *Gilia coronopifolia*, *Hebenstretia comosa*, *Helipterum roseum*, *Leptosyne Stillmanii* (Coreopsis), *Linaria maroccana*, *Nigella damascena*, *Phacelia campanularia*, *Trachyemene carulea* and *Verbena hortensis* hybrids.
CHAPTER XVII

THE COLD GREENHOUSE

THERE are thousands of greenhouses which come under this heading and for that reason I am devoting a chapter solely to this subject.

By a cold house I mean the type which has no heating beyond the small amount necessary to keep out frost. A number of people possessing such houses fail to do much with them and it is usually their own fault. They try to do the impossible. They choose warm house subjects which probably grow quite well during the summer and autumn, only to realize that the heat essential to their well-being is not there during the trying months of winter and spring. This causes great disappointment, but I still find amateurs trying to do this sort of thing after many failures. The fact is that any success in keeping a cold greenhouse in good trim with a collection of healthy plants, lies in choosing the right subjects. In this chapter I make no fancy arguments in favour of growing warm house plants in such structures, and the list of plants I give—though not what the amateur may want to grow—will at any rate be those which will survive healthily in cold structures.

At the same time I would strongly recommend the consideration of some means of keeping such houses just a little above freezing point on the coldest night, because the little warmth makes such a difference.

Electricity has made this particularly easy, and where current is available I can think of no easier method of keeping houses frost-proof, while, if one wishes, there is the choice of gas and paraffin heaters which nowadays are so efficient.

In some gardens, houses of this sort are looked upon simply as a storage place for all those half hardy subjects used in the summer bedding schemes. Such an object is a very laudable one and certainly pays for itself by saving one’s plants from year to year. After the plants have been put outdoors again the house can be utilized for producing a crop of tomatoes, flowering plants or cut flowers during the summer.

A registering minimum and maximum thermometer will soon
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indicate the fall of temperature during the night. If the house can be kept somewhere about or above 40° on a cold night it will be a splendid winter home for such things as Fuchsias, Heliotropes, Geranium stools, Cassias, Plumbago, Hydrangeas, Eucalyptus, Acacias, and other half-hardy plants used in summer gardens, providing they are kept fairly dry in winter. This, of course, is only one way of using a cold house, but the majority of people will be wanting much more from it than that. They will want flowers and greenery—especially in winter—and at the same time wonder if there are enough subjects which will not only grow well but will be attractive to look at. Yes, there are many such subjects, and if the owner will exercise a little patience he can achieve results equalling those usually expected from a warmer structure. Perhaps the most helpful way of dealing with this subject will be to go through the year, month by month, and see what can be grown in a cold greenhouse. Of course I do not expect that all the plants enumerated will be grown, but in giving a fairly extensive list, I leave it to the grower to make his choice.

Before going into the actual details of plants, I must remind anyone beginning a cold house collection, that much depends on the way the plants are looked after. Actually, many of the failures frequently seen in such collections are due to one thing—over-watering, especially in winter. Plants growing in cold houses must never under any circumstances be over-watered, and this applies particularly from November to March. To give an instance, a batch of hardy Primulas being grown in a cold house may only need water once in three weeks—Calceolarias once in a fortnight—Primula malacoides once in ten days. It depends on the type of weather, of course, but I have in mind the general wet or dull weather which usually falls to our share for the greater part of the winter. During very frosty weather all plants should be quite dry. No harm will come to them, for at that period of the year root action is almost dormant.

Another point worth noting is the value of some covering material for the roofs of such houses when heavy frost is expected. There are many things which can be used for this, such as tiffany, hessian, scrim canvas and garden netting. Any such covering, with the aid of a small heating apparatus inside, should be enough to ensure safety for all subjects. Ventilation also plays an important part in the well-being of plants in cold houses. This is not generally realized, but a buoyancy of air is just as
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necessary in the cold house as in the warmer ones. Even during the depth of winter try and give the house some fresh air once a day, especially if the outside temperature is over 40°, and also on frosty days when the sun is bright. High temperatures during the daytime in winter are dangerous because they are apt to agitate growth and cause some plants to break into growth before their time only to face severe cold later in the season.

Winter-time is the danger period in such a house, but having passed safely through that period, the rest is fairly easy providing that the general rules applicable to all greenhouses are followed. An amateur who can keep a collection of plants growing healthily in a cold house is often a far better craftsman than the man who has the greater facilities of heat.

In making a selection of suitable plants, it is always wise to keep to those which will really do well, even though they may appear common subjects, and I am quite sure that only failure will come to those who persist in choosing unsuitable plants, thinking that by luck or some other equally elusive agency, they may succeed.

January.—During this month the last of the Chrysanthemums will still be making a show but only if suitable varieties were chosen the previous spring. As these plants go out of bloom, cut them down and keep the 'stools' still in the house to provide cuttings. The main supply of bloom this month will be from bulbs. A few pans of early Crocus, especially those belonging to the small-flowered species, come into bloom naturally in a cold house during January. These should be grown in pans rather than pots and the bulbs should be potted in September. By January too the first of the Hyacinths should be in bloom, more especially the Roman and 'prepared' sorts. Here again early potting is essential. Iris reticulata and others of the dwarf type should also be in bloom towards the end of the month, and with them should come the first blooms of I. tingitana. One or two varieties of Narcissus will also be blooming if the bulbs were potted in early September. These include Paper White, Soleil d'or, Grand Monarch, and Spring Glory. Do not expect too much from a cold house during January, but remember it can be of great interest even in this the coldest month.

A great deal of pleasure may be had by growing a collection of Heathers, choosing those which bloom early and yet can be grown outside for the rest of the year. The two species most suitable are Erica carnea and E. darleyensis. There are excellent
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varieties of both, especially King George (carmine) and Springwood (white), both belonging to the former.

**February.**—Bulbs will again provide the principal show but towards the middle of the month there should be a definite increase in varieties. Tulips should be in bud and should bloom at the end of the month. The Duc van Thol and Early varieties should be chosen and potted in late September. The Daffodils ought to be giving their first flowers, King Alfred being an easy grower and blooming early; there are also Carlton, Cragford, Magnificence and some of the Poetaz varieties. There should also be a collection of the Miniature Daffodils grown in houses of this sort, which, together with some of the varieties mentioned for January, should make a good display. Chionodoxa and *Scilla sibirica* will also bloom this month. *Primula malacoides* will throw up its first flowers this month, and plants expected to do this must have been sown in June. Several of the other hardy primulas, such as *P. courtusoides, P. denticulata* and others like them are worth growing in pots simply to give a show in February. The first early shrubs send up their flowers and most notable of them all is *Prunus triloba* with its rosettes of pink all up the stem. Then there is *Daphne Mezereum*, grown primarily for the glorious scent of its mauve flowers. Witch Hazels or *Hamamelis* grown in pots always make a bright splash of yellow this month. *Azalea amena, A. Hinomayo* and *A. Hinodegiri* and others will be breaking their buds at the end of the month. During February several seeds can be sown to provide summer displays, or to give an early show in the greenhouse itself. *Nemesias, Calendulas, Clarkias, Ursinias, Bartonia*, are just a few of the things which come to mind. Sow cauliflower for planting out in **April**. Strike *Chrysanthemum* cuttings.

Start Begonia tubers in boxes of leaves.

**March.**—The bulbs now come on with a rush and especially the Narcissi. Practically the whole group give their flowers this month without the slightest trouble. Tulips will be giving an extensive display, but it will be mainly from the ‘Earlies’. Some ideal varieties for March are De Wet, Prince of Austria, Yellow Prince, Madam Gevers, Sunburst and Diana. They should be potted up the beginning of October. Following these will come the Mendels and Darwins in which there are some of the loveliest of all tulips for this work. Tulips grown in cold houses are usually far more attractive, stronger and longer-lasting than those grown in heat.

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Shrubs come into bloom with the greatest ease and, besides those mentioned for February, one can have the Forsythia, Pyrus, Prunus, Malus, Deutzia, shrubby Spirèas and Daphne species. All these shrubs should be potted up in January or before, and stood in the cold house, so that they are not too heavily frosted.

The Primulas, especially *P. malacoides* and *P. kevensis*, will now be in full bloom, and if you have taken the trouble to pot up some Polyanthus from the garden, this too ought to be making a fine show. Another showy plant is Dicentra, the Bleeding Heart which, if potted up in January will bloom in March. The slower it develops the better its colour and the longer it lasts. Several annuals if sown in the previous September or October will also be showing their buds. These include Nemophila, Limnanthes, Nemesia, *Gypsophila elegans*, and *Cotula barbata*. One can have a splendid display from a collection of Winter-flowering Stocks which come into bloom in a cold house during March, providing they were sown in the previous July or August.

Cinerarias may quite easily be grown in cold houses but they will be killed by the slightest frost. Those sown in the previous July and August usually come into bloom during March. Seed sowing can now go on freely and during the latter half of the month tomatoes can be sown to provide the crop later on, in the same house. Freesias and Lachenalias are happy in cool houses and are usually at their best in March, but must be kept well above freezing point.

April.—During this month the rush of bulbous subjects coming into bloom may cause the house to be overstocked with flowers at one time. To prevent this, stand some of the Tulips (which will be the Darwin or May-flowering types) outdoors, with slight protection against sun and wind. This will retard their flowering period and therefore make them more valuable later in the month. Good varieties for April are Princess Elizabeth, Bartigon, William Pitt, Albino, Dom Pedro, Pride of Haarlem, Afterglow, Beverley, Zwanenburg, Sunkist and the Parrot-flowered sorts.

Autumn-sown annuals should continue to bloom in profusion, especially Schizanthus which was sown in September. *Azalea mollis* will bloom from the beginning of the month onwards. Cinerarias will be at their best while Calceolarias of all types will begin to form their buds. Shrubs too will still be making a bright show, especially the Crab Apples and the Flowering Cherries.

Seed sowing must be a big feature of the month. In addition
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to providing for the outdoor crops, remember to sow a few subjects which will grow on and give a summer and autumn display in your cold greenhouse. A few useful plants are Celosia, Browallia speciosa major, Exacum affine, Zinnias, Petunias, and Begonias. The latter will need the help of a small propagating frame placed in the warmest end of the house to ensure germination. Actually all seed would be better if placed in a similar contrivance, rather than just stood on the staging.

During April a certain amount of shading must be done. This is easy if blinds are fitted to the house, but where these are not in use, either a temporary shading material can be fixed up over the roof (preferably outside) during the middle of the day or a thin film of whiting and starch can be sprayed on to the glass. The danger from the sun’s rays is more prevalent in April than any month of the year. Attend to the timely staking of tall-growing plants, especially annuals. Fumigate once during the month to destroy pests.

May.—If the house is to be used as a mixed-flowering house all the summer, provision for a continued display must be made early in the year and this involves potting up such things as Cannas, Campanulas, Fuchsias, Impatiens, Heliotropes, Petunias, Begonias, Francoa, Liliums, especially L. auratum, L. speciosum, L. tigrinum, L. longiflorum, L. japonicum, L. umbellatum and its allied varieties. During May all these subjects will be growing very quickly and may involve a good deal of potting. Use rich soil and do not delay potting a plant once it is ready. Clear out every plant which is not wanted inside the greenhouse and do not overcrowd the stagings with fast-growing plants. Give each one ample room to develop. Watering will be more necessary than ever, often once a day, but it is equally important to keep the floors and staging thoroughly damped too.

Amongst the plants in bloom there should be the Calceolarias, Cinerarias, Primulas of the japonica and other hardy sections, Spanish and Dutch Iris, Schizanthus, Annuals, Hydrangeas, Rhododendrons, Choisya ternata, and Campanulas.

If tomatoes are to be grown in the house it is best to clear all other subjects out and train the tomatoes up the roof glass. As this obscures light it is obvious that few subjects other than ferns or shade-loving subjects will survive. Tomatoes should be planted, either in their final pots or on the staging by the middle of the month. This gives every chance of a crop ripening well ahead of those grown outside. Tomatoes require a normal atmosphere,
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cucumbers a moist one, so the chances of growing the two to­
gether (and both succeeding) are very small. For that reason
choose one or the other.

In the warmer counties tomatoes can be planted during April,
but here I am thinking of the Midlands, North and Scotland.

Shading (except for tomatoes) will be necessary for longer
periods than in April and it will have to be thicker. Permanent
shade can be given to most plants after the first week in May.
Watch for sharp falls of night temperatures all through the
month, and when the outside thermometer reads 35-40° through
the night, it is a good plan to help the inside temperature by
putting on a little heat for a couple of hours. This will keep
your plants growing at a correct speed instead of having a check
such as these low temperatures cause during May. Sow Zinnias.

Keep floors wet and use the syringe in between the pots at
least twice a day.

At the end of the month put Chrysanthemums into their final
pots.

June.—The full summer show begins this month and it is
rather a question of keeping all plants in bloom over as long a
period as possible. To do this, one must keep the temperature
of the house down as low as possible, by giving plenty of ventila­
tion, shading heavily during the bright part of the day, and
continuous damping down, especially under the stagings.

Sow Calceolarias for next year’s blooming and towards the end
of the month Primula malacoides, P. kewensis and all the hardy
varieties. Sow Forget-me-not outside to provide plants for pots
in November and these will bloom next spring. Sow Cineraria
for spring and Nemesias for autumn blooming.

Stake and top dress all Lilies as they require it. Support all
quick-growing plants with thin sticks. Feed Cannas and other
well-rooted subjects with soot water and artificial manure. Top
dress tomatoes and cucumbers, tying both in to their supports
at least once a week.

Begonias should now be in their flowering pots, which may be
the 5- or 6-in. pot. The fibrous-rooted Begonias are excellent in
a cold house and these should be in the 5-in. size coming into
bloom. Take any Hydrangea cuttings that are available.

July.—Cut back Hydrangeas as they go out of bloom, and
take more cuttings if any young ones appear near the base of
the plant. Prick out all seedlings that are ready and keep them
growing in the shadiest part of the house until they are well
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established. Soil for pricking-out purposes need not be so light as that used earlier in the year. A soil which is too light is apt to cause weak growth.

Feed tomatoes with artificial manure as the trusses are swelling, keeping every bit of unwanted growth cut out. Reduce the growths on cucumber plants and do not allow too many cucumbers to form at the same time. A few turves, placed grass downwards, over the mound of soil will provide an ideal top dressing. Take cuttings of Regal Pelargoniums as soon as they are long enough. Sow Cinerarias and Salpiglossis for spring flowering. Stake all plants requiring it and continue feeding those plants which are in full growth. Do not over-feed Lilies. Keep Begonias shaded but do not have dense shading over the Celosias. A very handy plant this month is the Coleus. Being difficult to winter in a cold house, stock can be raised each season quite easily by sowing seed in March or April. Another good plant for the cold house is Rehmannia angulata. Sown in the previous September, it flowers for weeks during summer. It is almost hardy. Strike cuttings of Zonal Pelargoniums for providing plants for next year.

August.—Zinnias sown in May will now be in bloom together with some of the Lilies. Besides these there should be the Petunias, Browallia, Celosia, Exacum, Begonias and several of the perennials. Again the big job is to keep temperatures down and the air moist.

Feed tomatoes as long as they are producing fruit and defoliate the plants if the weather is dull and the fruits are slow in ripening.

Send in the bulb order for early-flowering bulbs and pot up the Hyacinths wanted for Christmas and the New Year at the end of the month.

Strike young stock of Heliotrope, Petunias, Campanulas, Francoa and any other subject giving satisfactory cuttings this month. Of course most of the bedding plants will need striking during August and this will tax house room to the utmost. The earlier cuttings are struck the better their chance of surviving the winter. Begin the systematic feeding of Chrysanthemums in preparation for bud development. A very handy plant in August is Trachelium caryophyllum (the Cloud plant). From a March sowing good plants will be blooming now and next month. Sow Schizanthus and another batch of Cineraria. Pot up Freesia and Lachenalia bulbs.
September.—One important job is to house the Chrysanthemums by the end of this month. Few amateurs can get all their plants into their house at the same time, so make sure that the early ones are taken in first, the others following in strict rotation to their flowering period. Continue to feed them heavily. Clear the house of tomatoes or cucumbers immediately their usefulness has passed and any plants that can reasonably be put into the frames without harm should be removed to give every bit of useful room in the greenhouse. Reduce both the amount of water and air humidity as the month proceeds, and by the middle of the month it is usually quite safe to wash all permanent shading off the roof.

Keep Zinnias in the driest and lightest part of the house. Sow all kinds of annuals for spring-blooming, keeping the seedlings cool and close to the light as they germinate. Stand Fuchsias outside to ripen for a month before storing them, shortening the longest growths slightly when moving them. Cuttings that have rooted can be placed in more airy conditions to strengthen them.

Potting bulbs should be one of the outstanding jobs this month. Narcissi, Crocus and Iris tingitana should come first; after them, the other Iris, Tulips, Hyacinths, Gladiolus Colvillei and the Fritillarias. At the same time a number of bowls should be planted as these, being reared in the greenhouse till blooming time, are particularly handy indoors. This saves the other flowers for a greenhouse show.

October.—During this month all Chrysanthemums must be put under cover, even the late-blooming ones. Those already in bloom will need a much drier atmosphere than is usually associated with greenhouses. After watering them, mop up any water lying on stone floors. Don't syringe or damp down. Put on just enough warmth at night to keep the air dry, and do all that is possible to stop the petals from damping. Other subjects in the house must take second place when it comes to deciding correct conditions. As a matter of fact most of the plants will appreciate the drier and airier conditions, for one has to remember that a cold greenhouse will only be a success if the occupants come through the winter safely. The obvious thing to do is to grow all such subjects coolly so that they are ready to stand up against the cold weather ahead. Some useful flowering plants for October are Salvia splendens, S. Pitcheri, S. rutilans, Browallia, Exacum, Trachelium, Lilium speciosum, Asters, Tuberoses, Nerines and the Autumn Crocus.
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Beware of sudden frosts, putting only enough heat on to ward off danger. Keep all Primulas, Cinerarias and Calceolarias quite cool to prevent undue softness. Annuals sown during August and September must be pricked out or potted according to their size, but once the roots are working they should be placed on shelves and kept rather on the dry side.

November.—The chief work lies in keeping the atmosphere dry to lengthen the blooming season of the Chrysanthemums. Those which are over should be cut down to within a foot of the soil and be placed in cold frames, there to stay until cuttings are produced. Salvias and Nerines will still be gay, and by sowing them late it should be easy to have Asters and Nemesias through the greater part of the month. There is a lot to besaid for potting up some small conifers and foliage shrubs just now to take the normal place of ferns on the stagings. A collection of small well-grown conifers adds greatly to the enjoyment of such a house during the winter months.

At the same time, pot up some Helleborus niger (Christmas Rose). Good clumps of these in a 7-in. pot will make a fine show a month or so hence.

The shrubs required for growing in pots should be ordered forthwith and as soon as they come to hand should be potted. They can remain outside till January or February so long as the pots are covered up with leaf-mould or peat-moss litter. Make sure that the heating lamp or stove is in perfect working order.

December.—If you can manage it, give the house a thorough scrubbing out this month or next. Beware of frosts and remember that a sheet of newspaper laid over the plants will keep off many degrees of frost. Have any outside covering at hand in case it is wanted. Reduce the watering of plants to a minimum and forgo all syringing. If there are any creepers in the house, prune them now to ensure that every atom of light possible reaches the plants. Put the earliest bulbs into the house at the beginning of the month, underneath the staging will do, if there's no room on top. Iris tingitana should be kept near the glass. If there is any greenfly about, fumigate the house, especially after the Chrysanthemums have finished.

Besides the plants mentioned there are a number of useful decorative subjects very suitable for cold houses. Of these I would recommend the majority of hardy ornamental grasses (especially Cyperus natalensis, Eulalia, Eragrostis elegans, Isolepis
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gracilis and Agrostis nebulosa), Centaurea candidissima, Cineraria maritima (Senecio), Eucalyptus in variety, Kochia and Artemisia sacrorum viridis. A certain number of the more hardy ferns can also be utilized.

It must be borne in mind that a fine display can be procured in such a house by digging up clumps of hardy plants from the garden during spring so that they bloom much earlier than they would outside. A few suggestions would include Canterbury Bells, Aquilegias, Heucheras, Doronicums, Campanulas and the Belladonna Delphiniums.

Moreover, one should remember that if clumps of rhubarb, or roots of seakale and chicory are placed in soil under the staging, they will soon grow and give useful crops at a time when all are expensive to buy.

To sum up, I would again point out that it is essential to grow only those plants which definitely require a cool house for their cultivation. To extend the collection into the realms of warm-house plants is to court failure.
CHAPTER XVIII

THE 'STOVE' OR TROPICAL HOUSE

This type of house must not be confused with the average warm greenhouse. It is something apart. Its very occupants decide that it must be kept at a uniform temperature, for unlike the majority of greenhouse plants, tropical subjects will not as a rule adapt themselves to any conditions other than their natural ones. I would like to make this point very clear, because it is useless to begin a collection of truly tropical plants unless the essential heat can be given winter and summer. Such a house usually requires artificial heat all the year round except on hot summer nights. As a general guide the night temperature of such houses must be 65° from October to April and 70° from May to September. During very cold weather the night temperature may be lowered five degrees but this should be the only time that this is allowed to happen. This steadiness of temperature has a great deal to do with the success of plants grown in these houses.

Besides heat, such a house must have a continually moist atmosphere and this again is something different from the damping down of the ordinary greenhouse. The humidity of the stove must be of a lasting nature and therefore special arrangements have to be made to ensure this. First of all the stagings must be covered with some moisture-holding material. The best thing is crushed up sea-shell, shingle or Thames ballast. All these can be used over a very long period, because each year they can be thoroughly washed and cleansed. The depth of this should not be less than two inches on the staging, which of course must be a closed one made of galvanized sheeting or slate. The former will need renewing every eight or ten years but if painted should last much longer. Slate is everlasting, so probably cheapest over a period of years.

The floor of a stove house should be made of brick or absorbent tiles rather than cement, but all other parts of the floor should be covered with ashes or coke breeze. This ensures that water can be stored in all such material and thus give off continual atmospheric moisture at all times when the pipes are hot. Every inch of ground, walls, stagings and supporting woodwork will
need damping every day, and in summer-time twice a day. In warm weather it is usual to syringe all the plants overhead once or twice a day. Even in winter, though overhead syringing must be reduced to a minimum, it is still necessary to syringe between the pots every day and to keep the surface of the staging from drying out. If syringing is done methodically, this in itself should be sufficient to keep the stagings damp.

The reader will draw his own conclusions about the quality of timber used for such structures. The continual dampness makes it imperative that the best timber must be used and that the house itself is carefully built. I will be quite frank and say that to buy a cheap house for this kind of plant-growing is waste of money. Teak, oiled and well jointed, is no doubt the best kind of wood, but if the best quality of pitch-pine is used, the joints well made and everything painted with three coats of best white-lead paint, such a house will give very many years' good service. Front ventilation is not required but a few air holes should be left in the brickwork. These can be used to allow a free current of air in exceptionally hot weather, if sliding doors are fixed over the openings.

Hot humid conditions must be balanced by uninterrupted light, especially in the winter, otherwise some of the softer-wooded subjects will probably draw and become thin. To ensure this, keep the roof glass washed during the dull season and build the house where all the light possible will be available.

In summer, shade is just as essential as full light is in winter, but permanent shading should be avoided. The best method is to fix thin blinds on rollers so that these can be pulled up or down at will. This allows full light to be given to the plants up to about 9 a.m. and again from about 4 p.m. This is a far better proposition than permanent shading which, as you will see, deprives the plants of much helpful light.

The actual culture of tropical plants follows that of most greenhouse subjects, but potting soil should generally be on the light side and never pressed too tightly at potting time. Most composts require a little peat, so that I recommend the use of peat-moss in preference to leaf-mould for mixing with the loam. All soil must be open, for a close undrained compost is far more dangerous in a tropical house than in an ordinary one—therefore use a coarse river-sand. To sum up the essentials for tropical plants:
THE ‘STOVE’ OR TROPICAL HOUSE

(1) a well-built house;
(2) steadiness of a high temperature;
(3) atmospheric moisture;
(4) close attention to the requirements of the plants;
(5) scrupulous cleanliness at all times.

Besides an annual scrubbing down of house and washing staging materials, all foliage plants require spongeing from time to time to keep them clean and to give true lustre to their foliage where the leaves are large.

In giving a list of tropical or stove plants well within the scope of the amateur, it must be clearly understood that the list is a very abbreviated one, because there are hundreds of worthy subjects which might be included in such a list. I have therefore chosen a few of the most useful and leave it to the person interested to find out for himself the great number of other lovely plants which can be grown in a ‘stove’ house.

Acalypha.—These are mostly shrubs, which with their variegated leaves and their compact growth make them very useful for decorative work. There is one called *A. hispida* which has large green leaves and from the axils of each a crimson tail-like tassel a foot or more in length emerges. The best of the coloured foliage sorts for the stove are *A. Godseffiana* and *A. Hamiltoniensis*.

Allamanda.—These are stove climbers and certainly one of the most delightful of all tropical flowers. Best trained up the roof or on chains. Needs a rich compost composed mainly of loam and some broken brick and manure. There is only one species of interest, to the amateur, *A. cathartica*, but its varieties *Hendersonii*, *grandiflora* and *nobilis* are the best. The yellow flowers are one of the most effective of all stove climbers.

Alocasia.—These belong to the Aroids (Araceae) and are grown for their enormous leaves, which are most exquisitely marked and veined. They are increased by division or suckers. Grow in a very humid, shady and hot spot. Pot in very turfy loam and lump peat. A plant for large houses rather than small ones.

Anthurium.—This, like the Alocasia, has very large leathery leaves and needs similar treatment. It is usual to chop up some sphagnum moss and put with the soil, together with some charcoal lumps about the size of a hazel nut. They are grown for the colourful spathes which last in beauty for months. The best
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Known species is *A. Scherzerianum*, with its exceedingly brilliant scarlet spathes and its many exquisite varieties.

**Aristolochia.**—Climbers needing lots of room and only of use in large houses. All the same, their curiously shaped flowers, and in some cases their scent, make them popular where there is room. A turfy loam and a little peat suits them. The largest flowers are on *A. grandiflora Sturtevantii*.

**Brunfelsia.**—This has now been accepted as the correct name of the beautiful warm-greenhouse plant, formerly called Francisca. The whole genus is beautiful and in the old days six or seven species were often grown in one house, but to-day *B. calycinum* and its varieties seem to be the only ones grown. Certainly they are very worthy sorts.

This is another plant which likes a very rich loam with ample rough peat added to prevent its being too hard or sticky. It blooms over a large part of the year and can be made to climb over the roof-glass, where its purple-blue flowers are seen to advantage. Half-ripened growths make excellent cuttings.

**Caladium.**—Grown for their large or small ornamental leaves which, for variety of colour, stand alone in the plant world. Tubers, which must be rested in the winter in a warm place, should be started into growth during February or March in boxes or pots of a very leafy mixture. Grow on afterwards into 7- or even 8-in. pots. Light loam, peat leaves, sand and a little charcoal make the compost. Damp conditions, with heat in the region of 70°, are needed when the plants are growing fast. Cooled down when they have finished their growth, they last till the autumn when, as the plants show signs of resting, water is gradually withheld and the tubers stored in the pots they are in.

**Cissus.**—These stove and greenhouse climbers were once very popular as they were easy enough to grow if one had the right conditions. Being rampant growers, they all want rich, well-drained soil, and moisture. For the stove the outstanding species is *C. discolor*, with deeply ribbed leaves beautifully mottled with white over a red and green base. Most of the others are far too large and rambling for the average house.

**Clerodendrum.**—Best known and most frequently grown is *C. fallax*. This has large spreading foliage and panicles of bright orange-scarlet flowers. Grown from seed or cuttings. Seeds sown in February will bloom the same autumn. March struck cuttings will bloom in summer. *C. Thomsoniae* is a good stove climber. *C. fragrans* is also good in a stove.
The lovely red sprays of *Euphorbia fulgens* in December. This plant is definitely a warm-house subject, but well worth growing.
The dwarf and early Azalea Hinomayo in bloom during winter. This type of Azalea is almost hardy, hence is ideal in a cold greenhouse.
THE 'STOVE' OR TROPICAL HOUSE

Columnea.—A plant belonging to the Gesneria family which gives a rich show of red tubular flowers. As it has a drooping habit it is a splendid subject for hanging baskets. Peat compost, plenty of humidity and warmth must be given.

Croton.—Well-known plants, prized for the wonderful colouring of their foliage. The shape of foliage varies considerably, but in all cases the shiny surface adds to the brilliancy of their colourings. Good loam, a little peat and decayed manure is the soil required. Plenty of syringeing is essential to keep down insects. Cuttings supply the majority of young plants.

Dieffenbachia.—A group of plants grown for the ornamental character of the leaves. Its stems are thick and succulent while the foliage is usually broad and spreading and greatly varied in colour and markings. Likes to grow in a loamy compost—not too light. Easily propagated from their stems, cut up so that each piece contains an eye. These are placed in peat and sand, and in hot temperature, say 70°, and will soon root, and they can be potted on. There are many species and varieties.

Dipladenia.—A very lovely stove climber, which climbs about quite easily if it has anything to cling to. It flowers very freely all the summer and is not a bit difficult to grow. Needs a very open soil, fifty per cent of which should be peat. There are many varieties with flowers of crimson, purple, blush or white flowers. Two excellent species are D. amabilis (deep rose) and D. bolivensis (white).

Dizygotheca.—These ornamental and very beautiful foliage plants were included in the previous editions of this book under Aralia, but the name has been changed. They make excellent small pot plants, with their thin elegant foliage, variously coloured. The two species I suggest are D. Veitchii and D. elegantissima. There is a particularly beautiful type of the former called gracillima. Soil must be light and on the peaty side.

Dracaena.—The tropical group of this family is noted for its amazing variety of richly coloured foliage. These plants are mostly the result of hybridization and consequently one can expect to find a very wide range of colouring—from green and white markings to the deepest crimson. A rich soil is essential, say a third each of loam, peat and manure with just enough sand to keep the mixture porous. Propagation is effected by cutting up the old stems into inch lengths and placing these in sand. If the sand is kept moist and very sharp heat given (70-75°) these pieces of stem will soon give roots and shoots. Potted on,
they soon become good plants. Cuttings can also be obtained by cutting off the top of the plant and keeping the plant dry for a time. Shoots will then push themselves out from the stem and these can be taken and struck in the usual way. Another method is to take the underground shoots called ‘toes’, severing them about two inches behind the tip and potting or boxing them in sand or peat-moss. In a propagating pit they soon grow into plants. Cleanliness is everything in the culture of these plants. Syringeing twice a day, sponging the leaves when necessary, watering whenever the plants require it, are the great points to watch.

The striped leaves, some yellow and green and others white and green, are delightful, while the red-and-brown-leaved varieties make very effective companions.

**Gardenia.**—Well-known tropical shrubs, prized for their highly scented white flowers. Makes a good subject for pots and is very easy to grow in a warm house. Loves a rich peaty soil and revels in a moist atmosphere during the growing season. Easily propagated from cuttings.

**Gesneria.**—With these are bracketed the Nægeliæ which give a splendid show of blossom during the late autumn, but *Gesneria fulgens* blooms in spring and summer, its long tubular flowers of vivid scarlet always being a great attraction. Both groups have attractive velvety foliage which adds to their charm. Treatment follows that of the family—peaty soil, moisture and warmth. Can be grown from seeds, cuttings or tubers.

**Gloriosa.**—A tuberous rooted climber, bearing curious flowers with narrow twisted and reflexed petals of red and yellow. Needs a rich loamy soil and some training, otherwise it is easy to grow. A special favourite in warm houses.

Grown in a rough loamy and peaty mixture—the tubers being potted in March, this plant will be a delight all the summer. After flowering, the soil must be dried out slowly and the ripened tubers stored in dry warm soil all the winter. The two best species are *G. Rothschildiana* and *G. superba*.

**Ixora.**—These are evergreen shrubs which give terminal clusters of flowers in many colours and are one of the most beautiful of all the tropical group. Propagated by cuttings taken in spring or summer. Such cuttings will, with luck, give a single head of bloom within six months, but most people prefer to pinch the tip out and so make the basis of a shapely plant. Peat and loam in equal proportions suit this plant well.
The 'Stove' or Tropical House

Jacaranda.—This plant, now known as *J. acuiflora*, formerly called *J. mimosae folia*, is well worth growing for its very beautifully cut foliage, being a much prettier thing than the Grevillea. Seed provides an easy way of getting a stock of it. Must be raised and grown all its young life in the stove house.

Maranta.—Tropical plants with ornamental foliage, most of it being curiously marked or spotted. There are all shades of green in the family and on these greens there appear all sorts of markings of other colours. There are nearly thirty varieties in commerce and a collection of these is most interesting. They like a rich, fairly light soil, plenty of moisture and heat in the growing season. Increased by division. Some sorts also do well in cool houses.

Medinilla.—A shrub with very leathery leaves which gives panicles of rose-pink blooms in spring and summer. Most of these droop in a quaint fashion, and when several of the panicles are in bloom together the effect is very fine. Rich loamy soil with a generous addition of peat and manure is the compost.

Musa.—The Banana. Only recommended for large houses where plenty of heat and moisture is available. The plants have enormous leaves and take up a great deal of room. Best grown planted out in a rich border—or in tubs of very rich loam.

Nepenthes.—These are the Pitcher plants, known to most people because of their ingenious arrangement for trapping insects. The ‘pitchers’ form at the end of the leaf and, as they develop, the pitcher becomes partly full of liquid. It is this that attracts the insect which is allowed to enter the pitcher but never returns from it. The plant then uses the insects as food.

Generally grown in teak baskets, so that the pitchers can hang quite freely. They are usually potted into a mixture of very rough fibre and sphagnum moss, given plenty of water, shade and heat. Varieties are named according to the type, quality and colouring of the pitchers.

Care in handling the plants is essential, whether when potting, moving, or arranging them, and the hotter the house the better the results.

Pancratium.—Stove bulbous subjects which remind one of the Eucharis. Potted in very loamy soil, these bulbs soon increase and offsets may be used for building up a stock. Not difficult to grow, requiring a resting (or partial resting) season during winter, a generous temperature in spring and a cooler and drier atmosphere as the flowers begin to open. Exquisitely fragrant and of the purest white. There are three species all white.
Pandanus.—A decorative form of the pineapple, the most popular being *P. Veitchii*, with its green and white stripes running the whole length of the leaf. Needs a rich loam and plenty of drainage. Quite an easy subject, so long as the roots never get dry. Most of the leaves have spines along their edges—so it pays to be careful when handling them.

Phyllanthus.—Small-leaved ornamental shrubs of particular beauty, the quaint combination of rose, white and green in the small round leaf being most attractive. Peaty loam, rather on the rich side. Propagated by cuttings. The varieties of *P. nivosus* are very useful. This is sometimes listed as *Breynia nivosa*.

Rondeletia.—A small-leaved tropical bush, bearing bunches of bright red flowers in May, June and July. Is propagated by cuttings taken from half-ripened wood. A light soil with a small proportion of peat is required.

Strelitzia Regina.—This very stately plant needs a good deal of room and therefore it can only be recommended for large houses. It has large oval-shaped glaucous leaves on firm leaf stalks, and its flowers look like the head of some gorgeous bird, being light blue and yellow. Increased by division. Needs a rich loamy compost and a continually damp atmosphere during the growing season.

Here then is a short list of outstanding ‘stove’ subjects, and while many plants already mentioned in previous pages will grow in this temperature, I can assure readers that I have but touched the fringe of this interesting phase of tropical greenhouse gardening.
CHAPTER XIX

FERNS FOR THE GREENHOUSE

IT is very seldom nowadays that we find a house given over entirely to the cultivation of ferns. In one sense this is a great pity, but on the other hand the majority of greenhouse owners look upon ferns as something which have a very definite utility value and are grown mainly for use amongst other plants. All the same, ferns need special treatment if they are to be the lovely things which it is possible to make them. For the most part, ferns need shade and moisture, more especially during the spring and early summer when growth is being made and the fresh green fronds are so tender that sunshine or a dry atmosphere would easily damage them. Consider this point for a moment as you think of ferns, and then ask if you can give them the conditions necessary to their well-being. It is, of course, possible to give up one end of a house to them and, by heavier shading and more frequent damping, keep that part of the house in such a state of higher humidity that ferns will have a fair chance of doing reasonably well.

Then there is a question of temperature, for to be really successful it must be understood that, roughly, ferns can be divided into three groups so far as temperature is concerned. First the hot house or 'stove' group necessitating temperatures of 60-65° at night, next the 'temperate' group (the most useful to the amateur), requiring 45-50° at night, while in the third group come the hardy sorts which survive outdoors during our British winter.

The last-mentioned group does not come within the province of this book, and I am only reviewing the other two very briefly and giving the names of some good useful ferns in both sections.

First of all, remember that tropical ferns need tropical conditions and that without such it is useless to attempt their culture. Some plants will, I know, accommodate themselves to varying conditions both of temperature and atmosphere, but not so ferns. True, some tropical ferns will live in low temperatures, but they never look happy or luxuriant. The beauty of any fern lies in its perfect healthiness (which is so apparent to any observer)

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in the green beauty of its fronds. The intensity of the green, the
full development of mid-rib and stalk and the 'spread' of the
plant, alone indicate health. All this can be obtained if correct
varieties are chosen for the existing temperatures. This, then, is
the first point I wish to make, because any success one may hope
to achieve will be decided by the initial selection.

In the case of 'stove' or hot houses, it is essential to damp
down the house and stagings at least twice a day, and in very
hot weather three times a day. The air must be moist in hot
weather. In the house with only a greenhouse temperature, the
same principle applies, but it can, of course, be done with less
water and fewer dampings. In autumn and winter this is not
necessary, but care should be taken to see that the air never
becomes arid. From March to September humidity is essential.
Most ferns will, in time, show resentment of overhead syringing
and it is a false idea (unfortunately held by a large body of
amateurs) that ferns must be sprayed overhead. They respond
far better to the moisture coming off a damp staging, which may
be kept in such a state of dampness by syringing very thoroughly
in between the pots. This means that shading of some sort is
especially necessary in sunny weather, from April to September.

Watering plays a far more important part than might at first
be expected, and another false notion held by some is that the
soil in which ferns are growing must always be wet. That is
wrong and such a doctrine has been the chief cause of many
failures. Ferns must be given the same individual attention
afforded to other plants. They should never be watered unless
they require it, and this applies particularly to the time between
repotting and new roots being made. All ferns are best if given
rain water, but if for any reason this is not available, make sure
that the water which is being used has been aerated and is the
same temperature as the house itself.

Should a fern become dry enough to cause the ball of soil to
shrink away from the side of the pot, it will need placing in a
pail of water until the ball is soaked through; otherwise it may
be a long time before the ball swells sufficiently to stop the water
passing between pot and soil.

Most ferns need potting every year and the best time to do
this is in the spring when growth is just starting. Fern houses
need an annual overhaul and this is best given in March. Some
plants will only require a top-dressing, others may need dividing,
while some of the more established ones will need no attention
beyond the cleaning off of any moss that has formed on the pots, making the surface good and trimming off all bad fronds.

For potting or top-dressing the soil must be as coarse as the job will allow. The smaller the fern, the finer the soil, but as a general rule the rougher the compost the better. It is often thought that peat should form the essential basis of any fern mixture but as a matter of fact only a very few ferns require peat, and even then it should be in small quantities. Some of the larger-leaved Adiantums, the Platyceriums and Filmy Ferns are benefited by a fourth part of the compost being roughly broken peat.

For the general run of greenhouse ferns a suitable compost can be made up as follows:

Three parts very turfy loam, one part flaky leaf-mould or peat-moss, one part coarse sand and grit. So much depends on the texture of this compost that I emphasize the point already made about keeping the soil on the rough and open side. Should there be the slightest suggestion of the soil becoming close or hard, add enough crushed brick to ensure its porosity. Manures cannot be recommended in a general way but a little well-rotted stable manure may be added to the soil in the case of repotting old and well-rooted specimens. The ball of soil should be thoroughly moist all through, before any potting takes place. Splitting old ferns should be done with the garden hand fork and not with a knife. The outer portions of the growing crown should be selected for potting on, the older and harder portion near the centre being thrown away.

Some ferns need growing in baskets suspended from the greenhouse roof, because this gives a better effect to their pendulous fronds than if grown on stagings. All such baskets must be heavily lined with moss before putting in the compost, such moss acting as a cooling agency in hot weather besides being necessary to hold the compost in the basket. It also holds much moisture.

Other ferns grow on blocks of wood, the two best groups for this being the Davallias and Platyceriums. The best material for blocks is the rough bark of a tree, an old portion of a Tree Fern, cork bark or a piece of oak or elm.

The young ferns must have their roots wrapped in moss and peat and this should then be fixed to the block by a thin piece of wire. String is useless as it will probably rot before the roots of the fern have attached themselves to the block. When growing
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fast, these blocks will need syringeing every day and the secret
of getting really good specimens is to nail these blocks to a damp
warm wall.

As I have already pointed out, shade plays a very important
part in the successful cultivation of greenhouse ferns. While
blinds are undoubtedly the ideal way of ensuring perfect shade,
being rolled up each night and on dull days, the majority of
growers will want something less expensive. I suggest fastening
hessian canvas or tiffany over any such houses from the middle
of April till September. If, however, it is possible to give a
lighter shade from July to September so much the better. This
has the effect of hardening the growth already made, so making
it of greater value from a decorative point of view all through
the winter. I have known old gardeners who, after growing their
Maidenhairs well and making them into shapely plants, would
gradually move them about until they were able to stand on
some sunny shelf in a greenhouse. In this way such plants
have their foliage hardened without loss of colour and so can be
used for all sorts of decorative schemes throughout the dark dull
weather.

For convenience I am giving two short lists of useful ferns, one
for the Stove or Tropical House and the other for the average
cool greenhouse. In cold houses it would be more profitable to
grow some of the true hardy sort.

FOR THE TROPICAL HOUSE

Adiantum (The Maidenhair).—This is a very popular and
decorative group. It needs a very lumpy soil where tropical
varieties are grown and a few lumps of charcoal will do much
in keeping the compost to their liking. A. Bausei, A. tenerum
Farleyense, A. trapeziforme and A. macrophyllum.

Davallia (The Hares Foot).—Delightful on account of its dainti­
ness, this is one of the best groups of hot-house ferns. D. fijiensis,
D. bullata, D. elegans and D. solidà are especially good as pot
plants and also for cutting purposes.

Dicksonia.—This is the noble tree-fern from New Zealand and
Australia. It is only for the large heated house, but what a
magnificent plant it is. D. antarctica and D. squarroso are the
main species. They revel in a mixture of peat, loam and sand
in equal parts, so long as continual humidity is available in spring
and summer.
FERNS FOR THE GREENHOUSE

Gymnogramme.—This particular group of ferns which for so long has been styled the 'Silver' or 'Golden' fern, has now been given new genetic status under *Ceropteris* and *Pityrogramma*, but writers differ on this point. Assuming the latter to be correct, the best species are *P. calomelanos*, *P. sulphurea* and *P. triangularis*. They are always worthy of good cultivation for only if well grown can they reach the point of perfection which makes their colouring so attractive. The best silver form is probably *P. Mayi*.

*Lygodium* (The Climbing Fern).—These are useful for covering pillars or trellis work and quite easy to grow if the temperature is warm and the atmosphere moist. *L. circinatum*, *L. japonicum* and *L. palmatum* are the best, or at least the easiest to grow.

*Nephrolepis*.—Delightful ferns because of their varying forms and densely spreading fronds, deeply and finely cut.

Best warm house species: *N. Duffii* and *N. acuminata* (*davallioides*)

*Platyerium* (Stags Horn Fern).—This is an epiphytal fern, with fronds a foot to three feet long, each frond being freely forked like the antlers of a stag. This is one of the ferns which must be grown on blocks of wood.

Varieties: *P. bifurcata* (*alcicorne*) (The Elks Horn), *P. biforme* (very large), *P. grande* (the real Stags-Horn) and *P. Mayi*.

FERNS FOR THE ORDINARY GREENHOUSE

*Adiantum*.—The best maidenhairs for cool houses are *A. cuneatum* and its varieties, *A. elegans* and varieties, *A. gracilimum* and *A. Capillus-Veneris*.

*Asplenium*.—A large group with great variation in form of frond, some being highly cut and divided, others not being divided at all. Most popular in the group is *A. bulbiferum*, a fern so easily grown and lasting in full beauty for months that it is a real amateurs' fern. Other good sorts are: *A. caudatum* (fronds four feet long), *A. Trichomanes*, *A. fontanum* and *A. Nidus*.

*Cyrtomlum* (The Holly Fern).—A really good greenhouse fern, which if given good growing conditions during spring will make up its fronds with such strength that they last in full beauty for a year. The most useful species is *C. falcatum* and some sub-varieties of this.

*Davallia*.—Like the warm house group this is particularly
decorative. There are many varieties serviceable in cool houses if given good treatment when growing. Of these choose *D. canariensis*, *D. dissecta*, and *D. pallida*.

**Dryopteris.**—Once known as *Nephrodium* and then as *Lastrea*, the botanists now class the species under this genus. Amongst the best for the greenhouse are *D. dentata*, *D. rigida*, and our own native ferns of this genus, known as the Male and Female fern.

**Nephrolepis.**—Though I would rather count all the ferns in this group as worthy of warm-house cultivation, it would be a great pity if such a suggestion caused people with moderately heated houses to neglect this lovely collection. The two best species are *N. cordifolia* and *N. exaltata*. In the latter there are a very large number of amazingly beautiful forms and it is upon these that the amateur should concentrate. The crested and much-divided fronds are so varied that one might think each a different species. I recommend the following, all being varieties of *N. exaltata*: Childsii, compacta cristata, Hillsii, Macawii, Millsii, Scottii, todeoides and Whitmannii.

**Osmunda.**—Good cool house ferns, liking plenty of moisture when growing and rather more lump peat than most other ferns in its compost. There are three species, all worthy members of an ornate genus: *O. regalis* (the Royal Fern), *O. cinnamonia* (the Cinnamon Fern) and *O. Claytoniana* (the Interrupted Fern). These ferns are hardy, but are especially lovely when grown in a cool, moist house.

**Platycerium.**—Already mentioned for the stove house, the species *P. bifurcata* and its varieties can be grown in any ordinary damp house, even if there is not much heat.

**Polypodium.**—A very large genus of cool house ferns mostly possessing wavy narrow fronds, some short, some long, some deeply serrated, some plain. Many have a beautiful shade of glaucous blue, others almost a golden tint. No group is more diverse and for the cold house provides a really big selection. Notable species are *P. aureum*, *P. fraxinifolium*, *P. glaucoprunatum*, *P. quercifolium*, and, in cold houses, *P. vulgare* and its varieties.

**Pteris.**—Another large and very popular group, providing both market and garden with many varieties of useful ferns. The species which has provided the largest number of outstanding varieties is *P. cretica*, to which the three well-known forms of *P. c. cristata*, *P. c. Wimsettii* and *P. c. major* belong.

The other species are *P. tremula*, *P. serrulata*, *P. ensiformis*
and *P. longifolia*. Each of these has a number of good varieties and all are worth growing.

**Woodwardia.**—One species and its varieties are particularly useful in cool greenhouses, namely *W. radicans*. It will grow to very large proportions, if under the right conditions with plenty of genial root run. That is why it is such a good subject for planting out in greenhouse rockeries. It must have an open loamy soil with leaf-mould rather than peat, and if fed with soot-water as the fronds are developing, then both colour and length of frond will be exceptionally good.

Owing to its liking for an unrestricted root-run, this is not really a good subject for pots.
CHAPTER XX
OTHER GREENHOUSE SUBJECTS

THE ALPINE HOUSE

DURING the last fifty years or so there has been a big increase in the number of cold houses used exclusively for alpine or rock plants. Such a house has much to commend it, seeing that it costs nothing for heating. At the outset I want to make it quite clear that this particular type of greenhouse gardening has its peak point of interest during spring, and after that it remains rather on the sombre side until the late winter. All the same it has a fascinating interest and allows the cultivation of many an alpine plant, which though it can stand the cold climate quite well, cannot face the cold and moist conditions of the British Isles. It is by giving such control as a house affords that many of these plants can be seen at their best.

One also feels that during the past decade of plant collecting there have been so many new plants introduced suitable to the conditions of such a house, that this in itself may, to some extent, explain the growing popularity of what is popularly accepted as the Alpine House.

In planning an alpine house it is well to bear this point of dampness in mind. Everything must be done to avoid stagnation and thus it is essential to build such a structure in an open part of the garden, keeping it well above ground level and also well away from trees, walls or other objects that might obstruct the free passage of air and light. As a rough guide, I suggest that the house should be nine feet high at the ridge with the eaves five feet from the ground level. This will allow front glass sides to be two feet wide and fit directly on to a sill set on about three feet of brickwork. The glass sides must be made to open and there should be lower ventilators. The lights at the ridge can either be made to open in one continuous length or they can be made in four-foot lengths to open independently, those on one side of the house being alternated with those on the other. An abundance of air is the main essential in a house of this kind. If a house is thirteen feet wide, the two stagings can be four feet
three inches each with a central path of about four feet. These measurements may be altered at will, but it is wise to leave plenty of path room. A two-inch pipe to carry hot water may be fitted if special or difficult subjects are to be grown. This certainly does give full control, but it is by no means necessary. During foggy weather or in districts which lie rather damp, this warmth will probably make all the difference between success and failure.

The principal necessity, as I have already indicated, is full ventilation at all times except during severe frosts. Frost will not harm alpines, but being grown with some protection it is only fair to assume that the plants are not quite so strong as if grown naturally. Therefore it is wise to close the house when the temperature outside reaches freezing point. Of course all watering should be reduced to the minimum during winter and no water should lie in the pathway or on the stagings when the weather is cold.

The soil for potting alpine plants can be somewhat varied, but a general soil, useful for most things, may be made up of four parts coarse loam, one part peat-moss, one part of some rough stony material (lime-rubble, potsherds, limestone chips, or crushed stone), together with a little sand. When mixing, this compost should be kept on the rough side as a fine soil is not altogether satisfactory for alpines. Potting must take place for
the most part after the plants have ceased to bloom and some care must be given to the actual operation. First of all be certain that the drainage of either pot or pan is done in a thorough manner. It depends on this drainage as to how the roots will act in winter—when it is essential that moisture must pass quickly and easily from the ball of soil. Before potting any plant, water it and allow it to drain. Then set it in the new pot or pan so that it will sit comfortably on the surface of the soil when the pot is filled up. Leave at least three-quarters of an inch for watering and, before actually finishing the job, wedge into the surface soil some small broken pieces of rock and some smaller chippings around the collar of the plant. These chippings do several things. They keep the crown of the plant free of the soil and thus stop damping, they prevent the soil from caking and drying on top and are, at the same time, quite ornamental.

After potting, plants should be placed in shade (if the potting takes place in summer), though a frame is much better for them than a house in very hot weather. Better still, if the pots or pans are plunged in ashes or peat-moss, this keeps the roots cool and makes a great difference to the growth of the plants. Potting which has to take place in spring or autumn will necessitate the plants being kept in the drier atmosphere of the house rather than the frame. Water newly-potted plants after the first or second day, according to the weather and the amount of moisture in the compost.

From then onwards, the great thing is to avoid over-watering a plant but at the same time see that it never becomes dust dry. During spring and early summer continued and copious waterings may be necessary, but during autumn and winter the soil may be allowed to dry normally without any harm coming to the plants. In winter plants will often go six weeks without watering. During hot weather the house must be damped down twice a day and a light spray given to the plants either night or morning (or both in very sunny weather). If shingle staging is used, see that this is kept wet during summer but dry in winter. Pests include the great arch-enemy red-spider mite, which has a particular liking for some of the alpines. The best control is some good nicotine emulsion or an insecticide containing lindane, which if used persistently and yet not too strongly will make the plants an uncomfortable home for the mite. Scale insects and aphides are also a nuisance in some districts but are easily checked by modern insecticides.
OTHER GREENHOUSE SUBJECTS

Shading is necessary and nothing is so good as the blinds made of slatted wood. They may be considered expensive but are really cheap in the long run, seeing that they keep the house cool in summer and are for the most part of everlasting wear.

Any person thinking of starting an alpine house cannot do better than procure some of the catalogues issued by firms specializing in alpines, specially grown for this method of cultivation. The range is very large and it would be impossible to go into details here of all those which lend themselves to this mode of culture. I will therefore mention only a few of the outstanding subjects, leaving the reader to make his own selection from catalogues or other works devoted to this particular subject.

The following genera contain quite a number of species and varieties suitable for the beginner, but as he or she becomes proficient I suggest a study of some authoritative work devoted to this subject.


Add to these such shrubs as dwarf conifers and evergreens which bloom in spring or early summer and a very interesting collection can be achieved, which will be the nucleus upon which a more comprehensive collection can be built up.

Nor should one forget the many dwarf bulbs which make such a show in spring, and especially those of the Tulip and Narcissus species, *Crocus*, *Scilla*, *Chionodoxa*, *Muscari*, *Fritillaria* and *Allium*.

THE CACTUS AND SUCCULENT HOUSE

The cacti and succulents are bracketed together because they require very similar conditions. In their native home they are
subjected to long periods of drought and in their own way they make provision against this period by storing up food and moisture in their leaves. Few cacti or succulents require much heat and that is probably why many amateurs have taken up the cultivation of these things in the last few years. Generally speaking, the cultivation of such plants is not understood and no doubt there is a great difficulty always in the mind of the beginner or novice as to how or when these things should be watered. That seems to be the eternal stumbling-block. Because we always think of cacti as coming from hot arid climates we may be tempted to think that they require very little water. That is wrong. Though they do grow in exceptionally dry places —there are times when rain comes, and comes in abundance, and it is then that they make their new growth, store up moisture for the future, and push their long fleshy roots farther into the soil and against the rocks, so as to use this medium later on when the surface has become parched and hard. To apply the same conditions when cacti are growing under greenhouse treatment, simply means that during the growing season of spring and summer normal supplies of water should be given, easing these off in autumn and keeping the plants almost—but not quite—dry in winter.

If, however, the house is cool, there will be little fear of the soil becoming so dry as to harm the plants if the last watering proper is given at the end of September or beginning of October. During the spring and summer it should not be necessary to water cacti or succulents very often, but the great point is to make certain that the plant has used up all the moisture in the soil before more is given. From May to August it is quite helpful to spray the plants once a day, preferably in the afternoon in very hot, dry weather. During winter, enough heat should be available to keep out frost, though a temperature of 40° minimum should be aimed at in winter.

Potting and repotting is best done in spring or early summer, though frequent potting is not necessary if plants are growing healthily. Over-potting must also be avoided, and it is often remarkable to see fine specimen cacti in pots which look very small for the size of the plant.

Soil for potting cacti should consist of turfy loam, broken brick and coarse sand in equal parts, and to every bushel of this add a peck of peat-moss. Cow manure is sometimes added in small quantities but this must be several months old before use. See
The Alpine House at the Royal Horticultural Society's Gardens, Wisley, in early spring, and below, *Iris reticulata* J. S. Dijt, and the miniature Narcissus Snipe, which are two easily-grown subjects for the cold-house.
A house of melons growing on either side with a staging given over to cucumbers growing on a flat surface.

An orchid house showing the layout of the stagings and the pipes running along overhead, thus ensuring perfect growing conditions.
OTHER GREENHOUSE SUBJECTS

that in the mixing the loam is kept on the rough side. Use this
compost almost dry and it will make the operation far easier.
Never pot a plant too low, for that is a sure way of courting
trouble.

When strong-growing succulents are being dealt with it will
be wiser to add double the quantity of loam to that suggested
for cacti and some rotted cow manure in small quantities will
help still further, seeing that the plants must stay in their pots
for some time. Succulents should be given slightly more water
than the cacti, but the principle of not over-watering must be
adhered to just the same.

Very little in the way of shading is required but it is well if
some slight film of shade can be given temporarily during long
periods of bright and powerful sunshine. Even then this must
not be overdone or harm will follow. Muslin or tiffany is ideal,
especially if it can be removed after the sun has gone. Should it
be necessary to use a permanent shade painted on the glass see
that this is put on as thinly as possible.

Keep the plants clear of insects by systematic syringeings of
some good insecticide and keep wood-lice away by smothering
the base of the plant with pepper dust or a proprietary powder
sold for this purpose.

It is not proposed to go into such a vast subject of succulents
and cacti at any great length, because it cannot be dealt with
in a really helpful way except in a book devoted to the two
groups.

I am therefore listing the most useful genera which will offer
the beginner a number of easily grown species with which they
can start a collection.

*Aporocactus flagelliformis* (the Rat’s-tail Cactus), Cereus,
Chamæcereus, Echinocereus, Echinopsis, Epiphyllum, Mammillaria,
Opuntia, Rebutia and *Zygocactus truncatus* (the Christmas
Cactus).

The number of species in some of these genera is very numerous,
but I advise any beginner to obtain a cacti specialist’s catalogue,
where he will find those of easy culture set out.

Cacti of most kinds are also easily grown from seed, and it is
not difficult to raise, providing the soil is sterilized and well
drained. When large enough, the seedlings must be pricked out
in the usual way and again the essential well-drained compost
must be used.

The interest in succulents has increased in recent years partly
THE MODERN GREENHOUSE

owing to their adaptability as house-plants, but one can find very much pleasure both by collecting and growing these in a small house devoted entirely to them, especially if one adds to the more generally grown succulents those curious mimics which look more like pebbles than plants (Lithops), and others such as *Pleiospilos Bolusii*, *Euphorbia obesa*, *Pachyphytum oviferum*, *Aloe variegata*, and the Mesembryanthemums which have a good blooming season.

The following are the main genera which the average gardener will be interested in: Agave or Aloe, Cotyledon, Echeveria, Crassula, Euphorbia, Haworthia, Kalanchoe, Kleinia, Mesembryanthemum, Rochea, Sempervivum, Stapelia and Sedum.
CHAPTER XXI
COMMON PESTS AND DISEASES WHICH ATTACK
GREENHOUSE PLANTS

In the preceding pages I have made it clear that one of the
most important steps towards success in the cultivation of
high-class plants is cleanliness. All sorts of diseases dog the steps
of those who own greenhouses. While it would be a great pity
if such a thought discouraged the keen grower, it would on the
other hand be very unwise if he did not face up to the inevitable,
and learn something about the many diseases and pests which
attack greenhouse plants. To be forewarned is to be forearmed.
All the same I do not propose to go through the whole list of
diseases and pests which attack greenhouse plants but will confine
the list to those which are more prevalent and which are the
common lot of all who try to grow plants under glass.

The first thing to remember is that a healthy plant is capable
of resisting many of the pests or diseases which ordinarily attack
weak plants. It is weak or unhealthy plants that often start an
epidemic and the grower should ask himself if he is really wise
in allowing such plants to remain as a potential danger to more
healthy ones. Look around the greenhouse every now and
then and throw away the suspects; it may save a great deal of
trouble.

Another very potent cause of disease is the rubbish that some­
times accumulates beneath the stagings. Avoid this by every
means possible. Old plants, wooden boxes or timber of any kind
make a safe resting and breeding spot for many animal and insect
pests, therefore keep your houses clear of all such rubbish. Make
your woodwork and glass as clean as you can by scrubbing
once or twice a year. Wash the pots before using them. See that
all soils, leaf-mould and other composting materials are as sweet
as it is possible to get them. Beware of using impure water. All
these things have a distinct bearing on the ability of the plant
itself to resist disease. It is, in fact, the formula of prevention
being better than cure.

Moreover, the whole aim of the grower should be directed
towards the cultivation of a perfectly healthy plant—a plant
THE MODERN GREENHOUSE

strong enough to resist all pests and diseases—this being one way above all others of ensuring the best defence against either.

PESTS

Ants.—A particularly annoying pest, partly because there are so many of them and partly because the damage they do to pot plants is done before one knows it. Watch for the first sign of them in the greenhouse and use one of the new and very effective powders sold to kill them. If a nest is found in the soil of a pot plant, it is best to wash the soil from the roots and repot into clean soil. Dust suspected nesting places with napthalene as a repellent, and the staging and ground under the staging should never be allowed to dry out. Some of the newer powders containing Aldrin are most effective.

Aphides.—The well-known and very unpopular pest usually called greenfly, though as a matter of fact it may be any other colour, according to the particular meal it is making at the moment. They breed at a terrific rate and if one remembers this it will help in their elimination. It means persistent watching for the first signs of them, followed by a very thorough onslaught while the colony is still small. I am convinced that much of the worry caused by aphides is due to the grower allowing the pest time to increase before seriously setting about its eradication. Frankly, it is one of the easiest things to get rid of, if attacked correctly and thoroughly. Fumigation is, of course, the most effective way of killing aphides but where the attack is severe, two fumigations, with a few days' interval between the two, will be required. Often one is satisfied to damp the plants over with insecticide and then hope for the best. This is useless, as the whole secret lies in forcing such sprays on to the infected parts with some power, so that every insect is touched with it. Do all spraying on dull days or in the evenings, especially if nicotine or paraffin sprays are used. On very soft foliage or on young seedlings their use is dangerous unless used as the makers suggest.

Persistent as this pest is, it must not be thought unbeatable, because if one really sets about it in earnest, both the spraying and the dusting will kill the flies quite easily.

In recent years, however, a great advance has been made in this war against aphides and with much success. It has taken the form of 'Smokes' (a canister containing chemical which, once
ignited, gives off that chemical through the medium of smoke), thus penetrating where sprays and dusts do not. The chief chemical used is benzene hexachloride (B.H.C.). All one need do is to place the canister on the greenhouse pathway, light it, walk out and leave it to do its work, locking the door to prevent any unsuspecting person entering for some hours.

Various sprays and dusts containing the newer chemicals are sold under proprietary names and these, if used as the makers suggest, are perfectly safe and will kill any infestation.

Nicotine dust is an old but useful remedy if attacks are slight, and nicotine shreds are both easy to use and effective, as they are simply placed on the floor and ignited, sending off a poisonous smoke.

Crickets.—Usually found at the warmer ends of heated houses, near or under the hot-water pipes. They do much damage and are often not suspected as their energies are displayed at night. Their particular sin is to visit the pans or boxes of young seedlings just when germination has taken place and bite off the little plant near the ground level. Unless one suspects the presence of crickets it might be assumed that the seed did not come up, so it is wise to watch all boxes of seedlings for such a happening. Another nasty habit of theirs is to wait until some seedlings have been pricked out and then nibble them off. There are one or two very good proprietary articles on the market for the destruction of crickets, and these I recommend. Here again the use of B.H.C. smokes and poisonous soil-powders will soon clear the house of them.

Cuckoo Spit or Frog Hopper.—In some seasons this may be a great nuisance. The little balls of froth seen on plants conceal the grub, which, after feeding on the juices of the plant, exudes this froth as a sort of protection. The ideal cure is to spray the infected plants with a very strong insecticide, preferably containing nicotine, and then keep the plants syringed at intervals with some weaker insecticide. If the Cuckoo Spit is bad outside, take preventive measures against its appearance in the house during the summer and autumn, when the adult fly is likely to be seen hopping from plant to plant, as soon as touched. Dust with tobacco powder or give a nicotine or B.H.C. fumigation. Almost any good insecticide will be found effective.

Leaf-Miner.—This is the larva of a fly, often called the Marguerite Fly because it is upon this particular plant that the pest does its worst. The pest is common enough for it attacks a great
THE MODERN GREENHOUSE

many plants other than the Marguerite, principally Chrysanthemums, Cinerarias, Zinnias, Salvias, Statice, and many of the annuals when they are grown under glass. It is a maggot which tunnels its way between the tissues of the leaf, leaving a white trail all over the leaf and sometimes discolouring the leaf to such an extent that hardly any green is left. The eggs which produce this maggot are laid in the upper cuticle of the leaf by a small two-winged fly, usually in May and June, but in a greenhouse one can never be certain when this fly will become active. As a preventive use B.H.C. smokes in spring if the pest is suspected, or spray with nicotine, avoiding the use of strong insecticides on very young growths that are extra soft. These should at least discourage the fly making your particular greenhouse her home. As soon as any markings appear indicating that a maggot has developed, pinch the end of the tunnel (where the maggot will be) with thumb and finger. This stops the damage, and a little persistence will often check even the worst attack. Naphthalene dust on the staging will do much to keep the adult fly away.

Mealy-Bug.—These are scale insects which derive their name from the mealy covering of the females. They lay little colonies of eggs surrounded by woolly material, and in a very short time a whole plant will be covered with the pest. Being one of the most difficult pests to dislodge, it should be looked upon as one of the most serious of greenhouse troubles, especially if the house is a heated one. It attacks old ‘stove’ plants, grape vines, Streptocarpus, Streptosolen and many of the Solanums. Climbers which are of a good age will usually suffer an attack of this pest but fumigation with B.H.C. during spring will check, if not clear it. In the case of vines it is wise to wash the rods during the dormant season with Tar Oil wash, just as used for fruit trees. The newer insecticides, which are now more powerful than the older remedies, are quite capable of keeping plants clean, but it is wise to remember that they must all be used with care and exactly as the makers suggest.

Red-Spider Mite.—One of the most dreaded pests known. It is a very tiny spider, so small that only people with very good eyesight can see it. It spins a minute web on the under sides of leaves and lives on juices sucked from the leaf cells. These cells, as they empty, become a sickly dry yellow which shows very plainly on the surface of the leaf. By that time, however, much damage is done and it will indicate that the mite is very firmly established. To eradicate them when they have taken a hold
upon a plant is very difficult, so the best thing to do is to watch for the first signs of them and then go all out to rid the house of them. Red spiders cannot live, let alone thrive, in a humid atmosphere and so the first thing to do is to keep the syringe working amongst all plants in hot houses. Damping the staging, drenching the floors, especially near the hot-water pipes, and making certain that there is always some humidity in the air, is the best way of preventing an attack. Sulphur is now ground very finely and this, blown on to the undersides of attacked plants, will stop the spiders, while if this is followed up by two or three very strong fumigations, it should be possible to clear the house of them. Azobenzene ‘smokes’ are now the standard remedy against red spider, and though a few plants may be injured by its use the majority are quite safe. The supplier of azobenzene should be able to indicate which plants resent its use.

White Oil Emulsions are widely used to keep plants clean once they have been cleared of an attack.

Scale.—These are insects which cling very closely to the stems or leaves of hot-house plants, sucking out the juices, and are round or flat according to the species. In dealing with the hard-skinned older insect one finds a particular difficulty in moving it, so firmly does it attach its body to the plant. When this is the case the only remedy is to remove it by force with a stiff brush or sponge, using some very strong insecticide as a wetting agent. Afterwards ply the syringe continually, using a nicotine or paraffin-emulsion spray, at least once a fortnight in spring and early summer.

Thrips.—These insects can be considered amongst the very worst of all pests in any greenhouse, because the damage they do is enormous. They breed rapidly and at practically all seasons. The insect is a winged one, but its jumping powers are so great that it springs away from any leaf to the next with the greatest ease and rapidity, in this way carrying on its destructive work all over a greenhouse in quite a short time. They love a house with a dry atmosphere and such a condition is ideal for its spreading. Its presence can be seen by the yellow spots noted on the surface of the leaves. These are the dried-up cells from which the life has been sucked by the thrips. As these insects do their work on the undersides of the foliage it is always possible for much damage to be done before the presence of thrips is discovered. That is why one should make periodical inspections if its presence is suspected. It is a small yellowish brown insect
about one twenty-fourth of an inch in length, with a thin body. The larvæ of creamy coloured or yellow maggots do as much damage as the older insects and it is wrong to treat such larvæ casually. Thrips have their likes and dislikes but one can easily say that at least nine-tenths of greenhouse plants are susceptible to their ravages. Ornamental plants such as Crotons, Dracænas, Palms, Gloxinias, Streptocarpuses, Begonias, Ipomoeas, Clerodendrums, are apt to be completely spoilt by an attack. Carnations can be killed by this pest if not controlled.

B.H.C. and D.D.T. smokes are particularly useful against this pest, while some of the newer sprays or dusts containing B.H.C. are certain to conquer the trouble if persisted with. Thrips can and do spread diseases and therefore it is more than necessary to keep them in check.

All the same, the most effective means of dealing with thrips is that suggested for red-spider mite, making certain that there is always humidity in the atmosphere and by being very thorough in the use of syringe or spraying machine.

**White Fly.**—This is now a general pest, well known to most greenhouse owners. The adult fly is one twenty-fourth of an inch in length, snowy white in colour, this being due to a covering of mealy wax. The fly lives and works on the undersides of the leaves, sucking the juices from the tissues, generally rendering the plant weak and making it very dirty. They breed, like most pests, very fast, laying eggs in small circular groups all over the lower side of the leaf, and within fourteen days hatch out.

It is most important that this pest is cleared as soon as it is seen, and therefore the amateur should be very particular to apply remedial measures with a sense of urgency.

Simple fumigation with B.H.C. and D.D.T. will check it in its early stages, but a more potent fumigant containing Parathion will be necessary in a severe infestation.

Another method which is less dangerous is fumigation with tetrachlorethane, which is a volatile liquid, sold under proprietary names such as 'White Fly Fumigant,' 'White Fly Death,' etc. If used with care it is perfectly safe and quite effective. A list of plants which will not stand the fumigant is indicated on the instructions, and of course all such plants must be taken from a house before fumigation begins.

The parasite *Encarsia formosa*, once quite popular in ridding houses of white fly, has now given place to the more easily procurable fumigants.
COMMON PESTS AND DISEASES

Wood Lice.—These are the small pinky brown bugs which curl themselves up into a ball when touched. They live under greenhouse stagings and at night come out and feed on young shoots or roots of plants. A little tetrachlorethane sprinkled near their haunts will do much to paralyse them and drive others away. Naphthalene will keep them away from under stagings but the most effective control is to keep all litter, especially old wood, away from the greenhouse. Scoop out potatoes and place them where wood lice are known to be, and these will prove to be effective traps. Examine them daily and if you persist this pest will soon disappear.

A house which is kept systematically sprayed and fumigated is not usually affected by this pest.

Worms.—When these are known to be affecting the growth of any plant in a pot, an easy and safe method of treatment is the old one of watering with lime water. Put a pound of unslaked lime into two gallons of water. Allow it to stand for about twenty hours and then (without stirring) use the water as if it were clear water. Any worm in the pot will immediately come to the surface. If stagings are known to be rather heavily populated with worms, dress them with one of the ‘Worm Killers’ sold for lawns. This, if heavily watered, will bring all worms to the surface, where they will die and can then be cleared off.

DISEASES

Botrytis cinerea.—This disease is known as Grey Mould and is a particular enemy in certain seasons. If not checked it will soon spoil a host of plants in any greenhouse. It is a fungoid trouble often accelerated by close, cold and damp conditions.

One of those plants frequently attacked is the Cineraria, others Lettuce and the Tomato, but almost any greenhouse subject grown too soft and given the conditions mentioned will contract it.

Clean conditions, effective and frequent ventilation, great care taken not to over-water during autumn and winter, will all help to make plants resistant, but should any evidence of mould appear, spray with Bordeaux Mixture, which can always be obtained at any garden shop.

Damping-off.—When a box of seedlings have germinated and the small plants begin to elongate, it frequently happens that large numbers of them fall over. On closer examination one will
see that a certain amount of tissue near the soil level has become soft and that a portion of the tiny stem has turned brown and is partially shrivelled. It is a particularly common disease and its presence is often due to sowing seeds too thickly using too much heat and humidity combined. Badly drained sowing soil is another contributory cause.

Sterilized soil and other materials, used for sowing seeds, are the first and best control of this disease. Where un-sterilized soil has to be used I recommend a sterilizing agent such as Cheshunt Compound. This is dissolved in water at the rate given on the tin, and all seed boxes, pots, etc., are watered with this after being filled with soil. This preparation is the outcome of many years' experiment at the Cheshunt Experimental Station, and the fact that the compound is sold by all sundriesmen should encourage growers to use it. At the same time it must be remembered that 'damping-off' may be controlled to a great extent by giving airy conditions to young seedlings and by watering all boxes and pots of newly germinated seed by the immersion method. A sweet, well-drained seed-raising compost is essential.

Foot Rot.—This is really a later edition of the same fungus that causes 'damping-off' in seedlings. It attacks older plants. The fungus enters the tissues of the plant at or near the soil level and sets up a decaying or rotting stem. The stem frequently hardens and consequently the water supply no longer functions and the plants simply dry up and die. The only effective control is to give the plants such airy conditions after the seedling stage that the fungus itself cannot exist. The suggested use of Cheshunt Compound may be considered as applicable to all plants attacked or likely to be attacked in this manner, long after they have passed the seedling stage. Once the disease has really taken hold of the plants there is little chance of them ever becoming thoroughly healthy and useful. Cuttings taken from the tips of such plants will, however, root and grow quite healthily. Tomatoes, cucumbers, Carnations, Petunias, Zonal Pelargoniums, Schizanthus, Calceolarias are all particularly prone to an attack, but in each case the most effective control is correct growing conditions coupled with well-drained soil and careful watering.

Mildew.—There are many forms of mildew, each affecting certain plants in different ways. To be correct one would refer to such mildews as differing somewhat from each other, but for my purpose here I want to treat them generally.
COMMON PESTS AND DISEASES

First of all, mildew appears on plants when conditions suitable to the growth of the fungus exist. Thus it is, that on hot summer days and damp autumn ones, when the difficulty of getting a current of air moving through the house is more pronounced, the disease becomes effective. It is therefore on such days and in such seasons that one must ever be on the look out for an attack of mildew. It is likely to appear on such plants as Carnations, Cucumbers, Verbenas, Cinerarias, Schizanthus, Tomatoes, Begonias, Solanums and on many others at any season.

In most cases it forms a greyish mould on the undersides of the foliage which, if allowed to go on unchecked, will soon cover the whole plant and also the surface as well as the bottom of the leaves. Any plant so attacked will become poor and very unhealthy and will ultimately die.

The main control of mildew may be summed up as sulphur, for this in some form or another will arrest the development of the fungi, and if to this is added a free current of air through and between the plants, so much the better. Sulphur is now so finely ground (as I have already stated) that there can be no reasonable argument against its use. In this finely powdered form it is easily distributed on to every part of the plant and there is no question about its effectiveness. Wet spraying can also be done, by using one ounce of sulphide of potassium in two gallons of water. In using the latter a very fine spray must be used and every part of the plant damped. It turns white paint a dirty blackish colour so every care must be taken when spraying that none of the liquid gets on to the woodwork. The use of sulphur candles or Colloidal Sulphur will also help, while the more general use of Bordeaux Mixture both in solution or in powder form should be considered as an effective antidote to this trouble.

Virus Diseases.—This is a group which now causes much trouble amongst greenhouse plants. It is known to scientists in many forms, but the average greenhouse owner will not be able to sort out many of them. A particularly prevalent one nowadays is a virus disease called 'Spotted Wilt' which affects a large number of greenhouse plants, particularly Nicotianas, Gloxinias, Cinerarias, Primulas, Amaryllis, Gesnerias and tomatoes. Little is known of any remedy which can be suggested as one hundred per cent efficient. The result of this disease means death to any affected plant, though it may take some time. In the case of
the Gloxinia a round ring about a quarter or half an inch in diameter, brown or grey in colour, will be the first indication of the disease; in Cinerarias a brown marking of the leaf stem or spots on the leaves; in Amaryllis, markings yellow or cream or sickly green in mottled irregularity; in Nicotianas an oatmeal-coloured splashing all over the leaf as the tissues dry up. In some plants the distortion or curling of foliage may indicate that a virus is present. In Iris, the virus is seen by the thin light green streaks or yellow markings on the foliage.

Mosaic disease in tomatoes and cucumbers is a virus and is also widespread. It dwarfs and stunts all growth, as seen by the mottled yellow markings and distortion or blistering of foliage.

Research workers are quite definite on one point, that virus diseases are carried from one plant to another by touch. The very smallest portion of juice from an infected plant, coming into contact with a healthy one, will cause the latter to become diseased. Insects, especially thrips and greenfly, are prolific agents in the spread of this form of disease. Whenever dealing in any way with these diseases treat them as highly dangerous. Burn diseased plants and do not allow foliage, flower, soil or pot in which such a plant was grown to come into contact with any living plant. Wash your hands with carbolic after doing the job and any tools such as a knife or hand-fork should be immediately sterilized. Keep houses fumigated or, if empty, sterilize them.

To my mind the tragedy of neglecting virus disease is not generally realized and that is why I have tried, in a simple way, to give some indication of the seriousness, which may follow the general lack of knowledge on this subject. *Cleanliness in every particular is the first rule in all dealings with virus.*

The up-to-date control of both pest and disease has been made far more effective and somewhat easier by the introduction of new materials, new chemicals and new methods of application. All these are at the gardener's service and it would be a great pity if one allowed greenhouse plants to suffer because one is not familiar with such things. I recommend that all keen gardeners should make themselves aware of the new hygiene which affects the greenhouse and its occupants, and the fungicides and insecticides in all forms which will help him towards perfect cleanliness.
CHAPTER XXII

VEGETABLES IN THE GREENHOUSE

The usefulness of some slight protection during spring has a very advantageous effect on raising seeds of vegetables, for producing early crops in the kitchen garden.

Even in a cold house one can be sure of getting such things as cauliflowers, onions, marrows, lettuces and peas, ready for planting out, some weeks ahead of those sown outdoors. This makes a greenhouse enthusiast wonder what he can do in this respect and whether the work of pricking out and growing on is worth while. I am quite sure that it is, especially if the spring happens to be a bad one or if the winter is so extended that ordinary ground work is delayed.

The raising of such vegetables as I have mentioned is easy compared to the raising of some flower seeds.

Cauliflowers should be sown in February and immediately they germinate should be kept near the glass, as it is very essential to keep them stocky. They must be pricked out as soon as the first rough leaf appears, into a soil that is four parts loam, one part peat-moss or leaf-mould with half a part of sand added. It pays to pot these up when they reach a reasonable size, for they can then be transferred to the open ground without the slightest disturbance to the roots—a point which probably makes a week or two’s difference to the cutting of the heads. Use a really good loamy soil for pricking-off.

Onions, especially the larger sorts like Ailsa Craig, should be sown in January or February in a sandy soil. Do not give much heat or they will be thin. A temperature of 45–50° will suit them. Prick out into similar soil advised for cauliflowers, and when the leaves are two inches high cool them off slowly so that they are ready for planting out during April.

Lettuce. The seed should be sown in March in warm houses or during February in cool ones. The pricking out should take place as soon as the plants can be conveniently handled and after a fortnight they should be growing fast enough to warrant hardening off, this being done gradually so that ultimately they are in the cold frame a week or so before planting takes place. Lettuce
can also be sown in October, kept cool during winter and the plants brought to maturity inside slightly warmed houses during early spring.

*Peas,* especially dwarf varieties, should be sown in pots of loamy soil, using 3-in. pots and putting five seeds in each. If particularly strong they can be reduced to four at planting time. Small bushy sticks placed around the sides of the pots will give the growing peas the support they need and beyond that and careful watering, treatment is very simple indeed. Again one must cool them off gradually. Keep a sharp look out for mice, which may do a deal of damage if they find out that the peas are sown. Trapping the mice is the only sure way of stopping the damage. February and March are the two months for sowing.

*French Beans* sown in a cold house during early March and potted on into 5-in. pots will make fine plants by May, but the success of the crop will, to a large extent, depend on how the plants are cooled off. If done slowly and carefully the result will be a crop long in advance of those sown outdoors.

*Runner Beans* should be sown about the end of April because, if sown earlier, they will starve before the weather is warm enough for planting them outdoors.

*Celery* is another crop which needs the warmth of a greenhouse in the early stages. Sow in March or April in a well-drained soil and to ensure strong plants prick out at the earliest moment. For exhibition celery, one should go to the trouble of potting off the plants singly, sowing the seed in February. Self-blanching celery, too, must be sown in late February to encourage early usefulness.

Besides providing early seedlings, a greenhouse will often furnish a few vegetable luxuries at a minimum of cost and labour. Some of these, coming to maturity during the winter, are especially welcome.

*Asparagus* can be forced quite easily even in only moderately warm houses. The success of this crop lies in purchasing well-grown crowns. These can always be supplied by growers, but the fact that they are wanted for forcing should be stated at the time of ordering.

During January make up a bed of old potting soil about three inches deep in the warmest part of the house, lay the clumps on this quite close to each other and just cover them with soil. Water them with warm water and see that they never get dry
VEGETABLES IN THE GREENHOUSE

again. When growth begins, give just enough light to keep it
green and cut the stems when about six or eight inches high.
The old crowns are useless after forcing.
Where old beds are being scrapped it is always worth while
using up the crowns in this way. Something of a crop is always
forthcoming.

Aubergines or Egg Plants provide a succulent vegetable in
summer-time. Sow seeds in March in a warm greenhouse and pot the young plants on before they have the slightest chance of starving. Ultimately, they can be planted out or put into large pots and grown all the time in any ordinary greenhouse. Though they need a fairly dry atmosphere when setting their flowers, a heavier humidity can follow, as they are addicted to attacks from red-spider mite if the atmosphere is too dry.

*Beans* can be grown to maturity in any greenhouse but the one usually chosen is the French or Dwarf bean.

Sow and grow on in 7- or 8-in. pots, say three or four in each pot, or grow only one in a 6-in. pot.

Feed frequently or starvation will cause you much wasted endeavour. Another bean now becoming popular is called the Climbing French and is an ideal subject for those people who have large greenhouses or 'lean-to' houses which allow such beans to be trained up the walls, or on strings from the floor to the rafters. Both these are likely to get red-spider mite or thrips attacking them if not kept syringed every day. For that reason these beans really require a house to themselves and though this pays on a commercial scale I doubt if it is worth it for the amateur.

*Capsicums* should be sown in March and grown in 6-in. pots, filled with rich soil and then placed in a sunny position in the house. As the richly coloured pods near maturity make sure that the plants have plenty of water and plenty of food. The smaller podded capsicums are worth growing for their decorative value alone, but like the larger ones they have a culinary value also. The small-podded red Chilli makes an excellent decorative pot plant.

*Chicory* can be purchased in root form for forcing and is a very valuable salading. Seeing that it can be grown under any greenhouse staging in the dark it suggests a means of making such spots useful. The roots are thick and usually devoid of all branching roots, so if they are put into an 8-in. pot of soil and about five roots in each pot you will see how easy it is to get quite a good crop. If fresh roots are put in each week this will ensure a succession of useful crowns all through the late winter and spring. Cover each pot with another of the same size, inverted. Water only just sufficiently to keep the soil from drying out. Boxes can be used instead of pots so long as the young growth is kept dark. The growing season is from December to March.
An ideal timber greenhouse which allows the cultivation of a vast range of subjects, as it can be partitioned off if required. Note how the ventilators run the whole length of the roof, while the frames attached make the house still more valuable.
A group of cacti and succulents which any amateur should be able to grow with the greatest ease, providing a house is given over to these special subjects.

A magnificent group of the brilliant Poinsettia, their scarlet bracts being at their best during December. These must be given a warm temperature throughout their growth.
VEGETABLES IN THE GREENHOUSE

*Mint* can be dug up from the garden and placed in boxes three inches deep during January. If placed in any warm spot and kept watered it will soon give a few small succulent shoots which are very useful at that time of the year.

*Mustard* and *Cress* are so simple to grow that little need be said about either. They can be grown at all times of the year and only require a very shallow box of soil. Cress takes four days longer than the mustard to come to useful maturity so it means sowing the cress that far in advance of the mustard. A common fault is sowing both these crops too thickly, and amateur growers should try the effect of thinner sowings, judging the effects for themselves.

*Seakale* is one of those luxuries which appeal to most of us. It is so easy to force that it is surprising to find how little forcing is done by amateurs. Purchase forcing crowns and treat them exactly as directed for chicory. Keep a sharp look out for the moment when growth is ready for cutting as it can soon become thin and rather strong if left. The inverted pots should be removed for a few minutes each day to allow for an examination of the soil and the crown, which will be all the better for the sweetening influence of fresh air.

Many other vegetables can of course be grown under glass and especially in those houses which have soil borders capable of producing good quality root systems to the plants being grown. Such crops as early lettuce, carrots, turnips, beetroot, radishes, will all help to pay the rent of such borders and in some cases tomatoes can follow these early crops.

A fuller guide to this subject may be found in *Early Vegetables under Glass* (Cassell. 6/-).
CHAPTER XXIII
MONTH BY MONTH IN GREENHOUSES

JANUARY

Warm House.—During the month sow Gloxinias, Streptocarpus, Begonia, Coleus, Grevillea, Asparagus Sprengeri and A. plumosus in sharp heat.

Take relays of early bulbs into warmth together with the earliest blooming shrubs such as Daphne, Prunus species, Ornamental Crabs, Azaleas, etc.

Keep humidity as low as possible in frosty weather and do not be afraid of temperatures being five degrees below their normal during severe spells of cold. Force seakale, chicory, rhubarb and asparagus.

Cool House.—Take Chrysanthemum cuttings. Cover tender plants with newspaper when weather is very cold. Reduce watering to a minimum and keep the atmosphere of the house dry. Pick off decaying leaves. Bring in early bulbs. Strike Carnation cuttings and keep those in bloom on the dry side. Pay particular attention to Calceolarias, Cinerarias and Schizanthus, never allowing them to become too wet or frozen. Ventilate whenever possible.

Annuals growing in pots should be on shelves as near the glass as their safety allows.

Primulas and plants in bloom must never get water on the flowers.

Bring in from the frames those bulbs ready to throw up their buds.

FEBRUARY

Warm House.—Sow Antirrhinums, Lobelia, Salpiglossis, Dahlias, Begonias, tomatoes, cucumbers, celery and cauliflower.

Strike cuttings of Geraniums, Coleus, and Saintpaulias. Bring more bulbs and shrubs into warmer quarters together with relays of Cinerarias and Primulas.

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Bring into warmth from their winter store such plants as Fuchsias, Heliotropes and Hydrangeas to provide both early cuttings and early flowers. See that the roots are well soaked when starting them into growth. Prune Fuchsias and Heliotrope if necessary.

Place Dahlia tubers in leaf-mould to give cuttings next month. Mix up soils and place in a warm dry spot ready for use. Pot on any soft-wooded plants now becoming pot bound. Force Lily of the Valley.

Cool House.—Give more air to the house, especially if days are mild. Still keep watering as near the minimum as possible. Bring in more bulbs and shrubs. Strike cuttings of Chrysanthemums and Carnations. Sow Sweet Peas. Pot up Lilies. Make a sowing of cauliflowers and onions if these are wanted early, even though you have no warm house. Keep Schizanthus near the glass, and begin giving more ventilation when weather allows.

MARCH

Warm House.—Much potting will have to be done, ferns may be split up, canna's started into growth and divided, foliage plants repotted. Start tubers of Gloxinias, Begonias, Achimenes, Caladiums. Take any cuttings available. Sow tomatoes, cucumbers, melons, Stocks, Asters, Coleus, Zinnias (for blooming indoors), and Celosia. Prick off all plants as early as possible. Beware of sudden bursts of hot sunshine. Soak any plants being taken from their winter quarters by immersing them in water for half an hour.

Take Dahlia, Fuchsia, Hydrangea, Solanum and Salvia cuttings. Sow Solanum capsicatum for Christmas and Salvia splendens for bedding purposes.

Cool House.—Keep a moister atmosphere but give plenty of ventilation on warm days. Sow seeds of half-hardy annuals and tomatoes in a box frame placed in the warmest corner of the house. Place any tubers of Begonias or similar subjects in leaf-mould or peat-moss, keeping them as warm as possible to encourage them to break into growth. Watering must now be more general. Put any forcing bulbs and shrubs inside. Begin general potting of all subjects at the end of the month. Pot up more Lilies. Pot off Carnation cuttings immediately they are rooted. Stake Schizanthus, Cineraria stellata and tall-growing annuals. Cool off the struck Chrysanthemum cuttings.
THE MODERN GREENHOUSE

APRIL

Warm House.—A busy month. Most important task is prick­
off all subjects as they become ready. Sow any of these again
if germination has not been good. Sow also Primula sinensis and
P. s. stellata for next season. Strike any cuttings available of
decorative and flowering plants. Pot on all started tubers of
Begonias, Achimenes and Gloxinias. Split up Clivias, and repot
Amaryllis immediately after blooming. Shade glass if necessary.
Repot Azaleas into peat and sand. Continue general potting as
fast as possible. Stake Calceolarias. Euphorbias, after their rest,
should be encouraged to give cuttings, these being taken as soon
as possible. Train climbers. Put Roses outdoors after flowering.
Fumigate frequently as a preventive against pests.

Cool House.—Pot on all subjects requiring it. Keep young
tomatoes in warmest end of house. Sow cucumbers, Zinnias,
Coleus, Stocks, Dahlias, melons, beans (French and Runners).
Beware of cold winds and draughts. Shade glass if sun is hot.
Keep Calceolarias and Cinerarias free of greenfly by fumigation.
Sow Primulas for next season and all half-hardy annuals for the
present one. Put all shrubs that were inside into a sheltered
spot outdoors where they can be covered up if frosty at night.
Begin the seasonal feeding of plants in full growth.

MAY

Warm House.—Keep plenty of moisture on the floors, walls
and stagings. Shade the house during sunny periods. Put old
Arum lilies outside. Sow seed of Primula sinensis, stellata, obconica
and some of the hardy sorts for ultimate pot culture. Pot on all
subjects as they require it. Feed growing plants if well rooted.
Keep ferns shaded. Take cuttings of Euphorbias and Begonia
Gloire de Lorraine. Repot Azaleas, Cassias, Acacias and Heaths.
Pot on Gloxinias, Celosias and Begonias. Fumigate frequently.
Give melons and cucumbers every encouragement to make foliage
and flowers, by humidity, but ease this up in the case of melons
once the flowers have set.

Cool House.—Top-dress any lilies requiring it. Give a final tie
to Schizanthuses and Calceolarias. Pot on Carnations and Zonal
Pelargoniums for blooming next winter. Put Chrysanthemums
into their final pots. Put all plants possible outside, so as to give
plenty of room to those which remain. Sow Balsams for a show
MONTH BY MONTH IN GREENHOUSES

later on. Give Lilies that are well established a feed of soot water each week. Keep floors of houses moist. Leave a little ventilation on each night. Continue general feeding.

JUNE

Warm House.—Potting of all soft wood stuff, Celosias, Torenias, Exacums, Achimines, Gloxinias must be pushed ahead. Give Cannas plenty of water and lots of food. Be sure that there is a high degree of humidity in the house during very hot spells. All plants in bud should be given manure water. Strike cuttings of Hydrangeas, Begonias (of the tuberous section) and Fuchsias. Sow Gloxinias and Begonias to provide tubers for next year.

Cool House.—Sow Cineraria again, also Calceolaria and Primula malacoides. A few Zinnias sown now will give fine plants in pots during late August and September. Pot the remainder of Chrysanthemums into their flowering pots. Stake them immediately after and tie them to wires outdoors. Gloxinias and Begonias sown in January should also be placed in a cool shady house to retard part of the batch for later flowering. Feed fast-growing tomatoes after a couple of trusses of fruit are set. Stand young Carnations in cool pits. Keep Cyclamens free of mite by constant syringing; their final potting should be finished this month. Keep palms, ferns and foliage plants well syringed.

JULY

Warm House.—Main work will be keeping plants moist both at the roots and in the atmosphere, especially amongst ferns and foliage plants. When Gloxinias are in bloom reduce syringing slightly. Put all blooming Begonias into the cool house. Winter-flowering Gloire de Lorraine, and Rex types of Begonia are best kept in the warm. Stake Achimenes and Gesnerias. Pot on Torenia, Exacum and other plants wanted for autumn. Keep plants well picked over, decaying leaves doing so much damage if left. Give both ventilation and shade as these are required, the former by night as well as day.

Cool House.—Nip the tips out of tomato plants that are carrying a good crop. Feed with sulphate of potash and a tomato fertilizer. Pinch lateral growths of any cucumbers in cool houses, keeping the house as moist as possible in sunny weather. Stake all plants as they grow and train climbers before the wood...
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becomes too hard. Sow Salpiglossis for spring flowering and make another sowing of Primula malacoides. Order any bulbs required for forcing. Celosias must be given good light but not full sunshine. Zinnias must have a dry atmosphere but plenty of water at the roots.

AUGUST

Warm House.—Feed and top-dress cucumbers to encourage them to continue the crop. Keep ripening melons rather dry. Give more air and light to foliage plants to slightly harden their new growths. Take cuttings of Crassula, Coleus, Begonias, Selaginellas, Pilea, Tradescantia and any other soft wood cuttings available.

Cool House.—Sow Schizanthus, Cyclamen, Cinerarias, Stocks, Larkspur, Nigella, and other annuals wanted for next spring. Top-dress tomatoes if room is still left in the pots. Strike cuttings of half-hardy bedding plants, especially Geraniums. Syringe Carnations with insecticide and then with some anti-rust solution. Pot on Cinerarias and Primulas as they require it, keeping the plants moist and shady afterwards for a few days. Prick out Calceolarias and Salpiglossis but keep them cool. Feed Chrysanthemums, keeping them syringed and tied. Being outside they are apt to dry up rather quickly this month, therefore watering is more important than ever. Pot up Lachenalias, Freesias and bulbs wanted for Christmas blooming. Pot up some of the Arums.

SEPTEMBER

Warm House.—Gloxinias, Caladiums and other tuberous rooted plants should be transferred to other quarters after flowering, but water must still be given till the leaves die. Euphorbias should be given more light but not full sunshine. Syringe and sponge all foliage plants thoroughly, they will then keep fairly clean all winter. Prune hard-wooded climbers if they have finished blooming.

Begin rearranging house to make room for bringing in those plants now outside. If nights are moist and cold, it usually pays to warm up the pipes for an hour or two. Wash off shading.

Cool House.—Prepare to bring in the Chrysanthemums, Solanums and Azaleas by the end of the month. Clear house of
MONTH BY MONTH IN GREENHOUSES

tomatoes. Pot up Arum Lilies from outside and stand in cool spot. Make a selection of bulbs for spring blooming, getting them all potted, excepting the Tulips. Strike cuttings of all bedding plants. The final potting of many Primulas and Cinerarias may take place. Sow more Schizanthus and other annuals. Throw away every unwanted plant in an effort to make room for all the plants requiring protection, which have stood the summer out-of-doors. Keep the atmosphere drier, especially at night.

October

Warm House.—Reduce watering and atmospheric moisture. Stake, tie and feed Begonia Gloire de Lorraine. Place Euphorbias near the light. Caladiums and Gloxinias having been dried off may be put under the stagings, the pots lying on their sides, where they will be safe throughout the winter in a temperature of 50°.

Bring a few Solanums into the warm to colour the berries quickly. Prune out all unnecessary wood from roof-climbers to allow the maximum of light entering the house. Wash inside of glass if possible. Mildew may become a great nuisance this month if carelessness in ventilation occurs. A little heat and a little top ventilation is best means of keeping down mildew. Dust with flowers of sulphur as soon as it appears.

Cool House.—Bring in all Chrysanthemums, giving slight warmth if the weather is wet or foggy, together with plenty of air when fine.

Put more supports on fast-growing Carnations. Continue bulb potting, at the same time putting in some early Gladioli of the Colvillei type. Pot on Cinerarias, Calceolarias and Schizanthus. Procure and pot up some Lilium longiflorum eximium for Easter blooming. Pot up Tulips.

November

Warm House.—Keep plants as dry as circumstances will allow. High temperatures caused by excessive fire heat are unnecessary and dangerous; try and keep the house at an equable temperature. Very little syringeing will be necessary. Give fresh air whenever possible. Make arrangements for scrubbing all the woodwork in the house either this month or next. Cyclamens should be developing quickly and the earliest should be in full flower; aim at a temperature of 48° at night.
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Cool House.—Keep the atmosphere dry, especially where the Chrysanthemums are. A few Cinerarias and Primulas may be placed in the warmer house to give early flowers. At middle of month bring in the bulbs required for early blooming. Keep Calceolarias cold and clean. All annuals should be placed on a shelf and kept on the dry side but safe from frost.

DECEMBER

Warm House.—The chance of scrubbing the house ought to be taken during the month. Keep plants just moist but that is all. Very little syringing will be required. Bring more plants into the warmth to continue the display. Cyclamens, Primulas, Cinerarias, Euphorbias and Begonia Gloire de Lorraine and the winter-flowering sorts should be at their best. Avoid over-watering them. Bring in the early bulbs together with a few pots of Freesia. Give a little air to the house wherever possible. Pick off every decaying leaf. Force Seakale and Chicory. Pot up some Retarded crowns of Lily of the Valley. All bulbs wanted for Christmas must be taken into sharp heat during the early days of the month.

Cool House.—Keep plants almost dry. Bring in relays of bulbs as they become ready. Pot up shrubs for forcing, and a few clumps of Dicentra and Solomons Seal. If Fuchsias, Heliotropes and such-like plants are being wintered under stagings, clear up any faded leaves that may have fallen from them as these may cause trouble. Scrub and clean the house this month if possible. Cut down Chrysanthemums after blooming and put them into frames. Keep carnations in an airy part of the house and do not give much water.

Beware of annuals being over-watered, for they will never survive if given too much moisture at their roots.

Before the end of the month, consider all the seeds, tubers, corms and bulbs that will be required in the spring and get them ordered.

In all one's gardening it is essential to have the material at hand for use the moment it is wanted, but in no place is it so necessary as in The Modern Greenhouse.
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