Greenhouse Gardening Around the Year
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Around the Year

MARION DULLES

The Macmillan Company, New York
1956
For Rhea
PREFACE

"Who loves a garden, loves a greenhouse, too."

WILLIAM COWPER, *The Task*

This book has grown out of one person's experience in a small greenhouse. There is some material listed in the appendices that I have not grown, and cultural suggestions taken from sources other than personal records, but on the whole, the book is based on first-hand knowledge. There is no substitute for working with the plants themselves in learning how best to bring them into flower, and yet I am so indebted myself to information gained from books that I can only hope this one will prove useful in turn. Whether one is a beginner or an old hand at gardening under glass, whether the pursuit is a full-time occupation or a casual hobby in a busy life, there are endless possibilities to be explored. To suggest some of these and to encourage the amateur to experiment on his own are perhaps the main purposes of the following pages.

A word should be said about nomenclature. Without wanting to be technical and indeed, having myself started with almost no knowledge of the Latin names of plants, I have used them in the appendices and where it seemed advisable in the text, because of their increasing practicality for me. Common names are also given, whenever they are available. As one becomes interested in rare or unusual plants, more often than not there is no common name in use. Even among species familiar to any gardener, there are a great many known only by their Latin names. Starting with such flowers as calendula, petunia, verbena, camellia, cyclamen, and fuchsia, to name a few, it is easy to
add, little by little, to the list. Once learned, there is satisfaction in being sure of identification, whether one comes across the Latin name in a seed catalog, a garden magazine, or a book on horticulture.

I should like to express my thanks to the editors of *Horticulture*, and of *Flower Grower* and to The American Garden Guild, Inc. which holds the copyright on *The Home Garden*, for permission to reprint material from articles which appeared in those magazines. Among the many people who were helpful in various ways in the preparation of this book, I would particularly like to mention Charles R. Sutton, Frank Seibering, Donald Wells, Victor Ries, Constance McMullen and Mary Rhea Waller. I am grateful to H. W. Rickett for the care with which he read the entire book, making many valuable suggestions, and to Carol Woodward, with whom it has been a pleasure to work throughout all the final steps of editing the manuscript. Especially, my thanks are due to my husband, Foster Rhea Dulles, not only for his encouragement during the writing of the book, but for his interest and inspiration through all my gardening years.

*Marion Dulles*

*Worthington, Ohio*

*May, 1956*
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Greenhouse Gardening Around the Year
1. September

MAKING A START IN
GREENHOUSE GARDENING

There is no beginning and no end to the cycle of growth. Every operation in a greenhouse is dependent on one that has gone before. One of the most rewarding possibilities for the gardener raising plants under glass is, indeed, that of continuing performance, from seed to seed, from flower to next year's flower. September is an ideal time to break into this charmed circle. In my own case, it was a very simple procedure. I lifted seedlings and annuals still in bloom from the outdoor garden, started some paper-white narcissus bulbs, and begged cuttings of various house plants from my friends. Then I bought two pots of big yellow chrysanthemums in full bloom to add a touch of the lavish look that I associated with the idea of gardening under glass.

Since then, every September has seen a reorganization in the greenhouse. When a soft haze and the first turning leaves belie the continuing warmth of the sun, it is always time to set the scene for the cold winter months ahead. This year there are a dozen orchids, several camellias, a tea olive for fragrance, a passion vine that will clamber to the roof on the north side of the house, and many other plants I never dreamed I could raise successfully when I started. At the same time, there are still common annuals for cut flowers, and many of the cuttings of that first season continue to thrive as large plants on the shelves.
No matter how many bulbs are forced, the paper-whites lead the procession, if for no other reason than their dependable habit of providing blossoms and fragrance in a short six weeks. And all autumn long, chrysanthemums in variety highlight the display.

Starting in ignorance that first September, except for some slight knowledge of outdoor gardening, I made the common mistake of thinking that there was something occult in the successful operation of a greenhouse. Through the years I have learned that quite the opposite is true. To be sure, there are flowers difficult to grow under glass, just as there are flowers difficult to grow in the open. In either case, it is wise to start with the less demanding plants and as experience is gained, to add, little by little, material that must have special care. No matter how one proceeds, however, it soon becomes apparent that rather than any esoteric lore, it is practical knowledge that is helpful, and instead of being more demanding than outdoor gardening, the ability to regulate so many of the essentials for growth makes for even greater success under glass.

Controlling the Weather Inside

At just what point I realized that running a greenhouse was controlling the weather in one small area, I don't remember. But I do know that from then on, the goals in greenhouse operation became far less mysterious. Instead of worrying for fear the specific needs of each individual plant might be overlooked, I could take comfort in the thought that they were all protected against the extremes of weather. They were not tossed by winds, parched by drought, exposed to storms, or to unseasonable heat or cold. More than this, the glass-enclosed area was providing sunlight, a chosen temperature, circulation of air, and controlled moisture in a far more ideal way than is often possible in nature. That sunlight, air, and water, everywhere and through all the ages, have accounted for the mutability of the weather is perhaps a commonplace. As soon as one stops to think, it is obvious
that, together with a fertile soil, they make possible all plant life. And yet it was a long time before I saw that the main purpose of a greenhouse was to control these elements.

A greenhouse is best placed with a southerly or easterly exposure, preferably a combination of the two, in order to utilize all available winter sunlight. A thermostatically controlled heating unit is almost a necessity, so that the temperature can be regulated on cool gray days and during the cold nights of winter. Automatic ventilators are also nearly indispensable. They not only give circulation of air, but assure a fixed temperature range, opening when the house becomes too warm on a sunny day, and closing when it has cooled to the desired point. A convenient water supply makes it possible to provide essential moisture in the benches, and humidity in the air.

What Kind of a Greenhouse?

Help in choosing the best greenhouse for a certain purpose or location and suggestions on equipment are a part of the service offered by most greenhouse-manufacturing companies. Many of the larger concerns have regional representatives who will supervise the construction from start to finish. If a prospective customer wants to undertake the assembly of a prefabricated unit himself, he can still ask for advice at any point. There is a list of greenhouse manufacturing companies in Appendix I.

My own greenhouse is a lean-to, and we were lucky in having an ideal situation for it, between house and garage, facing east and south. By extending the roof of a breezeway to meet the deck of the lean-to, it was possible to include an area equal to that under glass; this could be used both as a work-room and as a place for plants that do not require direct sun. A glass-paneled door at the north end opens into the living-room. Another at the south leads to a terrace where we spend a great deal of time during three seasons of the year. At the rear of the work area, that is, the west side, there is still another door, into the breezeway and from there to either kitchen or garage. One
bench to run the length of the east side was ordered with the greenhouse. We also bought two shelves to hang from the rafters above this bench. A shorter bench for the west side of the lean-to was made at home, and as time went on shelves were added wherever there was room for them. I have yet to meet the owner of a glass house who has as much space as he would like to have.

Soil for Benches and Pots

While it is possible to improve on nature so far as the weather is concerned, this is not true in providing soil for the greenhouse. In the first place the depth in the benches is limited to six or eight inches. Roots are even more restricted in a pot. In the second place, no matter how carefully one waters, there is likely to be caking and compression, and during a season valuable plant nutrients will be leached away. In the third place, soil in nature is usually being renewed in various ways, while that in the greenhouse is being exhausted. For these reasons, it is necessary to provide the best possible growing medium at the start, take care to enrich it as it becomes necessary, and replace at least two-thirds of that in the benches once a year or oftener, depending on what is being grown.

Good bench soil or potting soil has several essential ingredients, one of which is humus. It is possible to buy a mixture rich in humus from a garden store or commercial grower. This may be the best procedure for the first year, but it is obviously expensive for any long-term operation. It is far better, not only because of cost, but to assure the proper ingredients, to mix your own.

The Compost Pile The first step is to start a compost pile. There is no substitute for the material from this natural factory. All topsoil, to some extent, contains the rich, crumbly humus, which is the result of the decomposition of vegetable matter. The compost pile provides it in an unadulterated form. There are many ways to go about this. Perhaps the ideal is a pile, 3 by 5 feet, of alternate layers of upside-down sod and strawy manure, built to
a height of 4 feet or so, and left for some nine months to decompose. In England, certain perfectionists carry the art of composting to such lengths that they specify sod from an unplowed meadow, where cattle have grazed for centuries! Even without such niceties, the ingredients of this type of compost pile are the hardest to procure, and it requires the most labor.

Next best is an enclosure or shallow pit to hold layers of autumn leaves interspersed with good garden soil, with a sprinkling of commercial fertilizer added every few layers. This type of composting produces a humus usually referred to as leaf-mold. The process is comparatively easy and the end product is certainly fine as an ingredient of bench soil, but it takes a great many leaves to break down into a small amount, and of course, they are only available at one time of year.

My own solution is simpler than either of these. Since the results serve their purpose well, I am quite satisfied with it. I keep two compost piles going, one that has decomposed enough for use, the other for new material. Both are made by using any clean (i.e., undiseased and pest-free) vegetable matter that comes to hand. This includes grass clippings, weeds (if they have not gone to seed), discarded annuals and vines, any vegetable refuse from the kitchen, such as pea pods, carrot tops, potato parings and the like, and also, in season, all the leaves that are available. The only material that does not find its way to the compost pile is that which includes twigs or branches, which would decay too slowly to be practical, and the remains of diseased plants. With every two or three feet, I add a little garden soil—if I remember it—and two or three times a season, a sprinkling of fertilizer.

Whatever the type of compost pile, there are several general rules for its management. One is the practical measure of being sure that there is a depression in the center of it. This keeps rain from running off the sides. As moisture is necessary for the process of decomposition, this will hasten matters. In fact, it is a good idea, if possible, to hose down the pile during dry weather. Another way to speed up decay is to turn the material
over every two or three months. A commercial grower may break a sod and manure pile down and rebuild it. Leaf-mold or a general mixture such as I have described can be turned over with a fork.

No matter what is done to speed decomposition, or what material is used, it will take a large amount to make an adequate supply, even for a small greenhouse, and at least six months for it to reach a usable condition. With two compost heaps, and usually changing the soil in the benches only once a year, in September, I manage to get along, even though my method is rather haphazard. There are times as I put the dark rich stuff through a sieve when I wish I had enough to cover every foot of the lawn and flower gardens, as well as to serve in the greenhouse. I am always thankful, however, for what I have when I remember that in nature it may take hundreds of years to build a few inches of fertile topsoil.

The sifted compost makes up a third of the bulk of average bench soil. To this are added a third good garden soil and a third sharp sand (available at any builder’s supply store). Five quarts of dried cow manure and a 5-inch pot of bone meal per bushel provide fertilizer. A commercial fertilizer can be substituted, if one takes care to follow directions for the proportions. Or fertilizer in a dry form can be omitted altogether, and once plants are established, the benches can be watered at proper intervals either with manure water, or with one of the new liquid fertilizers which can be absorbed by the leaves of plants as well as by their roots. There will be more on this important subject of feeding greenhouse plants in later chapters; it should always be remembered that nutrients are only available to plants when the soil is damp, that is, when they can dissolve in water.

To Sterilize or Not? Whether or not bench soil should be sterilized is a debatable point. Large commercial growers often take this precaution against earth-borne diseases and pests. They use steam forced from the heating-pipes, or formaldehyde. A solution of the latter, a cup to three gallons of water, is sprayed
on the benches, thoroughly soaking the soil. This must stand for twenty-four hours, and then the soil is turned over once every day for three days, to aerate it again, before anything is planted.

I mention these possibilities in case anyone wants to try them. In my small greenhouse, I have never bothered to sterilize bench soil. One year I discovered small cutworms in the compost as I was sifting it, and, in alarm, called the floriculture department at our nearby University. I was told that if I sprayed the compost pile with a proprietary pest-killer once or twice a season, I would have no further trouble. This I now do. In the meantime, I heated that batch of humus in the oven, a preserving-kettle-full at a time, for two hours at 200°. Cutworms curled up and died in a gratifying manner, but still this was scarcely practical, even for humus for two small benches! I may still stick a half-bushel of soil in the oven, if I am planting some difficult seed or transplanting rooted cuttings of some special treasure. In general, I count on the insecticide, and on the fact that any signs of trouble are quickly detected in a small house.

Qualities of the Soil

It is very easy to take the composition of the soil for granted. I had gardened in a desultory fashion for years outdoors, and several seasons in the greenhouse, without giving the subject a thought. It was only when I started experimenting with certain plants that required individual potting mixtures that I became curious about what went on down there among the roots. What made soil fertile and what was this “food” which the plants required?

I discovered that soil fertility is dependent on four primary factors: texture, including the ability to retain moisture; chemical content; the presence of the microscopic fungi and bacteria known as soil microorganisms; and the degree of alkalinity or acidity present. There is great variety in the soil that covers the earth’s surface, and it is little short of miraculous how the plants
found in any stretch of country are adapted to the conditions which they find there. One has only to think of the contrast between the sun-baked earth of South Africa, which cakes hard as a brick in the summer, and the moving sands along the top of Atlantic shore dunes, or between the leaf-mold of any forest floor and the clay sod of the prairie, to realize this.

Texture Since the best texture for the vast majority of plants lies in none of these extremes, and since we are not interested in starting plants on an endurance race, we vary the texture accordingly. Compost adds to the capacity of the soil to absorb and hold moisture, helps prevent compression, and assures the aeration so essential to root growth. Sand added to a clay soil tends to break it down and “lighten” it. Even cow manure has value in improving the physical texture of the soil.

Chemical Composition The nutrients which plants get from the soil are made up of many chemical elements, of which the ones needed in greatest quantity are nitrogen, phosphorus, and potassium. Four others, though equally important, are needed in smaller amounts; and still others are necessary in such minute quantities that they are spoken of as “trace” elements. Nitrogen plays many parts in the life of plants, being a constituent of the living matter itself, as well as of the green coloring matter, chlorophyll. Adequate nitrogen therefore stimulates growth above and below ground and makes for a healthy green color (upon which many other things depend); but only if it is in the proper relation to other nutrients. An excess of nitrogen may retard flowering and cause a “water-soaked” appearance. A deficiency of nitrogen, other nutrients being present in sufficient quantities, may hasten flowering at the expense of growth. Phosphorus goes into the making of certain substances essential for life and found in all parts of plants, in every cell; and is especially concerned in the making of new cells and hence of new leaves, branches, roots, flowers, and fruit. The exact way in which potassium is used is unknown; but without it plants cannot thrive. This is far from the whole story of the intricate
chemical action and reaction of plant growth. Every plant, every living cell of a plant, is a delicate coordinated mechanism which uses the food made in the leaves from water and the carbon dioxide of the air, as well as the inorganic nutrients taken up from the soil. For practical purposes, minute but sufficient quantities of other chemical elements necessary for growth occur in almost every garden soil, and only the three named above need be supplied commercially. In fact, a commercial fertilizer, labeled with its percentages of nitrogen, phosphorus, and potassium, invariably supplies other elements also (magnesium, sulphur, etc.).

Microorganisms To persons who have had no training in biology the importance of fungi and bacteria is perhaps the least understood of all the vital factors in soil fertility. These minute organisms are at work everywhere during the growing season, in the compost pile, in the garden bed, and in the greenhouse bench, breaking down the tissues of plant and animal remains, setting free organic acids and forming the inorganic substances which are necessary to plants. Once the idea of their activity is grasped, it is impossible to look at any stretch of earth and think of it as a lifeless, inert mass. Instead, one knows that it is in a continual state of flux, due not only to physical and chemical changes, but to biological action as well. When the seed is sown or the roots firmly planted, the soil is ready to play its part in growth, with activities so complex and interwoven that even the scientists themselves do not understand every phase.

Soil Acidity Some soils are acid, others alkaline, to various degrees. These conditions have resulted partly from the rocks out of which the soil was made, but to a greater extent from the climatic conditions—temperature and precipitation—under which the soil developed. Soils subjected to long winters or high precipitation are apt to be acid (even where the underlying rock is largely limestone); arid soils and soils of warm climates may tend toward an alkaline condition. In general, vast areas of the most fertile soil in the world go to neither extreme. A soil
that is more or less neutral will grow most plants. In the greenhouse, only those plants which come from a native habitat with an acid soil, such as azaleas, or those from an alkaline region, such as most of the cacti, need special attention in this respect.

Anyone in doubt about the reaction of the soil in his greenhouse can buy a soil-testing kit, or send a sample to the nearest state agricultural experiment station for analysis. To read the report from the latter with intelligence, however, may take more information than has been given here. A simple way to test for acidity or alkalinity, is to use a piece of litmus paper from the drugstore. Placed in a wet sample of soil, the litmus paper will turn red if acidity is present, blue if the soil is alkaline. Of course, this is only an indication of the reaction and does not give the degree of acidity or alkalinity.

The value used to measure the degree of acidity of the soil is called the pH. Here again, there are complicated procedures involved, unnecessary to go into for practical gardening. It is, however, useful to know that a neutral soil has a pH value of 7.0; very acid soil goes to pH 3.0, and very alkaline to pH 9.0. Normal garden soils have a range usually between pH 6.0 and pH 7.0. A large majority of the plants grown in a greenhouse do well within this range. Either a higher or a lower pH is, however, occasionally suggested for some plant one wants to grow. Soil can be made more alkaline by adding agricultural lime and more acid by adding aluminum sulphate. More specific information is given under the cultural directions for individual plants.

**Temperatures for Greenhouses**

Once a greenhouse has been set up properly to make possible weather control, and once there is an ample supply of a fertile soil mixture on hand, there is only one restriction in choosing from the wealth of material suitable for growing under glass. This is the temperature range that is to be maintained. It is
possible to have a cool house, an intermediate house, or a hothouse. The ranges involved are always designated by the lowest degree of night temperature. In a cool house, the thermostat can drop to 45° at night, without damage to the plants chosen for this range. In an intermediate house the figure is usually 50° or 55°, and in a hothouse 60° or 65°. In each the temperature will run up during the day ten degrees or more, depending on the time of year and the strength of the sun.

Obviously, this is a relative matter. When we think of the range in outdoor temperatures, we realize that most plants can stand a wide variation. Leeway is also provided by the fact that even in a small house one area may be warmer than another. In a lean-to, the area closest to the house wall will be the warmest, and the most exposed part of the bench area the coolest. In a detached house, the area nearest the heating unit is warmest. In this way, plants that require somewhat different temperatures can often be grown together successfully. In general, however, a cool house rules out tropical and subtropical species, and a hothouse is equally unsuited to those that do best when the nights are cool.

I have always had a cool house. At first I chose it because it was said to be the easiest and because it was the cheapest to heat. As time went on, I found other advantages. It is ideal for raising seedlings for the outdoor garden, there is a seemingly endless choice of material, and it has a comparative immunity from the pests and diseases which attack plants in a hot, humid atmosphere. My desire to try lush tropical growth has been satisfied by experimenting with a hothouse during the summer, as I describe later. Even without this opportunity, I have grown so fond of some of the plants that refuse to bloom when it is warm, such as cyclamen, camellias, and the cypripediums, and have been so satisfied with the many plants which it is possible to raise for cut flowers, that I doubt if I would ever want to change to a hothouse during the winter months.
Growing Plants in Benches and Pots

My long bench is always treated more or less as though it were an outdoor border. I first planted it that way as a carry-over from what little garden experience I had. Since the greenhouse is so much a part of our living quarters, its decorative effect is an important, though far from the only, consideration in choosing material. Various heights, blended colors, contrasting foliage, and a border of small plants to soften the edge of the bench provide an attractive vista from the living-room, and still offer sprays to cut and odd spaces in which to tuck a few bulbs or seedlings. In planting a bench in this way, however, care must be taken that tall plants do not take light from those that are shorter. A row of large plants nearest the glass is to be avoided, for instance, although a few, say three or four, can be placed at wide intervals.

The smaller bench has been used through the years for more utilitarian purposes, although it also may have a low border for appearance's sake. Flowers that are needed in quantity for cutting, potted bulbs that will be moved indoors or given away when in bloom, seedlings in season, and herbs and salad greens are all grown here at various times. One year, when I was experimenting with several of the less well-known bulbs and a group of shrubby plants with which I had had no experience, I filled the small bench with coarse vermiculite. When watered down, this provided a fine, moist bed on which to set pots. In this way I could move the new plants in or out of the sun, away from too strong a breeze on a warm windy day, or from the cooler side of the bench to the warmer, near the house wall. Growing unfamiliar material in pots is, in general, a good procedure. In fact any plant that needs a special soil mixture, or may be wanted for use in the house, or has to be staked or sprayed or given some other treatment at frequent intervals, is easiest to take care of when in a pot. There are also plants which flower best with their roots restricted, and many shrubs can be kept to a
reasonable size in this fashion, whereas they would grow too large for a greenhouse if given more room. Small seedlings that do not transplant easily are also grown in pots. And hardy bulbs are put in pots so that they can be given a cold rooting period in the dark, before being brought into the warmth and light to form top growth.

It becomes apparent that pots play a vital part in greenhouse culture, adding tremendously to the scope of operations. In fact, some growers use nothing else, filling benches with pebbles or vermiculite to increase humidity, and placing plants in pots on it. This is especially practical when some one kind of plant is grown, such as orchids, camellias, or primroses. In a mixed house, certain possibilities, such as that of cut flowers, are limited by this method. The decorative quality of a planted bench also appeals more to me personally. My shelves, however, are always crowded with pots. Or perhaps I should say, as full as possible without crowding, for nothing is worse in a greenhouse than growing plants so close together that they are in danger of smothering one another.

**Vines and Hanging Baskets**

A vine or two can utilize available space in another way. Their diversity and appeal both in foliage and flower add a great deal to the picture, and at least in summer, when they can be allowed to shade the benches, they are useful as well. In the winter, however, they must be kept rigidly in control, to prevent this same loss of sunlight. It is important to know the habits of a vine before starting it. To devote a whole north wall, for instance, to a plant which will only grow to three or four feet is foolish. And another which will speedily reach the rafters and steal out over the glass may be too large to use at all. By what method they climb is important, and whether they will droop or must grow up. There is a chart of vines in Appendix D.

Hanging baskets add still further to the number of plants which may be grown in a small house. One type is made of wire
and can be lined with moss, which holds in the soil mixture used. Another, especially designed for orchids, is made of slats of wood, with sufficient spaces between them to allow for circulation of air and perfect drainage. Still another way to suspend a plant from the ceiling is to make a cradle of braided raffia or strong cord to hold a pot. The first two are obtainable from florists or garden stores, and I have found the last in a five-and-ten-cent store. Unglazed ceramic containers, with three holes from which to suspend wire supports, are also practical and attractive. And material for baskets is almost as varied and beautiful as that offered by vines. A number are listed in Appendix D, for low-growing vines are included in the possibilities.
2. October

MOSTLY BULBS

Some time during October, usually by the tenth in our part of central Ohio, the first black frost will come. Filling the greenhouse has been a continuing process, ever since the soil was renewed soon after Labor Day, but there can no longer be a sense of leisure about the operation.

Chores before Frost

No matter how busy the season is with other activities, time must be found to pot up seedlings started outdoors, bring in any annuals that are to be saved, and find room for the permanent plants that have spent the summer out in the open. As though this were not enough, October is also the month when all but a few of the bulbs must be started that will flower during the winter and well into spring.

There is something very lordly about the instructions usually given for the multitudinous tasks necessary or possible in a greenhouse in October. There is never a hint that you may have to neglect your family (or press them into service), neglect the final weeding of the perennial border, neglect seeing the friends who were scattered during the summer. Instead, you are directed in terse phrases to water down the greenhouse at frequent intervals while the sun is still warm; to fertilize and spray on a regular schedule in order to give the plants a good start for the winter; to repot all plants that have made active growth.
during the summer and show signs of needing it; to sterilize the soil used in repotting material prone to infection by fungi; to separate plants which can be multiplied by this method; to store those which have bloomed during the summer, according to their needs.

Such admonitions go on and on, but I have learned not to let them put me in a frenzy. I won't say that I am often idle, but I have come to realize that a last game of tennis, a picnic, a social hour with a view of the autumn splendor of golden leaves and the last brave show in the garden—these can be important too. I always manage to bring in the potted perennials, the wax plant, the night-blooming cereus, the fuchsias, clivias, camellias, and cypripediums, but I may not immediately get them repotted or trimmed back or otherwise properly groomed. I also plant the bulbs on hand. And I have found that no matter what remains undone when the inevitable morning comes to mark the end of the outdoor season, the sight of healthy growth in the greenhouse, with its promise for the months ahead, never fails to lift my heart.

**Bulbs and More Bulbs**

Time after time in my notebooks, I find entries reminding myself to plan for more bulbs another year. With almost every other category of greenhouse material, the tendency is to start more than there is eventually room for. With bulbs, on the other hand, it is almost impossible to have too many. A dozen hyacinths, potted individually, may seem prodigal when they are planted, and yet this is only enough to bring one or two into flower at a time, if a succession is wanted. With the bulbs that are grouped, six or more to a pot, a dozen is a mere nothing. How often have I wished I had more freesias to cut, or potted crocus or scilla to give away!

When it comes to making the choice, the opportunities are so great that a greenhouse could be filled with bloom the year around by nothing but bulbous material. Of course this in-
cludes a large number of plants which do not grow from a true bulb. There are those from a corm, like the crocus; those from a tuber, such as anemone; those from a pip, such as lily-of-the-valley; those from a rhizome, familiar in German iris. All are alike in that some form of fleshy subterranean part has the actual food for the next flowering stored away when it is planted. This makes for ease of culture and almost certain results. When the bulbs, corms, or tubers are wanted for another season’s performance, however, care must be taken to assure a renewed supply of food by tending the plant after it has flowered.

Certain of the small, early spring-flowering bulbs, including grape hyacinth, scilla, crocus, winter aconite, and snowdrops, can be dug in the garden, the largest from a clump used in the greenhouse, and the rest replanted. Dwarf iris from outdoors can be potted and treated like any other hardy bulb. It is usually a waste of time, however, to try bulbous material that has not been raised by experts.

My own selection has never been the same any two seasons, although I reorder certain favorites year after year. The list of bulbs for winter and spring bloom in Appendix A includes many species and varieties not commonly grown, and yet it does not begin to be complete. For one person, the magic of spring tulips and daffodils in flower at winter’s end offers diversity enough. For another, the descriptions of rare bulbs lead farther and farther afield, and prove rewarding even though the less familiar flowers are not necessarily more spectacular than the garden favorites.

No matter what the choice, it is poor economy to buy anything but the best. This is true of all material for the greenhouse but is especially applicable to bulbs. The few cents’ difference between top quality and bargain leftovers may make the difference between fine flowers and blasted buds or no buds at all. Although a bulb order may seem expensive when it is made out, one should not forget that most of the material can be used for many years. Hardy bulbs, while not suitable for indoor
bloom for more than one season, can be cared for by allowing the foliage to mature naturally, and saved to plant outdoors. Some tender bulbs, given the same opportunity to ripen properly, can be stored dry over the summer and used again and again. Others are evergreen and are given a rest period right in their pots, and so, with the right care, grow in size and beauty as time goes on. Only a few bulbs especially treated for winter flowering, of which the paper-white narcissus is the commonest example, are necessarily discarded after use.

For centuries Holland has been the center of bulb culture. There seems to be some particular combination of soil and weather conditions in that country—not to mention the skill of the Dutch growers—that is peculiarly conducive to excellent bulbs. During the war, large bulb farms in this country, on Long Island, on the West Coast, and in Michigan, supplied much of our stock, but Holland has regained her pre-eminence, raising more millions of bulbs every year than any other country in the world.

The stock of a reputable retailer is to be counted on, whether it is imported or domestic. So standardized has the business become that an order for such common bulbs as tulip or narcissus will be true to catalog descriptions in size, variety, and quality. If the material is rare, it may be necessary to hunt for it. Most of the bulbs mentioned can be found in the sources of out-of-the-ordinary material listed in Appendix H. The standards for less popular stock may not be so high, but, again, one can rely on a reputable firm.

Whether the bulbs wanted are common or rare, it is always wise to order as early as possible. Most catalogs of such material are sent out, or can be sent for, early in the summer. Some dealers even give a discount for orders received before the first of July, since this helps them estimate how many bulbs they will need. It is a general custom to fill orders according to the date they are received, even though bulbs may not be shipped until September or October. In this way the earlier orders are
given the pick of the crop, and there is less danger of missing out on a rare item of which the supply is limited.

**Tulips** Tulips will bloom in the greenhouse quite as well for the amateur as for the commercial grower, and each pot of six or eight will give several weeks' bloom. The early tulips, both single and double, are in general better for forcing than those that bloom late out-of-doors. Most bulb catalogs suggest certain varieties especially adaptable for winter use.

There is less mention of the possibility of using “species” or “botanical” tulips, as pot plants. These are the smaller dainty members of the family, more recently brought from Turkestan, Greece, and Persia to grace the rock garden and the front of the border. This is perhaps not the way to describe the flaming spread of the ‘Emperor’ tulip, largest and best known of the species, but most of them do have a delicacy and grace quite different in its appeal from the bold splendor of the larger tulips. There is the candy-stick tulip (*Tulipa clusiana*) for instance, the water-lily tulip (*T. kauffmanniana*) and quite a long list of others including *T. dasystemon* and *T. eichleri* which have not as yet been given common names. If they are kept on the cool side, not hurried and not over-fertilized, they can be brought into bloom quite as successfully as the larger, more common varieties.

**Narcissi** Perhaps it is because my greenhouse is small that I have a fondness for all the miniatures among the bulbs. Although I am likely to have a pot or two of the large trumpet varieties of narcissus, I almost prefer such little gems as *Narcissus cyclamineus*, with its golden recurved petals, or *N. canaliculatus* with three tiny, white and yellow, fragrant flowers on each six-inch stem.

**Hyacinths** In the same way, I like the slender spikes and smaller bells of the “Roman” hyacinths quite as well as the formal fat Dutch product. These it is possible to buy in white or blue; they are not really Roman at all but a French form of *Hyacinthus orientalis*. They are sometimes offered as “French Roman.” Just to confuse things further, there is another kind
known as “Italian Roman.” It is of much the same type but comes into bloom later.

Lilies Lilies in the greenhouse immediately bring to mind the white fragrance of the Easter lily (Lilium longiflorum) raised in the hundreds of thousands by commercial florists. Although tulips, lily-of-the-valley, hyacinths, smilax, and many other distant cousins in the lily family provide popular greenhouse material, the possibilities of the garden lilies themselves seem to have been largely overlooked by both amateurs and professionals. Yet they have much to offer in the way of fragrance and brilliance of color.

There are undoubtedly lilies that are temperamental, no matter where they are grown, others that might be too tall for the small greenhouse, and still others that will not flower until summer. If we skip those with a difficult reputation, however, and remember that, generally speaking, a garden lily can be brought into bloom about six weeks before its appointed time, there is a wide choice among the early lilies for spring display. They are especially effective when raised under glass, and can then be used in pots on terrace or porch as it grows warm enough to spend time outdoors.

Among lilies recommended for the greenhouse by an authority are the ‘Golden Chalice’ strain, the ‘Rainbow’ hybrid and the new ‘Hollancicum’ lilies which will flower in three weeks after the first appearance of the stalk tip, whereas most other lilies take five weeks from this time. Other sources suggest the ‘Cascade’ madonnas, hybrids of L. candidum, and the shorter L. brownii, a pure white Japanese lily with a lavender line down the center of each of the three inner petals.

I give these suggestions without having had time—as yet—to try them. From my own experience, however, I know that even a late-flowering lily, such as L. dauricum or L. speciosum, can be brought into bloom by late May. One year after bringing them along in the greenhouse, I planted several L. speciosum in bud, right in the garden after it had warmed up. I sti
Plate 1. A greenhouse may stand free from other structures or be attached to house or garage. Above is a prefabricated model. (Gottscho-Schleisner photo)
Plate 2. Freesias, ever fragrant (top left) and Peruvian daffodils (right) are attractive bulbous plants for greenhouse culture. Daphne (below) is a pleasing shrub for permanent use, flowering in February. (Roche photos)
remember the amazement of a friend of mine, a landscape architect, when he saw this August lily blooming beside delphinium!

*Iris* The genus *Iris* is the source of many lovely flowers for the greenhouse, both from bulbs and rhizomes, and in both hardy and tender classes. The dwarf bearded iris (*Iris pumila*), which comes in a wide range of shades, has already been mentioned. For a touch of clear purple, and in some varieties blue, in late winter, nothing could be more charming than a pot of six or eight *I. cristata*, another small species. And a third, is the lavender *I. reticulata*. Three forms of bulbous iris, the Dutch, Spanish, and English groups of *I. xiphium, I. xiphioides*, and their hybrids, can all be forced. They bloom in the order given, the Dutch coming first, with the variety ‘Wedgwood’ a common greenhouse plant. Its azure blue flowers are deservedly popular, but it is too bad to ignore the other possibilities, especially suitable for cut flowers, in this group.

There is a fascination, for anyone who likes to experiment, in the tender iris that will not live through the winter in the temperate zone, but can still be raised in the cool greenhouse. These come from the Punjab, Palestine, Armenia, the hills of Kurdistan, Bosnia, Afghanistan—just to mention a few of the far away places where plant explorers have traveled to bring them back to Europe and the United States. Their descriptions, even in a matter-of-fact garden encyclopedia, are no less enticing than the thought of their origins. There is *I. nada*, which is said to have evergreen foliage and as many as two hundred flowers to a branching stem, each white flushed with lavender and bearing a crest of orange. *I. collettii* comes from the Chin Hills of Upper Burma and promises deliciously scented flowers of pale violet; *I. susiana*, the mourning iris, has one great flower to a stalk, so thickly veined and dotted with darkest purple that it gives the effect of black.

The iris I have mentioned all more or less resemble the well-known groups, bearded or beardless, of northern gardens. There
are many other distantly related members of the iris family in the list of possible greenhouse bulbs. These include Freesia, Ixia, Moraea, Babiana, and the Kafir lily (Schizostylis), which bloom in winter, and Acidanthera, Tigridia, Tritonia, and Watsonia for summer flowering.

Amaryllids The species of a plant family can differ quite as markedly in outward appearance as the individuals of a human family. Who, for instance, would think from a casual glance that the daffodil (Narcissus) and the amaryllis (sometimes called Hippeastrum) were closely related botanically? The one, partly perhaps, because of English poetry, seems the very symbol of the cool windy days of northern spring; while the other is almost too exotic, away from its natural habitat in a tropical forest. Only when I think of the look and feel of the bulbs, the one a smaller counterpart of the other, and recognize the similarity of the basal, strap-like leaves, do I realize the family resemblance. It is far from necessary to place plants in their families in order to grow them, but it definitely furthers that interest in knowing his plants which every true gardener feels.

The amaryllis family offers many bulbs for the greenhouse. I have a list of some thirty different genera, but since many of them are best grown in an intermediate or even a hothouse, I am trying them out only gradually and will mention only a few that I have brought into bloom in the cool greenhouse. The large bulb that is generally known by the family name is also called Hippeastrum. It is sold up to Christmas-time and in late winter gives gorgeous bloom in scarlet, crimson, or striped red and white, trumpet-shaped flowers. I carry this bulb through its dormant period, and start it into growth by watering and feeding it, in the greenhouse. Only when color begins to show in the buds do I take it into the warmer atmosphere of the living-room, to open.

Nerine is an autumn flowering genus, one species of which is known as the Guernsey lily. This has an umbel of bright crimson or red flowers on a stalk 18 inches tall. It usually blooms
before the appearance of any leaves (a common trait among amaryllids), and therefore is best placed in the greenhouse where ferns or other foliage will add to the general picture. It is one member of the clan which definitely requires a cool house.

*Amarcринум* is a hybrid of great beauty which blooms in the autumn or early winter. Its delicate pink flowers are fragrant and last on the plant a long time. They are also supposed to be excellent as cut flowers, but I have never had enough of them to want to shorten their season for this use. This year I am going to try antholyza (obviously called ‘Aunt Eliza’ by familiars) which is described as having bright orange flowers opening like a fan on two sides of a thirty-inch stem; and *Eucharis*, which, according to the catalog, can be brought into bloom several times a year by giving it a rest in between; it has four white flowers on each stalk and likes the shade.

*Clivia* is perhaps my favorite amaryllid. My first plant was given to me several years ago and has grown since then, giving a better performance every year. A cool rest period, on the dry side, is best for it. Some authorities then recommend an intermediate house when it starts active growth. I have treated it in the same way as that mentioned for *Amaryllis*, with equal success. In fact, when the umbel of orange trumpets opens indoors, I may return it to the greenhouse to keep it in flower longer. It blooms best when pot-bound, and so should not be disturbed until the roots actually break the pot—or until such time as several new shoots have started at the base of the original plant, and these are wanted to start new plants. They can be cut with a sharp knife, their roots carefully separated from those of the mother plant by soaking the whole tangled root ball in water until it can be gently disentangled, and then the offshoots potted separately.

The blooming period has varied, the first bud sometimes opening in January, sometimes not until late February. This, incidentally, is another peculiarity of the amaryllids. They seem to like to choose for themselves when they will start into growth,
and when they are ready to rest. The foliage of *Clivia* is evergreen, and I know that the flower-stalk will come when it is ready. Each year adds to the number of blossoms. Although they open in succession, the first do not drop until all have come out, and the whole umbel has been in bloom for two weeks or more.

**Potting Up Bulbs**

When it comes to potting bulbs in October, it makes all the difference to have the necessary supplies ready at hand. I like to have bins of the various ingredients for soil mixtures in the work area of the greenhouse at all times. If I have help in September in sifting compost and soil and carting them to the greenhouse, I make sure of enough to fill a bushel basket, or better still, a two-bushel container to go under the potting table. Even heavier and more difficult to handle is the builder's sand, necessary to "lighten" the soil (though it actually makes it heavier) and provide drainage. I buy twenty-five-pound bags of dehydrated cow manure and bone meal at a time. These are kept in covered tins, since, strangely enough, they have an unpleasant odor in their dry form which entirely disappears once they have been mixed with other ingredients and moistened. Besides these staples are supplies of peat moss and vermiculite. And after a major operation like that of potting bulbs, it is a good idea to replenish these supplies, especially the compost and garden soil, which it may be impossible to dig once the ground is frozen.

To mix small quantities of different soil mixtures as they are needed, I have found that a round wooden cheese-box, usually obtainable at a super-market, serves the purpose very well. Since the ingredients should be thoroughly intermingled, it is best not to make too large an amount at once. Ideally, the materials should be dampened, though not saturated, the night before they are used. I seldom follow this counsel of perfection myself. When the day comes that finds me free to pot bulbs, I prepare
the mixture even though the ingredients may be dry, not watering until after the bulbs are planted.

Then there are the necessary pots. I am still likely to have to buy a few new pots in the autumn, even with hundreds of different sizes and shapes already on hand. Those suitable for bulbs have a way of disappearing, either by being used for other plants as the need arises, or by being given away with flowering bulbs in them. In any event, it is well to check the supply, as one checks the soil ingredients beforehand. New pots should be soaked for several hours or overnight in cool water, as soon as they are bought, and always allowed to dry out before they are used. They should be avoided if possible, for bulbs give a better performance when raised in old pots. These should be clean. I try to clean a pot, using water and a stiff brush, soon after a plant has been taken out of it. I may wait until I have half a dozen or so, but I know from experience that it is a tedious chore if they have been allowed to pile up. On occasion, a pot may be used without washing for some undemanding plant, but this is not true for bulbs. Since they are to be stored, damp, for root growth, every precaution must be taken against disease and rot. From an esthetic point of view as well, not only in the greenhouse, but even more when a pot is eventually destined for the house, a clean surface is essential.

For many years, the pot most in use for forcing bulbs was one known as a bulb pan. This is the name given a pot of the usual brick-colored clay that is shallow in proportion to its width. It is ideal for all the small bulbs, but in recent years, it has been found that a pot only slightly less deep than the normal is better than a bulb pan for tulips and other larger bulbs, since it allows for more root growth. These are often called azalea pots. Pots may be spoken of as 5s or 10s or any number between two and sixteen. This refers to the top diameter in inches. The small spring bulbs are usually potted, for instance, four or five in a four-inch pot, or six to ten in a six-inch pot. Tulips and narcissus are put six or eight in an eight-
or ten-inch pot or pan. I have suggested the average number of bulbs and size of pot for each variety in Appendix A.

Wooden markers and an indelible pencil are needed to label the potted bulbs. And last but not least, one should have on hand a package of a disinfectant, several of which are on the market under proprietary names. When used according to the directions on the package, it may ensure success with a bulb that is prone to some fungus disease.

The actual potting goes fast. A pot is filled to the desired level on which to place the bulbs. It is then given a shake or two on the table to settle the soil. The bulbs are set firmly in position—but not pressed hard into the mixture—and covered according to their needs, which differ somewhat. The majority are barely covered with soil, a few need more, and some are placed with the crown of the bulb showing. Directions for this are also given in Appendix A. There should always be half an inch at the top of the pot empty, for watering. If bulbs are pressed too firmly into the soil, they are likely to heave as they form roots. The same thing may occur if the soil itself is pressed down too tightly in the pot. So it is a good rule to handle the mixture, and the bulbs, lightly, so long as there are no actual air-pockets left in the pot.

**Attention after Potting**

After planting, the pots should be given one good watering before being put away for a rooting period. To make sure of thorough saturation at this point, it is best to water them from below, standing them in a shallow pan of water until moisture appears in the soil at the top. For the flower-bud in the bulb to develop properly, there must be good root development before top growth starts. In nature, bulbs are planted at a depth which ensures this, and if they are grown directly in the bench, and planted deeply, the same results can be obtained. Hardy bulbs, however, require a period of cold, as well as dark, before top growth starts. Frost does them no harm—in fact, it is bene-
ficial. So only tender bulbs can be raised directly in the bench. Since few amateur greenhouses have enough space to devote a bench to bulbs in any event, pot culture usually proves more satisfactory. There are certain varieties that can be grown in a deep flat, especially if they are wanted for cutting. Here again, it is often a matter of finding room in the sun for them as they develop their leaves.

Hardy bulbs are put in a cold cellar or coldframe and covered with several inches of damp peat moss to keep them moist and dark. Or they can be buried in a trench outdoors, in which case a layer of straw or salt hay is used and then the trench filled in with loose dirt. The necessary period varies with different bulbs, but one is far more likely to bring them out too soon than to leave them too long. In fact, for a succession of bloom they can be kept in the cold and, after the essential number of weeks, be brought in at two-week intervals, the blooming period being thus extended for a month or two.

Tender bulbs, on the other hand, are kept right in the cool greenhouse for the rooting period. A piece of cardboard with a hole or two punched in it or any other cover which does not exclude air can be used to keep them dark, although the shade under the bench, or on a shelf in the work area, is usually enough. A few of them are watered only once, thoroughly, after planting, until top growth starts. Others must be kept well moistened for the whole period. With all bulbs, care must be taken that the soil is not soggy wet; this will cause rot.

Although it is a help to have some idea how long a certain bulb requires for adequate root growth, you soon learn to judge for yourself. With some bulbs, the pot fills with roots which begin to grow through the drainage hole in the bottom of the pot. With others, top growth starts of its own accord when the roots have developed, even in the dark; this may or may not be a sign that they are ready to be brought into the light, and it is safer to knock the plant out of the pot, to see for yourself whether the roots have grown sufficiently.
To bring the whole mass of root and soil out of a pot intact requires a little knack, but it is a common greenhouse procedure and easily learned. The soil must be thoroughly damp. The pot is then turned upside down, one hand spread over the surface, and knocked gently against the potting table or any hard surface to loosen the root ball. With bulbs it is often possible to see the root growth without bringing the whole mass entirely out of the pot. Turned back right-side up, it is firmed into place again.

When it comes time for the leaves to develop, the process should be gradual. It is best to leave pots in the shade, yet where they get light, for a few days before putting them in the sun. This is especially true if white tips have developed. Once green shoots are up two or three inches, full sunlight is best for most bulbs. Watering can be stepped up, and then there is nothing more to do but wait for the flowers to appear. If they are carefully chosen, a variety of bulbs will fill the greenhouse with color and fragrance from early January on through the spring.
3. November

PLANT HABITS, CHRYSANTHEMUMS,
AND RECORDS

A morning inspection of the greenhouse has become as much a part of my routine as emptying ash trays or making beds. Sometimes I pass quickly through from the living room to the breezeway and on to the kitchen, sniffing as I go but not stopping for more than a quick glance around, on the way to get breakfast. Sometimes I wait for a second cup of coffee, when the other members of the household have gone about their various occupations and I can sit on the one chair in the work area for a few minutes, and take stock. Again, if there is some disagreeable task to be done, I save the inspection as a reward. In any case, it is never more pleasant than in November, when the gray days are broken by spells of Indian summer and one feels so poignantly that the outdoor landscape need not have become so bare and dun, if only the frost had not intervened.

Learning to Know One’s Plants

Many of the peculiarities of plants become familiar, if not wholly understood, as one watches them day by day and at such close range. There is, for instance, the amazing phenomenon of the mosaic made by leaves. Have you ever stood away from a newly planted bed of annuals and been dissatisfied with their stiff and awkward look? Or thinned out the perennial border, to find that the gaping holes seem to throw the whole
pattern out of kilter? Every gardener has had some such experience.

This unnatural appearance of newly planted material is especially obvious in the greenhouse, even when a bench has been carefully planned to please the eye. As day by day the picture grows more like that which was intended, it is not because plants have any slightest interest in an esthetic effect. It is rather because in nature, they settle themselves as they grow into the pattern which will best expose each leaf to the rays of the life-giving sun. This leaf mosaic, as it is called (no connection with the dread virus disease known as mosaic which attacks so many plants) is associated in our minds with the look of a healthy plant. Perhaps we feel subconsciously the strain on the plant that is twisted and turned out of its natural leaf pattern when newly transplanted.

Why are leaves flat? Here again the answer lies in the utility of exposing the largest possible surface area to the light, and we find extraordinary modifications. Some plants that are adapted to life in the shade will, if placed in the sun, turn their leaves at a vertical angle and so escape scald or sunburn. The leaves of a plant that is accustomed to the sun, on the other hand, will all stretch out toward the light, if it comes to them only from one side. The leaves of many desert plants grow thick and fleshy and store moisture. Those of a fern from the rain forest, where water drips eternally, are so thin and delicate that they seem almost transparent.

No green plant can get along without light. Leaves of plants that grow in the underbrush beneath thick trees are usually large, and can thus utilize every ray that comes through to them. Those of Monstera deliciosa, denizen of tropical America, have gone a step further. Not only do they have a wide spread, but as they grow, first slits, then slashes and finally actual holes appear in the body of the leaf. These allow the violent downpours of the rainy season in the native haunts of Monstera to drain through without tearing the plant to pieces.
The habits of vines in the greenhouse, as one watches them from day to day, seem in a way the most mysterious of all. Why will some vines only wind clockwise and others counter-clockwise, no matter what efforts are made to train them against their inclination? Why will some flower when they are trailing down and others only when they are reaching up? Why should any seed at all develop into a thirty-foot vine? The answer lies in the adaptation of a species to some environment through the eons of its past; but it is not always easy to find. When I come across an explanation of some point that has been puzzling me, I store it away and watch with new interest to see if it is borne out in the greenhouse.

So one learns to know when roots have “taken hold” and are absorbing nourishment from the soil, when the leaf pattern is established, when a plant is ready for a few months of rest and when it shows signs of making new growth. Plants are not unlike human beings in many ways. When they are small, they need attention. Some are delicate and must not be overfed, while others are robust and greedy and will rob all nearby of proffered food, if they are not curbed. Some are bullies and work continually to monopolize the sunlight and lord it over the bench. Others are shy and retiring and have to be helped a little to grow up into bloom. There are some that seem destined to go quietly ahead toward maturity and others that have an almost fatal tendency to get into trouble.

Once they are well established, however, each according to its inheritance needs a certain amount of independence. It is futile to try to force their powers of adaptation too far. Given a semblance of the conditions of their native environment, plants will go their appointed ways.

**Altering the Blooming Date**

In this connection, the term “forcing” has always seemed to me unfortunate. Its connotation of compelling plants to grow contrary to their natural habit is misleading in the extreme.
The natural habit of chrysanthemums, for instance, is to flower in the fall. When they are made to flower at another season, in midsummer for example, the natural light of fall is imitated in the garden or greenhouse. For chrysanthemums are among the many plants whose flowering date is determined by the amount of darkness present in relation to the hours of light. Since they flower when days are short and nights are long, they are termed “short-day” plants. The gladiolus, on the contrary, flowers naturally in midsummer, so this is called a “long-day” plant. To induce chrysanthemums to bloom in summertime, one needs only to darken them before the end of day. For flowering in midwinter, the early darkness of the autumn evening needs to be deferred with artificial light, which must be gradually reduced in advance of the blooming date desired.

Illumination to prolong the light of day will bring gladiolus into bloom in winter in the greenhouse. Some plants are quite indifferent to the hours of light. A dandelion, for instance, will flower in days of any length at all.

In several ways, plants can be very gently led, but not driven, to change the calendar of their cycle of growth. With deciduous plants that are dormant during the cold of winter outdoors, this rest period is merely shortened. It is only by providing the same gradual stepping up of warmth and moisture that occurs outdoors in the spring that hardy plants can be brought into earlier bloom. There is never any question of moving them directly from a coldframe to a hothouse, for instance. Nor will they respond at all, unless they have first had an adequate period of cold. This is as true of hardy perennials as it is of hardy bulbs. One of the advantages of a cool greenhouse is the very fact that it provides low night temperature for such plants as they are started into top growth.

“Forcing” is supposed to be difficult for the amateur and a matter of great skill on the part of the professional florist. It is true that it takes careful planning to produce flowers for a spe-
cific date, such as Christmas or Easter. In the first place, one must know which plants can bloom at a certain period. Then care must be taken to start them toward the goal in time. All too often, gift plants from the florist have been over-fertilized and given such a warm and humid atmosphere, to hurry them into bloom, that the plant never recovers from the effort. When the amateur wants to carry on his plants from year to year, this is obviously a wasteful and disappointing way to go about it. Yet it is often not difficult to bring these same plants into healthy flower. It may be no more than understanding the habits of the plants themselves, and being careful not to force them beyond the limits of their best performance.

Chrysanthemums for Fall Bloom

Chrysanthemums are among the most positive individuals in the greenhouse and they dominate the scene in November. How they flash gold around or glisten like the sun on snow! Their odor is neither sweet nor displeasing but pungently their own. Their blossoms, whether on the plants or when cut, last better than those of any flower I can think of, with the possible exception of that other proud specimen, the orchid. For this display, however, they demand attention the year round, and since their culture would be difficult to compress into a chart, it may be well to describe it here.

Both hardy and tender varieties offer material well worth growing in the cool greenhouse. Several azaleamums or any of the many-flowered garden species will fill a bench with hundreds of blooms in September and October, but for a display after frost it is usually the tender chrysanthemums which are chosen. My own taste eliminates those which grow so tall one must look up at them. In a small greenhouse, these seem out of proportion, even when they afford magnificent cut flowers. I have no objection however, to large blossoms, which are possible on low or medium-sized tender plants. All can be successfully grown in pots, but for some reason, perhaps because I bring in the first
ones in September when I am reorganizing the greenhouse, I grow most of them right in the benches.

Propagation  No matter what the choice of variety, or where they are grown, all chrysanthemums are treated more or less in the same way to provide stock for another year. After they have bloomed, a plant or two of each kind to be propagated is cut back, moved to a flat or large pot, and stored away. Hardy varieties can go in a coldframe. Tender varieties must be kept under the bench, or in an out of the way corner in the work-room. After this transplanting, they are watered once, thoroughly, and then kept on the dry side during a rest period that usually continues until January. "On the dry side" does not mean a mere sprinkle of water at infrequent intervals. Whenever a plant is watered at all, it must be watered thoroughly. With dormant stock, this is done only often enough to keep the soil from becoming powder-dry. For chrysanthemums once in two or three weeks may be often enough.

In January or February, watering is stepped up, the plants are fertilized, and they are given a sunny spot to bring them into active growth again. Many small suckers will develop from each root, and these basal shoots are used as cuttings, when they are two or three inches long. Garden chrysanthemums can be divided to increase the stock, but for greenhouse use this method is not as satisfactory as rooting cuttings. Chrysanthemum cuttings root easily in the cool greenhouse, either in sand or in a flat of general-purpose potting mixture, taking from two to four weeks for the process.

Professional growers will shift these cuttings several times, using a size larger pot each time, but I have had success in transplanting them from the cutting medium into a flat, from which they can be again transplanted either into the coldframe, if there is room, or into a row in the vegetable garden, in the spring. Here they must be watched all summer. They are heavy feeders, and must be fertilized every two weeks until the buds are set. To assure healthy and attractive foliage, they must be
sprayed with some all-purpose insecticide at least as often. And most important of all, except for the button varieties, they must be pinched back several times during the season.

**Pinching** This procedure can be very complicated, and differs according to whether one huge bloom or many smaller blooms are wanted. Some growers time the pinching carefully, to regulate the date of flowering. For the average-sized bushy plants best suited to the small greenhouse, however, the process can be much simplified. Top growth is first pinched off, to encourage side branches, when the plant is six to eight inches high. As new shoots reach this length again, it is repeated. And a final removal of extraneous buds takes place when they have developed, according to the variety and the number and size wanted on the full-grown plant. This should be done in July for October and November flowering, in August for plants not wanted in bloom until December. All but five or six buds may be removed from a large-flowered type, whereas only some of the side buds need be removed where a full head of smaller flowers are wanted. In the autumn, tender varieties must come in before frost, hardy varieties can stay in the coldframe until needed. When their burst of glory is over, the cycle has been completed.

**Purchasing Mums** Of course, it is always possible to buy chrysanthemums. Small plants of named varieties are available in the early summer. Growing them for fall use is the cheapest way to add new types to one's stock. However, if I have been away at some time that is crucial in their care, as happens every so often, or if I want to see for myself the shade or texture or habit of growth of some kind I have read about, I go to a commercial greenhouse while they are in full bloom.

There is a man in our vicinity who raises chrysanthemums that look like dahlias, others that have petals curved like ostrich feathers, and others that resemble dish-mops. He has large houses filled with the giants one sees at football games, so tall that walking between benches of them is like having strayed
into a golden jungle. When I stop by, I inspect them all and the grower comes with me, proudly explaining collarettes and crosses. He points out varieties he calls reflexed, Japanese, spidery, hairy, and feathery. For once I am not overly curious. Although I may some day succumb to the attraction of these strange mutations, so far I like my chrysanthemums to look like chrysanthemums. To the disappointment and (though he is very polite) no doubt to the scorn of the hybridizer, when I choose a plant or two, they are invariably of medium height and conventional form.

**Routine Care in the Greenhouse**

With the chrysanthemums in bloom, the bulbs potted, and the permanent plants established for the winter, greenhouse operation becomes more or less a routine matter. Although with bright sun, automatic ventilators are apt to open during the middle of the day, no matter what the temperature, when it is cold and gray, they may stay shut. Then it may be necessary to open a side window or vent for a few minutes. Plants need fresh air as people do.

There is never a season when one should not be on the alert for insects and spray accordingly. I keep a rust-proof sprayer filled and ready for action at all times. I use Black Leaf 40, mixing a quarter of a teaspoon to a quart of water and adding a pinch of detergent. This is a contact insecticide and so care must be taken to wet both sides of leaves with the solution. It is especially effective against aphids and white flies. There are "bug bombs" on the market designed for general greenhouse use which are also dependable. No matter what insecticide is used, it is worth while to spray on a regular schedule, at least every two weeks, as well as to go thoroughly over an infected plant at the first sign of trouble.

The most important routine task in the greenhouse is that of watering. There is so much variation in the operation, accord-
ing to the needs of individual plants, the time of year, the weather, and the soil mixtures used, that general directions are dangerous. Two, however, always apply. When a plant is watered, it should be watered thoroughly and in every case, the flow should be gentle, so that the soil is not caked. Both of these precepts can be followed either by setting a pot in a pan of water until moisture shows on the surface of the soil, or by using a fine rose spray or a mere trickle of water from watering can or hose, when watering from above. And in this connection, it cannot be overemphasized that directions to water sparingly do not mean giving only a few drops at a time. Plants not in active growth, succulents and many summer-flowering bulbs may need only enough moisture in winter to keep leaves or bulbs from shrivelling. This may mean watering only every two or three weeks. In general, one is more likely to overwater in winter than to underwater. Whenever the job is done, however, it should be a thorough soaking, so that all the soil around the roots is saturated.

The ideal time to water is in the morning, with the sun shining. Under these conditions, foliage can be sprayed as well, except on plants with woolly or hairy leaves, which usually should be kept dry. In the afternoon when the temperature is falling, or any time when the atmosphere is cold and humid, evaporation may be so slow that roots are in danger of becoming water-logged and foliage, if wet, may be permanently damaged. This does not mean that dry plants should be neglected during a cold gray spell. Sometimes the thermostat can be advanced a degree or two on cloudy days to hasten evaporation. Care can also be taken to provide good drainage. The potting mixtures in Appendix G all drain well, which is one very good reason for using them, especially during the winter months.

The smaller the pot, the more often it will need to be watered. If annual seedlings are being brought along in November to take the place of chrysanthemums when they are through bloom-
ing, they will need to be watered more often than the benches themselves, or any plants in larger pots. Plants with many small fibrous roots need more water than plants with fleshy roots; those in active growth, more than those in a rest period. Learning to know when and how much to water is one of the secrets of success in the greenhouse, especially in the winter.

**Keeping Greenhouse Records**

With no major operations under way and routine tasks at a minimum in November, it may be a good time to catch up on records. It was the discovery of how much wasted effort was involved in trying to run a greenhouse from memory that first led me to keep records. How long does godetia take from seed to flower? When did I plant the schizanthus that gave such spectacular bloom last February? How early did I start the broccoli for the outdoor garden, year before last? Where did I get those anemone bulbs which had such a lovely color range? When did I last fertilize the orchids?

Such questions as these started me off. At first, I was most casual in what I chose to jot down but as reminders became more and more helpful I tried to be more complete and accurate. Today I keep three different kinds of greenhouse records.

*Scratch-pad Notes* The first, often necessary for the others, is merely a large scratch pad hanging with an attached pencil in a corner of the work area. Here, on the spot, go the rough notes from which more detailed records can be compiled later. Besides daily operations, reminders of needed supplies are listed, and ideas for the future as they occur to me. In November I might find, for instance:

11/4, Frost last night. Down to 20. Aphids on forget-me-nots. Sprayed with Black Leaf 40, 1t to qt. of water, add pinch of soap flakes.

11/9, Picked small bunch violets. Anemones up 2 inches, fertilized, Rapidgro, 4t to gal. of water.
11/14, Melior begonia in full bloom. Need more vermiculite.

And so on.

Year's Diary  Another record is in the form of a diary or annual ledger. I try to bring this up to date at least once a week. An hour some time during the week end is usually enough. It contains not only information on when seed was planted, cuttings were taken, new stock was ordered or received, but on the length of time for seed to germinate, first transplanting dates, first flowers to open on a given plant, and some idea of general performance. Both successes and failures are noted and recommendations made for another year.

At the end of each month, I take a page to enumerate everything that is in bloom on that date. Year after year, chrysanthemums head the list in the autumn, camellias, cyclamen, and orchids (cypripedium and odontoglossom) carry through January and February, and from the first of the year on to late spring, bulbs in variety dominate the scene. I don’t mean that this is all I raise, but these are old stand-bys which recur again and again.

Why, then, should I record their performance? Partly just because I have worked out a good succession of bloom. By knowing when I took cuttings from the chrysanthemums, how often I watered the orchids, at what intervals the bulbs were brought up from the cold cellar, I can repeat any part of the display I choose, knowing from the monthly check-lists just what the results will be. With space at a premium, there are always choices to be made. This is especially true both in regard to annuals which take a lot of room in the bench, and large potted plants which need a place in the sun. When one is continually adding new material, it is often only by the judicious use of well-known favorites that continuous bloom can be managed.

Sometimes, looking over old ledgers, I come on entries that have no value except to stir memories. There is one that reads, “Found a hummingbird clinging to sill today. Must have
flown in and been trapped by closing ventilators. Poor tiny thing exhausted but revived and flew off." I had never seen a hummingbird except in motion before. He didn't weigh more than an ounce, and at first remained so still in the cup of my hand that I was afraid he was dead. But when I opened the door and lifted him on my outstretched palm, he stirred, ruffling the iridescent sheen of his olive feathers. Then, turning his head, the ruby throat seemed suddenly to catch fire from the sun, and with motion more miraculous than that of any jet, he took off into the sky.

Another such entry states baldly, "My cocoon hatched praying mantises!" And how well I remember that episode! Out at the edge of the woods one autumn, I had seen an unfamiliar brownish mass attached to a twig. I mistook it for a moth's cocoon. I can never resist bringing a large one home, and have had several different moths come out in the greenhouse, dry their wings with the first trembling motion of new life and flutter over the benches before being given their freedom. One female cecropia once attracted a dozen tawny, spotted males who weren't the least bit interested in being put out until I caught the female and let her lead the way. So it was in hopes of having come across some unknown beauty that I stuck the twig with the praying mantis nest on it in a jar on a greenhouse shelf.

No one who has not encountered—and at close quarters—some hundred minute replicas of that weird and comical insect, will entirely understand my amusement, amazement, and interest to find the greenhouse full of them one morning in May. I knew its reputation as one of the most beneficial insects in the garden and so, collecting the tiny creatures from leaf and glass and shelf, I carefully deposited them outdoors. I kept finding more for days. I suppose I could have left them, to feed on any aphids that had escaped my eye, but I had visions of not being able to see the flowers for the praying mantises, once they had attained their full length of six or seven inches!

*Card Catalog* The third record holds no such wanderings
from the subject. It is a card catalog with an entry for each plant grown in the greenhouse. Certain information is the same for all. I start with the Latin name, followed by any common names the plant may have. The class of material—annual, permanent plant, bulb, vine, etc.—goes in the upper left hand corner, and the cards are listed alphabetically according to these categories, which I have found so helpful that I have used them in the plant lists in this book. The family to which the plant belongs, and its native habitat if I can find it, are also put down.

My imagination is always stirred by the thought of bringing into bloom some species from an out-of-the-way corner of the other side of the world. This is not, however, the only reason why I like to have this information. It has far more practical application. A plant from the warm, moist forests of Java, for instance, will require constant high humidity and heat. No matter how enticing it may sound in a dealer's catalog, it will not thrive in a cool house in the winter. The plains of South Africa, on the other hand, have provided some of the finest plants and bulbs for a cool house, as well as a long list of familiar annuals. These the frost must never be allowed to touch, and in general they are grown on the dry side. Material from Mexico may or may not be suitable, depending on what part of that up-and-down country they come from. The hot lowlands are often as moist as those of Java, but plants from the high mountain meadows and the only slightly lower plateaus will adapt themselves very well to a temperature that goes down to 45° or 50° at night. Almost all plants from Mexico should be watered sparingly except as they come into bloom, to approximate first the long dry season, and then the period of the rains, when almost overnight the bare, rust-colored earth grows not only green but rainbow-hued.

Below the native habitat, on the card, goes the soil mixture best suited to the plant. I use the potting mixtures listed in Taylor's Encyclopedia of Gardening. This book is invaluable to me. Bailey's three-volume work may be more authoritative,
and I may use several other sources as well. All of my initial information on a new plant, however, is likely to come from Taylor. In years of choosing from catalogs of rare plants and poking around in commercial houses to find others, I have run across only a dozen or so not listed by him.

The potting mixtures that he gives are more or less standard. They are given in detail in Appendix G. All are mixtures of the ingredients already mentioned in connection with potting bulbs. These are the soil, sand, compost, and peat moss kept in bins in the greenhouse, with dried cow manure and bone meal suggested as fertilizers. It is in the proportions that the mixtures vary, according to the individual needs of the plants.

Specific cultural directions come next on the index card. For instance, under Azalea, I find:

Many shallow fibrous roots that must never dry out. Spraying foliage beneficial. Flower buds form in late summer, new shoots after flowering (cuttings from these). Less water outdoors during summer (semishade) but step up when growth starts and fertilize from this time on to flowering, manure water monthly, occasional dose of aluminum sulphate to keep soil acid. Sun in winter but cannot stand heat. Bring on gradually, at low temperatures. Prune, just after flowering, for well-shaped plant.

Sometimes a plant will have two or three cards in the file, especially if it is one with several varieties which require different treatments, such as begonia or geranium. Usually, however, there is room on the back of the card for such data as when seed, new stock or bulb was bought, when planted, from whom purchased, and the like.

Trying to explain these three records, the scratch pad, the diary and the card catalog, makes them sound far more complicated and time-consuming than they actually are. It also gives an inadequate idea of their usefulness. The cumulative value, as such records are continued year after year, is hard to exaggerate.
As the holiday season approaches, there is very likely to be a
dearth of material in the greenhouse, either to bring indoors or
to give away, unless the need is anticipated. The chrysanthemums that have given such a fine show all autumn are past their prime, if not already removed to make way for snapdragon, schizanthus, clarkia, or other seedlings not yet in bloom. Bulbs in general do not flower until after the first of the year. What color there is usually comes from any annuals that were brought in from the garden, and those plants which are almost everblooming, such as fibrous-rooted begonia and oxalis. These seldom lend themselves to Christmas decoration.

Planning Ahead for the Holidays

At least this was true in my greenhouse until I determined to do something about it. The first step was to plan ahead. Such planning may have to be incorporated in the greenhouse calendar six or even nine months in advance, for annuals raised from seed; it may have to be included in the summer orders for bulbs, so as to have on hand those few which may bloom by December; and it may be a consideration in the choice of permanent plants added from time to time to a collection.

There is a growing tendency to use every color of the rainbow in Christmas decoration. Even a small bouquet of mixed flowers is very apt to be appreciated at any time during the win-
ter, not excepting the holidays. Certain shades however, such as orange or pink, just do not seem appropriate for Christmas. The traditional red and green, with perhaps white besides, seem so much more in keeping that I have largely confined myself to such possibilities in this chapter.

There are at least three categories to be considered; plants which will lend a gala air to the greenhouse itself; pots or sprays or cut flowers to bring indoors; and material to give away. In the first group, one or two large plants, strategically placed, with red berries or scarlet blossoms, can brighten the whole area under glass.

_Focal Point for Esthetic Interest_ This may be the place to describe a device in my greenhouse which has proved eminently satisfactory through the years. Just as every good painting has a center of attention toward which the eye is drawn, so the greenhouse, as a decorative unit, is greatly enhanced by having a spot where the finest bloom of the moment can be shown off to advantage. This may apply more to a greenhouse opening from the living quarters than to a detached house; more to one where a variety of plants are grown than to that of a specialist. Yet whatever the aims and interests of the grower—even if they be purely scientific—a greenhouse so naturally makes an esthetic appeal that one might as well take advantage of it.

My own focal point is a very small bench, $1\frac{1}{2}$ by 3 feet, at the end of the central walk, opposite the door from the living room. It was added soon after the greenhouse was first filled with plants. When I discovered that from the living-room, that initial display was largely hidden, unless one walked right up to the door and looked out, I was disappointed. My husband suggested that we might utilize a little more space, right where it would show from every corner of the living-room. He immediately set to work to build the small bench; and no one improvement we have made in the greenhouse has given me more pleasure.

There is always low material around the edges of the "show
planted right in the soil. Sometimes it is asparagus fern (*A. sprengeri*), whose long feathery branches may cascade almost to the ground by spring; sometimes it is sweet alyssum, which also spills over gracefully. I have used oxalis, and a neat row of winter-blooming violets; sedums brought in from the rock garden; dwarf ageratum, browallia, and *Vinca minor*. Whatever the setting, in the middle of the bench I place the most spectacular plant—or my favorite—of the season. In the autumn, it is often the best of the chrysanthemums planted right in the bench. It may be a white beauty, in contrast to yellow and maroon in the other benches. Or it may be a large-flowered yellow, and then this color is omitted in the others. During the rest of the year, it is likely to be a potted plant, which is moved to the place of honor when it comes into bloom. It may be an orchid, such as a dendrobium with a two-foot spray of deep garnet-red flowers; a rosy cyclamen with dozens of blossoms; a clivia, with its great umbels of orange trumpets; a pot of white tulips, tall and stately. There can be endless variation. One year I rigged a small trellis and grew sweet peas.

At Christmas time, the place of honor is likely to be given to a plant of ardisia. This is a compact shrubby perennial with deep green, shiny leaves, not unlike those of holly but wavy rather than pointed. It has insignificant flowers, followed by bright scarlet berries. They not only ripen for December, but hold on the plant for months, sometimes even from year to year.

Another possibility is a red camellia. Although these beautiful shrubs do well in a cool house, it takes skill to grow one suitable for such use. Every branch that is cut off means the loss of future buds, and yet a certain amount of pruning, right after flowering, is necessary to produce a well-formed bush. Overwatering is a common cause of trouble. It is true that they must not be dry for any length of time, but even more disastrous is water standing at their roots. It is wise to put a camellia on an inverted pot, so as to prevent any chance of this. Drainage must be so perfect that as one waters a large pot or tub, the water runs down and
out of the hole at the bottom almost before the surface is saturated. Drafts, high temperatures during the day, or lack of humidity may cause buds to drop. And my own experience has been that one cannot count exactly on when any variety will bloom.

In spite of these hazards, the delicate widespread blossoms and the year-round attractiveness of the foliage make the camellia one of my favorites. I haven’t room for more than half a dozen plants. These have been chosen gradually, from both the sasangua and the japonica groups, for a succession of bloom from late October to February, and for a variety of color. The newest is a japonica, ‘Rubra plena,’ which has formal double red flowers, according to its description. It is supposed to be one of the earliest of the japonica, and I bought it with the possibility of Christmas corsages, as well as greenhouse display, in mind.

**Potted Plants on Display**  With smaller plants, effectiveness for holiday decoration in the greenhouse is also often a matter of how they are used. Half a dozen scarlet geraniums, for instance, may not show up very well if they are scattered around, but brought together in a row on a top shelf near the glass, they form a fine mass of color. They should be raised from early spring cuttings, and any buds nipped off until October, for Christmas bloom. (See Chapter 9 for full cultural instructions.)

Another way to dress up the greenhouse for the holidays is to set potted plants at intervals among small plants not yet in flower in the bench. This may not be advisable as a general practice, and the pots should be placed on inverted saucers or shallow pans even for an occasional display, because otherwise their weight will compress the soil beneath them. With this precaution, no harm will be done by adding color for two weeks at Christmas time.

The clusters of scarlet red bloom on bushy plants of mask flower (*Alonsoa warscewiczii*) for instance, can be used to great advantage this way. Although red salvia (*Salvia splendens*) is one
of the very few flowers to which I have an aversion, it could certainly be used the same way. Such annuals—or perennials which can be treated as tender annuals—should be raised from seed sown in August or early September. Once the days grow short and cloudy in November growth is slowed down; and flower-buds must be set during the last of the warm, sunny weather in order to give good bloom by Christmas. If they flower a little too early, they can often be held back by removing the first buds. If, by the first of December, they have not set buds, they may wait until early spring to decide to perform.

Plants with red fruits or berries offer another possibility. These include Christmas pepper (C. frutescens), bird pepper (Capsicum frutescens var. baccatum), Jerusalem cherry (Solanum pseudo-capsicum) and ‘Tiny Tim’ tomato, which has the tongue-twisting Latin name of Lycopersicum pimpinellifolium. The first three should be started from seed in the spring and carried through the summer outdoors. They need sun and plenty of water. In the autumn, they are potted and brought into the greenhouse. Jerusalem cherry may start to show color by September, but no harm is done. I once returned from a vacation, to find a dozen plants in this condition. I was dismayed, but I needn’t have been, for the fruit held in the humid atmosphere of the cool greenhouse, merely deepening in color. It was January before I gathered several of the “cherries” for seed for another year, and discarded the plants. They are perennial and can be cut back, to use a second year; new plants, however, are bushier, and so easy from seed that it is scarcely worth giving up space to old ones from January on.

The small, compact plants of the ‘Tiny Tim’ tomato are supposed to develop miniature half-inch fruits in forty-five or fifty days. This may occur during the warmth of summer. The first time I tried them, I started them in mid-October, and by Christmas they were only in bud. Here was another instance of slower growth in cool, gray weather. An early start, in August, is the only way to be sure of fruit by Christmas. In general,
cultural directions for a plant can only suggest a likely behavior. The season, the length of day, temperature, and fertilizing program will all cause variation, and one only learns through experience exactly what to expect.

**Plants for the House**

When it comes to bringing material into the house, there are certain problems to consider. Any plant which does well in the cool greenhouse is likely to resent the hot dry atmosphere of the average living-room. Many if used in a decorative scheme for two or three weeks at the turn of the year might as well be considered expendable. I have never brought one of my precious camellias indoors, for instance. If the 'Rubra plena' blooms this Christmas, I shall leave it in the greenhouse, perhaps cutting a flower or two to float in a rose bowl on a coffee table. The ardisia, although I doubt whether it would lose its berries, might easily lose its leaves! The change in temperature will not harm most plants for an evening, if one wants to use one for a dinner party or some such occasion but even then I am apt to put such a plant back in the greenhouse after the last guest has gone.

As a general rule, such permanent plants as cyclamen, cool-house orchids, jasmine, and azalea are weakened by any prolonged period in the house. Leaves may yellow and drop, buds may blast, or other signs of distress appear. There are exceptions. The fibrous begonia, besides being almost ever-blooming, will stand up well in a wide range of temperatures. Most of them come from moist, warm forests and will do best when these conditions are simulated. They bloom for me, however, both in the cool greenhouse and indoors, providing I remember to give them plenty of liquid fertilizer, for they are heavy feeders. There are several true reds, including one which is called 'Christmas Cheer.'

Flowers that grow from bulbs, including corms and tubers, also seem to do well in the house. Growing them in the cool
greenhouse tends to keep the flower- and leaf-stalks from shooting up too high, and just as the buds are about to open they can be brought in, and often stay fresh for weeks. Those wanted for another year, or to plant outdoors, are then returned to the greenhouse, watered and fed, until their foliage matures. The nerines, related to amaryllis, offer many varieties with trumpets in shades of red. They usually bloom in late autumn, if left to establish their own cycle, but by withholding water and starting them into growth in October, it is possible to have them for Christmas. In fact, they can be made to bloom at almost any time, so long as the bulbs are rested for four or five months between periods of growth.

It is for accents of white, however, that the bulbs I have tried offer the most for the holiday season. A bowl of paper-white narcissus, a low pot of Roman hyacinths, a red plastic bowl filled with lilies-of-the-valley, are but three out of many possibilities. White scilla, grape hyacinth, and pretreated bulbs of the Dutch hyacinth ‘L’Innocence,’ are others, although these tend to bloom in January unless given a little extra heat. Star of Bethlehem (Campanula isophylla var. alba) is especially useful with its trailing foliage and white flowers.

As for greens, sprays of ivy can be cut before frost and kept in water on a shelf not too close to the glass, to be used with—or in place of—the traditional evergreens. On the mantelpiece or the dining room table, Euonymus and pachysandra cut the same way, are possibilities. Smilax (Asparagus asparagoides), emerald feather (A. plumosus), and two other members of the asparagus family, A. sprengeri and A. scandens var. deflexus, offer greenery to put with cut flowers; and there is a large choice in foliage plants, including many of the succulents, such as crassula or the sedums, the large group of philodendrons, and the scented-leaved geraniums.

Gifts Of course, much of the material already mentioned could be used for gifts. Some of the perennials may be ruled out because of the time it would take to raise them from slips
and the space they would take during the process. A single camellia, however, makes a beautiful corsage, and a cluster of berries from the ardisia, with a leaf or two, adds an unusual touch slipped into the bow of a wrapped present. Small potted plants, which can be grown in one season, are very successful. Bulbs, especially the smaller ones, even if they are only in bud, are another good choice.

The range is far greater for the friend who is a gardener. Almost anyone is pleased with a Jerusalem cherry bright with red fruit, or a well-chosen ceramic dish filled with fragrant narcissus; but the gardening friend will appreciate a rooted cutting of a small foliage plant, or of any rare or unusual species. Here, if it is going to someone without a greenhouse, the only consideration is whether or not the gift will thrive indoors. Begonias, kalanchoë, scented-leaved geraniums, many of the succulents, and foliage plants such as coleus and tradescantia all offer material that roots easily and quickly in a cool house during September and October, and will prove satisfactory in the house after Christmas.

Sometimes when I order my bulbs I include extras in the list to give away at Christmas time. These have to be chosen with care, since the general rule is to plant bulbs as soon as possible after they are received. Exceptions include paper-whites and the amaryllis usually sold in garden stores for the holiday season. Such genera as *Achimenes*, *Chasmanthe*, *Curtonus*, *Gloriosa*, and *Habranthus* are more difficult to find. They can be ordered earlier, kept dry in the cool greenhouse, and started into growth as late as December. In giving bulbs, unless you know that the person to receive them has access to the necessary ingredients, it is thoughtful to send along enough of the proper soil mixture in which to grow them. A card with cultural directions is also a good idea.

Another possibility which seems to be appreciated is several pots of herbs, in some sort of tray or container that can be put
on a kitchen window-sill. These need not be large; indeed plants in a three- or four-inch pot are both decorative and useful. Chives, parsley, and winter cress make a good combination, or lavender, mint, and rose geranium. There are many herbs to choose from, and the only ones to eschew are those that grow too large or too straggly, such as sage or tarragon. Most of them can be grown from seed especially for such use, or, if they are established outdoors, small plants or seedlings can usually be found and brought in before frost. Parsley, for instance, is very slow to germinate, but once up in the vegetable or herb garden will self-sow, producing many fine seedlings in the fall. Chives is perennial and has a most attractive lavender bloom, when it is allowed to grow on for several years in the same place. It also will self-sow, or a clump can be dug and divided, and by severely cutting back its foliage, healthy compact plants can soon be obtained. Any of the scented-leaved geraniums are best grown from cuttings. As with all plants to give away at Christmas, herbs must be planned for in advance.

Arrangements of Plants

To combine growing plants attractively is a challenge, as well as a chance for infinite variety. One type of arrangement is represented by the terrarium. Although one immediately thinks of the small glass globe filled with such woods plants as partridgeberry, wintergreen, or shinleaf, it is easy to have available in the greenhouse many other small plants that serve equally well. Then there is the dish garden. Here I would say that one’s aim should be to differ as markedly as possible from the hit-or-miss collections of foliage plants, usually in ugly containers, all too common in florists’ shops. Modern ceramists have developed many attractive planters, not only of the conventional shallow dish shape, but in a wide range of graceful forms. These have not, unfortunately, reached the average market, perhaps because so many are individual, hand-built pieces. They can be
found, however, in the better gift and craft shops, and in themselves make handsome gifts.

Whatever the container, when a group of plants is to be used there are several rules to follow; never overcrowd, keep proportions in mind, and in general use small, compact plants which will not grow out of bounds. Since an arrangement of growing plants should give pleasure for weeks or even months, it is also important to choose materials that will do well under the same conditions. A terrarium, for instance, which is provided with a glass cover should contain only plants which will respond well to the constant humidity in such a container. The miniature forms of begonia, and ivy, small ferns, the creeping fig (*Ficus pumila* var. *repens*) are examples. It is hard to find a better ground cover than babies' tears (*Helxine soleirolii*). This little creeper forms a mat of tiny lacy leaves which almost give the effect of a moss, and incidentally it will grow right in the ground under the benches.

For the open planting, cactus may be the best adapted to a dry indoors atmosphere, but I far prefer other forms of succulents, which do almost as well. For several years I have tucked various forms of sedum from the rock garden into odd corners of the benches, to use during the winter in dish gardens. Their range in form and shades of green, brown, and gray, their compact growth, and the fact that they remain healthy under glass or indoors, are all qualities which put them at the top of my list for such arrangements.

Since nine times out of ten a dish garden is placed on a table or mantelpiece out of the sun, foliage plants are a second choice. Here again, form plays a large part. One upright plant of graceful habit, one that spreads and droops a little, and a contrasting vine might be enough in themselves for a small arrangement, or they might dictate the use of other material to fill in. If flowers are desired, one that lends itself to transplanting, even when in bloom, is the crocus. These can be grown in soil in a flat, and moved to a dish garden when in bud.
Plate 3. Chrysanthemums can brighten the greenhouse from late fall until Christmas. (Lord & Burnham) Ruffled snapdragons (lower left) can be grown for cutting. Amaryllis (right) is a reliable bulb. (Roche photos)
Plate 4. Jacobinia (upper left) has rose flowers. Monstera (right) is a large-leaved Mexican vine. Cyclamen (lower left) will bloom at Christmas. Ardisia bears bright red berries. (Photos by Alfred B. Graf, Julius Roehrs Co.)
The Problem Poinsettia

It may seem odd that I have not mentioned that most popular of all Christmas plants, the poinsettia. The truth is that I have never been able to raise it successfully in a cool house, nor bring a gift plant of it into bloom by December, a second year. While there is a certain amount of latitude in a surprisingly wide range of plants, so far as temperature goes, the poinsettia seems to be one plant that refuses to perform properly if not given at least 60° at night. Moreover, unless the humidity is high it will drop its leaves, even when it is warm enough. That it can be grown successfully, year after year, in a warm greenhouse, I know. There is an old gentleman of my acquaintance who pays a call on his friends, and his children’s friends, a day or two before Christmas, leaving at each house he visits a magnificent poinsettia plant. Then the week after New Year’s his chauffeur makes the same rounds, collecting the plants again to go back to the greenhouse. There was a time when I thought this was a very peculiar procedure, especially as the old man is a millionaire. As my own reluctance to “waste” growing plants has increased, however, I realize I may have been very mistaken in his motives. He may still be a millionaire just because of such frugal habits, but at the same time he may also dislike the idea of allowing healthy plants to die.
5. January

A HALF-YEARLY CLEAN-UP

January is a good time to indulge in a general, leisurely greenhouse cleaning. The first free morning after the turn of the year, I open the door from the living room to survey my small green domain with a far more critical eye than usual. I refuse to be diverted by the fragrance of the freesias, opening just too late for Christmas bloom, although I make a note to try some white ones a little earlier another year. My glance does not linger on the orchids, where there are likely to be several buds on the verge of opening. Instead, I see every withered leaf, every faded flower-head, the packed soil that needs stirring, the leggy shoots that need pinching back, the crowded plants that need thinning. I start down the long east bench, and am soon involved in a dozen different operations.

Cultivating

No matter how carefully one waters, soil in both benches and pots tends to become packed. If plants are spaced properly in the bench, this condition can be corrected by carefully stirring the soil between them, as one would cultivate an outdoor garden. As bench plants grow, however, top-growth is likely to fill in the space at an amazing rate, and roots will spread out in their confined area accordingly. Then the greatest care must be taken, not to disturb them. With a pot, one must be even more careful; only the top inch or two of soil should be stirred. With
a shallow-rooted plant, it may be inadvisable to cultivate at all. Often, if the soil in a pot seems so caked that drainage has become slow, it is better to repot the plant, than to try to remedy the condition. As I make the inspection, I may find that many plants are due for repotting, not only because of caked soil, but in more instances, because their roots require more room.

Repotting

January may not be an ideal time for repotting. I do not disturb any plant in full bloom at this time, nor one that is dormant. I have come to the unorthodox conclusion, however, that the time to repot is when a plant needs repotting and when I have the leisure to do it, providing the plant is in active growth so that its roots will take hold in the new soil. This materially reduces the necessary work later in the spring. It also catches those plants which may have been overlooked during the equally busy rush of autumn activities.

It is far harder to learn when a plant needs repotting than to become adept at carrying out the procedure. A beginner is more likely to overpot, in his zeal, than to neglect plants which should be moved. In the first place, a large group including geranium, cineraria, impatiens, and many others, actually flower better when they are root-bound.

It is almost as though the vital urge to reproduce were stimulated by confinement; as though the plant felt a necessity to take advantage of what little room there was to produce bloom before life was entirely crowded out. That all inflorescence with its diversity and beauty is no more than a means to the end of seed production we tend to forget, since for us it is usually an end in itself. When we remove faded flowers, before seed has set, the perennial plant works toward repetition of its effort another year, and the annual goes on forming buds, since it has only the one opportunity to perform its mission.

There are plants, such as certain members of the Amaryllis
family, which not only bloom better when pot-bound, but so resent being disturbed that they may skip flowering for a year after being repotted. It may be best for these plants to change the top inch of soil every so often, to fertilize them in active growth, and to wait until the roots actually crack the pot before moving them into a larger size.

Even with these plants, however, there comes a time when the pot is too full of roots to allow for proper relations with the soil. Then they need repotting just as much as the foliage plants, seedlings, or fast growers which should be moved on more often. One learns from experience to recognize the signs. Usually, when roots are starting to grow out of the drainage hole in the bottom of a pot, it is time to give them more room. When a plant looks top-heavy, or its growth seems to be slowing down unaccountably, or its leaves are turning yellow, it may be found that roots have filled the pot and are feeling their way round and round the inner wall.

To find out whether this is so, the plant must be knocked out of its pot. Just as when you examine a pot of bulbs to determine what root growth has been made, the plant must first be thoroughly watered. Occasionally, roots are so tightly confined that it is necessary to run a thin knife around the inner surface of the pot to loosen the root ball.

A few plants that need soil of a certain texture—porous, springy or crumbly, for instance—or those that require an especially rich mixture, may have to be repotted before the roots fill the pot. Watering such plants with too hard a spray may lead to signs of stunted growth, meager flowers, or dropping leaves. It is also very easy to let seedlings get ahead of one, their growth slowed down by being left too long in a small pot. Some of these examples may sound hard to distinguish, but one learns to recognize the rank growers that should be repotted every month or two, the old-timers that can stay in the same pot for years, and all the variations in between. Here again, as with so many greenhouse operations, the adaptability of the plants themselves
is on the side of the grower, forestalling serious trouble as knowledge of them is gained.

I use an old kitchen table as a potting bench. If I am fore-handed, the stoneware crocks in a row at the back of the table contain several quarts apiece of the mixtures most commonly in use. When I am about to repot more than one or two plants, I ordinarily have to get out the round wooden cheese-box and mix more.

I like to start, in such a case, with potting mixture 4. This is the one I use for bench soil. It calls for equal parts of sand, garden loam, and compost, with a half part of dried cow manure, and about a tablespoonful of bone meal to a quart of the mixture—or a five-inch pot to a bushel. If, after using this, a little is left, I don’t bother to remove it, but proceed to make up a quantity of number 3, which requires the same ingredients, except that it has two parts of the loam to one of sand and one of compost. Any of number 3 that is left I put in the proper crock, starting fresh for either the acid mixture, number 5, or that for succulents, number 6.

When I put a group of plants on the potting table, I water them thoroughly. It is preferable to water them several hours ahead of time, to be sure the root ball is saturated, but this is not essential if one makes sure, before knocking a plant out, that water is running out the drainage hole. Choosing a fresh pot of the desired size—usually one size larger than that the plant is in—I put a piece or two of crock in the bottom, over the drainage hole. Crock is merely broken pieces of a clay flower-pot. In a greenhouse there are always some pots discarded because they are cracked or broken, so there is a ready source of crock. Pebbles, cinders, or broken pieces of charcoal may also be used.

A small sprinkling of sand is then added, say enough to cover the bottom of the pot. This again is to make sure of good drainage. A small amount of the right mixture is put on top of this. Then the plant is knocked out of its old pot and set in the new one, with enough soil added or subtracted so that it will rest
firmly at approximately the same level—about half an inch below the rim—as in the old pot. Soil is added around the edges, filling in carefully so as to avoid any air pockets. With a seedling or other small plant, this can be done with the fingers. With a large hardwood plant, such as an azalea or a heath, it may be necessary to use a potting stick. The object, however, is not to pack the soil so tightly that it becomes caked, but to press it just firmly enough to hold the plant in place, and provide the right texture for the roots to establish themselves. Another good watering, and the plant goes on a shelf in the shade for a day or two.

There are very few variations in this general procedure of repotting. For a delicate or difficult plant I may use a rooting hormone. There are several on the market, going by various names. They are most valuable when you are potting a new plant which has suffered on its way from a grower; also in rooting cuttings, as will be described below.

Once in a while, if the soil seems very hard, it may be advisable to soak the root ball in water until it softens, and plant the bare roots carefully in a new mixture. This method is also used when a plant is propagated by division, two or more plants resulting from a separation of the rootstock.

New Plants as a Bonus

When a plant needs pruning to induce bushy growth or to keep it within bounds, it is often possible to use the discarded material for cuttings. Although January is not the ideal time to take cuttings from every plant, there are some which will root at almost any time of year. For plants making new growth after flowering, this is the very best month.

Cuttings In January, it will be for the most part the easy subjects that can be propagated. To that list might be added geraniums cut back to induce fuller growth, and begonias, whether grown for flowers or for foliage, such as the angel’s wing and the rex. To start as many cuttings as possible at this
time of year means that there will be more room in the spring when the weather has warmed up for those that can be rooted only at a later date.

An ordinary grape box from the grocery store makes a good propagating case for cuttings that root easily. Filled to within an inch of the top with a mixture of half sand and half vermiculite well watered down, it provides room for twenty or more. Sand alone or vermiculite alone is possible as a medium. I like the combination because sand makes the mixture firm enough to keep the cuttings in position, while vermiculite is ideal for retaining moisture and for aeration.

A closed propagating case can be made by fitting together four panes of glass with waterproof adhesive tape and using another pane as a cover. This is placed on any shallow receptacle. I have had success myself with an old square fish bowl, covered with a piece of glass. When there are no holes in the bottom for drainage, however, great care must be taken to see that the mixture, while moist, is never saturated. It is also necessary to lift the lid every day or so, to allow air to circulate and to wipe off drops of water that collect on it.

Most shoots, or slips as they are often called, to be rooted, should be between three and five inches long, cut just below a node with a sharp knife. The lower leaves are removed, leaving four or five at the top. When a rooting hormone is used, the cutting is inserted in the powder, any excess is shaken off, and then it is put in a hole made in the potting mixture with a pencil or dibber. Care must be taken not to leave an air-pocket beneath it. The mixture is gently but firmly pressed around it. About two inches of the cutting should be under the surface.

Any plant which has a tendency to form aerial roots will respond quickly, even rooting in water. Such cuttings do not need a rooting hormone, although there may be some advantage in the heavier root development that usually results from its use. Succulents such as the Christmas cactus (Zygocactus trunc-
catus), kalanchoë, the wax plant (*Hoya carnosa*), and the sedums, and certain foliage plants such as coleus, philodendron, and tradescantia, all develop these aerial roots on their stems.

With cuttings more difficult to root, not only may the use of a hormone powder make the difference between success and failure, but even with its use, a covered box may be necessary to provide constant high humidity. Permanent, woody perennials are apt to be among these difficult subjects. In the list of permanent plants in Appendix C, I have tried to indicate as often as possible the time of year, the temperature, and the type of growth most conducive to their propagation. "Greenwood" means that cuttings should be taken from new growth, usually appearing right after flowering. "Half-ripened wood" indicates a little later period, and "hardwood" means that new growth should become woody before being used for cuttings. The use of "bottom heat" to provide a warmer temperature in a cool greenhouse is described in Chapter 7.

**Offsets from Leaves** There are a few plants which tend to form new plants on their leaves. Among these are the so-called strawberry begonia (which is neither a strawberry nor a begonia but rightly *Saxifraga sarmentosa*), the air plant, *Bryophyllum*, whose Latin name means sprouting leaf, and the pick-a-back plant (*Tolmiea menziesii*). These offsets also root easily in an open propagating box, at almost any time of year.

**Air-layering** Still a third way to obtain new plants from top growth should be mentioned. This is air-layering, a method of propagation widely used commercially, and known to have been practiced in China thousands of years ago. It was rarely employed by amateurs until very recently. Today, however, the rooting hormones and the use of a plastic covering material have made air-layering not only feasible but extremely easy for anyone. Kits including all the necessary materials with full instructions are advertised in the garden magazines. When a large number of plants is wanted, the materials can be bought separately.
By this method, new roots are induced before the slip is removed from the parent plant. A longer shoot than that used for a cutting, even one with several branches, can be chosen. The outer layer of bark is girdled with a sharp knife, one of the rooting powders is rubbed on it, and some damp sphagnum moss dusted with a little of the powder is wrapped around the wound. The whole thing is then enclosed in the plastic and tied firmly both at the top and the bottom. The plastic is colorless and transparent and one can actually see root formation when the required number of weeks have elapsed. After roots have been formed, the plastic is removed, and the top with its roots is cut from the old plant and potted. As much as two or three year's growth on a slow-growing species may be gained in this way.

Air-layering will undoubtedly become more and more popular. It is well worth trying with any woody plant such as camellia, ardisia, the dwarf citrus fruits, osmanthus, and azalea. In the spring or early summer, the same method can be used outdoors on such small shrubs as dwarf cydonia, buddleia, and daphne, providing new plants to bring into the greenhouse later on.

**Thinning and Discarding**

As for other operations that can be undertaken in January, there are several which experience has taught me should be ruthlessly carried out. Or perhaps it would be more honest to say that I know I should be ruthless about them, and manage to be once in a while. This holds true especially of overcrowding. If five tiny oxalis bulbs have pushed up a tangle of clover-like leaves in a square inch of bench, four of them should be rooted out. Or if this happens in a section already planted to carefully spaced seedlings, all of the oxalis should be discarded.

Luckily such a need for mass extermination seldom occurs. Since annuals are kept in bloom by picking off dead flower-heads, they do not often reseed themselves. By replacing a large
part of the soil in the benches at least once a year, wandering roots are mainly controlled. But the prolific oxalis, once introduced, is next to impossible to eradicate. For this reason, it is far better grown in a basket or large pot. My Bermuda buttercups, *Oxalis cernua*, have all come from six bulbs, purchased several years ago. First planted in the long bench, they proceeded to multiply. Each year since, the small bulbilets have worked their way down to the gravel at the bottom of the bench, ready to spring up when least expected, a dozen where there was one before.

Just as it is necessary to guard against overcrowding, the ruthless discarding of any diseased or pest-ridden plant should be a rule of the greenhouse. The January clean-up is a good time to remember this. It is easy to be careless during the holidays, neglecting the first signs of trouble and perhaps eliminating altogether the spraying which should be done at regular intervals. It is true that one should have less trouble in a cool house than in one run at a higher temperature. By carefully examining every plant brought into the greenhouse in September, I have had little traffic with rust, mildew, scale, mealy-bug or red spider, all of which can plague the grower. Even with care, however, I have not entirely escaped pests.

**Combating Pests**

My private war has been with the white fly and the black aphid. These minute creatures, winged in their adult phase, fly in through the open ventilators in the early autumn before frost comes. Once established, that is, ignored for the ten or twelve days it takes for eggs to mature, their geometric multiplication makes anything short of discarding the infested plants often a questionable procedure. Even this measure has to be carried out with great care. The plant must be cut at the base without being jarred any more than possible. It is then lifted on to a newspaper ready at hand, folded in the sheets and taken immediately to be burned. One jerk and aphids or nymphs, as
the case may be, rain down on the soil below, eventually to find their way to another plant.

If there are very few of the wretched creatures, certain halfway measures may be worth trying, before resorting to the final drastic step. It is possible to hold a pan of water under the infested leaf, bend the stem down and shake vigorously, or even better, immerse the stem in water if it is flexible enough. It is a pleasure to see the almost microscopic nymphs fall off and drown. This, with a thorough spraying of the plant afterwards, may be enough.

Another aid in the control of sucking and chewing insects is to water the foliage of the plants with considerable force, using a fine nozzle on a hose or watering can. This must be done, however, when the sun is out and likely to shine for several hours, unfortunately a rare occasion in January in our part of the country. When the temperature is low, or going down, as in the evening, water on foliage does not evaporate and is bad for the plant. In fact, all during the winter, when a sunny morning comes, I am likely to leave everything else until I have given the greenhouse the thorough watering that is so seldom possible during the cold months. This does not mean that in between times I let plants dry out. In general, however, as I have already suggested, one is far more likely to overwater in the winter than to underwater. Except for plants in small pots, it is often possible to go for a week or more, in gray weather, without adding to the moisture in the bench, or in large pots. When any plant must be watered on a cloudy day, it is best not to water the foliage, if possible. There are certain exceptions to this, such as azaleas and orchids, which benefit from frequent syringing of the leaves. Even they, however, need it less during the cold months.

Cleaning the Work Area

When I have pinched, potted, rooted, sprayed, and cultivated my way along both benches, taking care of the plants on the
shelves as well, I finally arrive at the work area of the greenhouse. Here beside the potting table is another table for shade-loving plants, and shelves for empty pots and tools. There is a faucet in the corner for a hose connection, a galvanized iron bucket for rain water brought in from an outdoor barrel (used mainly for the orchids), and, in general, space for all the accumulated paraphernalia that collects in a working greenhouse.

During the January clean-up I am likely to find not only a favorite slim trowel or potting stick hidden at the back of a crowded shelf, but bulbs that never got planted, records that were never filed away, and an odd assortment of articles that rightly belong in the house. Almost any kitchen utensil seems to get used for one purpose or another, sooner or later; a pyrex casserole preserves the moisture over a pot of seedlings; a cookie tin makes a good tray in which to water small pots from below; a dust pan and brush take up dry soil from the potting table; measuring spoons and mixing cups help in the exacting job of diluting insecticides and fertilizers (and incidentally, once so used, should be very carefully cleaned, or relegated to the greenhouse for good, since some poison may be involved). Knives cut all sorts of things that no respectable knife should be asked to dull its edge on; a vegetable brush serves quite as well as the ordinary rubber bulb to sprinkle foliage; Mason jars make airtight containers for anything that must be kept dry; and the preserving kettle may be the only large receptacle on hand when one suddenly wants to sterilize some soil. Nor is it only the kitchen that suffers. Tape-measure, shears, hammer, twine, ruler, pencils, spoons, saucers, eye-brow tweezers—perhaps this is enough to suggest why a January housecleaning is a good idea!

When the benches are in order, the plants on the shelves groomed, the duck-boards washed down, supplies put in shape, and pots cleaned and neatly stacked, I am ready once more to forget to be critical. It may have taken the better part of several
mornings to accomplish all this, but I shall not have to be so thorough again for months. As I glance around, letting my senses be assailed, the color and fragrance, especially if there is snow beyond the expanse of glass, make as fresh an impression as though I had never experienced them before.
No matter how much immediate pleasure a greenhouse gives, half the fun is planning further triumphs. It may be an unfamiliar plant in a florist’s window, an article in a garden magazine, or the chance mention of some exotic wonder that sets one off. The most stimulating source of future projects, however, is likely to be found in the catalogs from seed houses and nurserymen. As they flood the mail at the turn of the year, I look through each in turn from cover to cover, and then go back and start marking. Of course I find far more material that sounds interesting than I can possibly find room for or afford, and so begin to compare one offering with another. The first thing I know it is February and high time to make myself face that final, difficult choice between potentialities.

My two favorite catalogs represent the opposite extremes of art in their field. One is large, lavishly illustrated and must be paid for, unless one has ordered liberally from it the previous year. The other is free, a small thin pamphlet, without a sign of a color photograph. What illustrations there are consist of line drawings that give little idea of their subjects, for all one grows fond of them. Only in the wide range of material represented are these two alike, and even in this there are subtle differences.

The elaborate catalog goes in for new introductions in a big
way; recent adaptations, improved strains, and modern hybrids boasting plant patents. The modest catalog also offers new material each year, but with no suggestion of the biggest or best, the most hardy, floriferous, or enduring. Rather, the prospective buyer is challenged, his skill put to the test in choosing rarities which seem to have been gathered from the farthest and most inaccessible corners of the earth. The hills of Lebanon are mentioned and the mountains of Crete, Japanese alpine heights, and the creviced ruins of Persia. It may even be that my interest in the native habitat of the plants I grow was first stimulated by the literary flair with which these distant places are noted.

There is still another difference. The first catalog deals almost entirely in plants. They will be sent under the best possible conditions, balled and burlapped, wrapped in sphagnum moss, or carefully secured in pots. Detailed instructions are promised, and so sure can one be of success that a guarantee of replacement is usually given. The second catalog, on the other hand, offers more seed than plants. It seems to be taken for granted that anyone who wants such rare material will have a sporting streak and will be ready to cope with difficulty of germination, slow growth, and demanding habits. A general leaflet of cultural directions is enclosed with an order, and there are also clues in the text of the catalog, with a series of cross-references that are a real help in choosing, if one can succeed in disentangling them.

Far be it from me to scorn the healthy plant that arrives in fine condition and soon adapts itself to my greenhouse. There is an English hybrid daphne which takes the place of honor in the small bench each late winter or early spring, when it comes into bloom. Even when it was quite young it lived up to the promise of its spectacular photograph in the large catalog. But is it surprising that I am far prouder of three pots of a rare form of kalanchoë, raised from powdery seed from Somaliland, which after two years of nursing show signs of blooming for the first time this spring?
These catalogs are but two of many. There are the specialists, for instance. They are worth patronizing, whether one is interested in a collection or merely wants a plant or two. The nurseryman who deals exclusively in orchids or camellias or chrysanthemums grows many varieties under ideal conditions. What is more, even though an order is modest, he will answer specific questions with great generosity. Such a response, as a matter of fact, is widespread in the trade. Whether it is a large concern with a "consultant" who does nothing but answer customers' letters, or a small grower who has to take time out at a busy season to reply to some request for information, one is seldom disappointed.

Questions to Consider before Ordering

Selecting from the winter catalogs should not be a cut-and-dried business. There is too much pleasure in indulging a sudden whim, or taking a risk on some plant that may not adapt itself to your greenhouse, to be always completely reasonable about it. There are certain questions, however, that are well worth asking yourself, before the orders go off.

Are there any particular periods when bloom is scarce?
Would you like to have a more continuous succession of plants for fragrance? For use in the house? For cutting?
Do you need material for the greenhouse during the summer months?
Have you room for one or two more large permanent plants?
Have you chosen what vines you will grow next year?
Are you sure you have room for the plants you have ordered?
Do you plan to save room for sowing seed of tender annuals and vegetables for later use outdoors? If so, what seed do you need?

These are but a few suggestions. Each greenhouse owner will think of a list of his own, according to his particular interests, needs—and limitations.

The one over-all goal in my own operation is to keep the
cycle, mentioned at the very beginning of this book, continuous. When a plant is diseased, or grows out of bounds, or proves sickly in a cool house, obviously it must be discarded. Annuals by their nature come and go. Many bulbs appear only for one season. Small plants, as well as cut flowers to give away not only at Christmas time but throughout the year, can be one of the most satisfying attributes of gardening under glass. At the same time, however, the old stand-bys live on year after year, and new plants are often raised from cuttings of the old, or from seed that has come down through many generations. The Jerusalem cherries that I have at the moment, for instance, are descendants of an original ancestor given to me long ago. And many of my friends have wax plants, raised from cuttings from my twelve-foot vine which, in turn, was an offshoot of that of a friend. In other words, the pleasure derived from letting one's imagination run riot over the catalogs has only a little to do with the realities of the situation. Plant material, and to a lesser extent seed ordered in February represent a few new ventures, rather than wholesale changes.

Contrary to what one might suppose, and regardless of expense, it is not always an advantage to buy full-grown plants, rather than raise them yourself. Not only annuals but some perennials as well will bloom the first year from seed, and a large number of foliage plants will make a good growth in a few months. Obviously, it may be impractical to start slow-growing species which will not mature for several years, especially if only one or two are wanted. For some seed it may be impossible to find a source, whereas plants are obtainable.

Some greenhouse families, such as the orchids, not only take years to grow to blooming size, but require such scientific care when raised from seed that only the specialist is equipped to give it. In some species certain varieties cannot be counted upon to come true to form or color from seed, and so must be obtained from a dealer who has grown them from cuttings. Bulbs in general, as has already been suggested, are best left to
experts. In spite of these exceptions, however, it is well worth considering seed before ordering a plant.

It is all too easy to forget that no plant is going to arrive looking like its picture or corresponding to its description in a catalog. Modern methods of handling stock have greatly reduced the hazard of losing it altogether, but no nurseryman can control conditions during shipment, which may include extremes of temperature, lack of fresh air, and often loss of moisture. The farther the plant has to travel, the more it may suffer. The larger the plant, the more affected it may be. For this reason, many dealers send only material out of four- or five-inch pots as a general practice, believing that young plants recover from the shock of transportation better than older ones. Such plants are usually first-year seedlings and more often than not will take a full season to recover, establish themselves in your house, and bloom.

Opportunity to add rare plants to a collection, however, even if from a nursery far from your area, should not be turned down for any such reasons. Some of my most satisfactory favorites were gathered in just this way, and over the years I have had very few complete failures. There are many times when it has taken patience, but with time and care each new acquisition will grow and assume its proper proportions.

The lure of the catalogs is well demonstrated by the eagerness to order more than is practical. For in January and February almost any greenhouse presents an eloquent reminder of the limitations of space. At no other time of year, with the exception of April, is it apt to be so crowded if a variety of material is grown. Plants in the benches are on their way to filling every available inch. Fantastic as it may seem, those brought in from the garden as seedlings in September may still be blooming so well that one hates to discard them. And added to the permanent plants on the shelves are not only rooted cuttings starting into growth but the bulbs, both tender and hardy, which have developed strong root growth by this time. Add to all this the
February

fact that by February any perennials potted in the fall have been brought in from the cold frame, and it really is a wonder that I order any new stock at all!

Cut Flowers in Abundance

A possible—and pleasant—alleviation of the overcrowded condition of the greenhouse at this time of year lies in the prodigal use of cutting material. There is seldom a time when I can’t find a few flowers for the mantelpiece or to take to a friend, but often these must be chosen with care and cut with short stems to leave buds to open later, so as not to denude the house of color entirely. This makes it all the more fun from February on to cut with a fine and lordly sense of extravagance.

One year I kept a record of the bouquets picked from the greenhouse during January, February, and March. There were twenty-eight, an average of something more than two a week. Since during this same time I also had bulbs in bloom and flowering plants for the house, many of these were given away. I like to take a few flowers to my hostess if I am going out for lunch or dinner. Cut the same day, and wrapped in aluminum foil, they will be fresher and last better than anything that could be bought at a florist’s. In January they were often meager; “few short sprays of forget-me-not, feverfew, rose petunia, and ageratum with asparagus fern,” or “violets, sweet alyssum, and one cyclamen.” It is also good to be able to count on a supply for a friend shut in by illness, or for occasions when some special event like a wedding or a big tea is in the offing. If such gala affairs come in February or March, there is added incentive to being lavish. “A dozen larkspur, colors beautiful this year,” or “Cut all the snapdragon to make way for tulips,” may suggest some such use.

Annuals It has been my experience that a variety of annuals, even though there is not room for many of each, provides more interesting material for cutting, over a longer period, than a whole bench of any one flower. I have already men-
tioned violets. It was all very well to have them to wear or give away almost every week the winter I devoted a whole bench to them, but there was very little else to cut. I continue to have violets, grown from cuttings descended from those original plants, but I now plant them in a deep flat fourteen by eighteen inches which I balance between the bench and the glass in the coolest corner of the greenhouse. This holds about a dozen plants which produce perhaps two or three dozen violets at a time. This is enough for a boutonniere or to add fragrance and color to a small mixed bouquet. And the bench is free for other varieties.

Stock, scabiosa, and salpiglossis are spectacularly successful in a cool house and usually raised in large quantities. They don't bloom until March, however, and in the meantime there is no color in the bench for any purpose. Of the three, stock is the least satisfactory grown this way, for not only does it take a long time from seed to flower, but each plant provides only one stalk which, once cut, does not come again. And the one time I devoted my smaller bench to it, each spike was between four and five feet tall (I got out the yardstick to back up my guess), dwarfing everything else.

Schizanthus has very attractive lacy foliage, and if properly pinched at an early stage is attractive even when not in bloom. I have found it erratic in its progress, according to the sun it gets. If started early enough in the fall to make good growth before the gray days come, it may flower in seven or eight weeks. The same holds true of seed sown in late March. When sown in October, on the other hand, it may dawdle along, waiting until the first warm days of early spring to bloom. Even four or five plants, started in late August or early September, grow to a large size and provide material for the mixed bouquet soon after Christmas. Their dainty, orchid-like flowers are borne in such profusion, however, that their season does not last so long as that of some of the other annuals which can be cut and will come again for months on end.
**Bulbs**  
Annuals are not the only source of cut flowers from the greenhouse. Several of the bulbs offer material best used for cutting either because so much staking is required that a pot is not decorative in the house, or because the cut flowers add so much to an arrangement that it is worth growing them for this purpose alone. Included in this group are freesia, alstroemeria, ixia, baby gladiolus, and bulbous iris. Of course flowers can be cut from any bulbous plant, but if a group is attractive in a pot, half a dozen tulips, for instance, or when the foliage adds a pleasing note, as that of clivia, I would rather bring them in the house right in their pots. This greatly extends the period during which the flowers remain fresh.

**Culture for Cutting**  
If any flower is raised especially for cutting, planting it in a deep flat not only saves room in the benches but makes it possible to move it about and give it special treatment if it needs it. I have already mentioned violets. Ranunculus and anemone are two others, excellent for cutting, that can be grown in flats. The question—so often raised in a small greenhouse—is whether one can find room for them or not. As a general rule, benches are set up some six inches away from the glass, to allow for circulation of air. This space must not be entirely closed off; but I have two wooden boxes, eight by twenty-two inches, which I brace between the greenhouse foundation and the bench, without, seemingly, doing any harm. At the moment, one of these contains a dozen ‘Spitfire’ gladiolus, a dwarf scarlet variety, and the other, a dozen ‘St. Brigid’ anemones.

Whether grown in pot or flat, an ingenious way to support plants with weak stems is to insert thin bamboo stakes at intervals around the edge of the container before the foliage has grown more than an inch or two, and criss-cross string from one to another. The shoots then grow up between these supports, eventually almost hiding them. The usual method is to wait until the plant needs staking, and run the string, held by stakes at intervals, around the outside of the pot. It often takes quite
a while for a group of plants to look “natural” again when this is done, and the string, on the outside, is far more unsightly.

**Artistry in Cut Flowers** The effectiveness of a single camellia floated in a rose bowl has already been mentioned. This flower especially may well be used without a stem, since new buds for another year are formed at the tips of the flowering branches; but it is by no means the only plant for the purpose. Oleander, tuberous-rooted begonia, and a flower from the passion-vine immediately come to mind. I have used a geranium cluster with a single leaf. And when bloom is scarce, one or two sprays in a bud vase will also lend color or fragrance to the living-room.

The uses of cut flowers are such a personal matter that I merely suggest a few, knowing that any greenhouse owner will devise his own. I have a small Persian print, for instance, that was given to me several years ago. Its subtle and intricate design employs every color of the rainbow with amazing harmony, and is so pleasant to live with that most of the time it graces one side of the mantelpiece. On the other side I like to have a vase of flowers, and attempts to carry out the color scheme have led to many combinations I should never have thought possible. The shades of sweet peas, for instance, red, lavender, pink, and salmon all included, are ideal. Schizanthus is another flower with “Persian” colors, and deep maroon lace-flower and pale clear blue plumbago bring out all the richer colors in the print.
7. March

STARTING INDOOR AND OUTDOOR PLANTS FROM SEED

Now the long winter is over. Crocuses pop out on a sunny day and chionodoxa, braving the last storm, deserves to be called the glory of the snow. Boots may still be necessary for a walk along the perennial border, where narcissus and tulips are already thrusting sharp tips through the wet ground, but soon, soon now, the outdoor garden will have to be put in order. In the meantime, there is plenty to be done in the greenhouse!

From the time of the first killing frost in the autumn to the first true signs of spring, the greenhouse has a quality of miracle about it. Every green leaf, not to mention the procession of bloom, can seem once removed from reality. Over and over again this thought comes to me when I glance out at a winter landscape beyond the protecting glass. In March, however, the greenhouse becomes a part of the natural world again. Plants suddenly make new growth; buds appear overnight on the tender spring bulbs, annuals sprawl all over the benches. In fact, almost every plant in the greenhouse seems to feel the same stir that moves in the outdoor earth.

It is, of course, the longer days, the warmer sun, that are at work. Camellias and orchids must be moved to dappled shade. It may be necessary to water every day, and the fertilizing program is stepped up. Violets that have bloomed all winter can safely be moved to the coldframe and the cutting box can be
filled to overflowing. Most important of all, for anyone who wants small plants to grace the summer flower beds, the time has come to sow seeds.

Seed Sowing Considerations

Supposedly, annuals planted at any time of year will proceed from sprout to flower in a given period. However, in parts of the country where winter sun is often lacking, early growth is likely to be delayed.

Timing  It is often suggested that seeds of plants slow to mature, such as *Vinca rosea*, lobelia, or fibrous-rooted begonia, should be planted as early as January. For February, the list is usually longer, including petunia, snapdragon, ageratum, salvia, stock, verbena, and browallia, among others. I have tried most of these flowers in the month recommended, and have found that at the seedling stage, owing to the number of gray winter days in our vicinity, they seem to stand still, or worse, grow weak and spindly. As a consequence, I now put off planting at least until the middle of February for seeds slow to germinate, and for the majority wait until March. The small plants then keep coming right along and I have successful bloom almost as early, in some cases actually as soon and from healthier plants, as from earlier-sown seed.

I have also discovered the inadvisability of bothering to give an early start to those seeds which are marked to be planted where wanted. Either because they are difficult to transplant, or because they need the conditions of outdoor, summer weather to develop properly, an early start seems to do them no good. Since available space to raise seedlings in the greenhouse is always at a premium it is with relief that certain packets, such as nasturtiums and zinnias, are put aside until the ground warms up in May.

Spacing  It is hard to remember that each seed planted, no matter how tiny, will require at the minimum a three-inch pot, or the equivalent nine square inches in a flat, before it can
be transplanted to its permanent position. Although I have never since repeated my first performance, when by actual count I started no less than fifty-two different varieties, it remains impossible for me to keep entirely within bounds. The vexing truth is that even a dozen packets of seed, with average success in germination, can fill the extra space in a small greenhouse. And who, left alone with the tantalizing promise of the seed catalogs, can stop at a mere dozen?

One compromise is to plant only as much of a given variety as will eventually be needed. Half a dozen vines, for instance, whether they be canary-bird-flower, cathedral bells, or cypress vine, will cover the side of a garage or a long section of fence. Successful germination of good seed usually ranges from 75 to 85 per cent. Allowing for some loss, a dozen seeds of such plants are all that are needed. Annuals to be used for accent or to fill gaps in the perennial border are usually needed only in limited quantities, and can be planted accordingly. As for those eventually destined for next winter's greenhouse display, almost inevitably a full packet of seed will provide more plants than can be used.

Viability Contrary to general opinion, many seeds will germinate for a period of years after they have been harvested. Viability ranges all the way from one to twenty years or longer. As often as I could find the data, or had it in my own records, I have noted the viability range in Appendix B. If seed is kept, however, it should be in a fairly cool, dry place, and in a container which allows some circulation of air. I use ordinary paper envelopes for small seed, and small cardboard boxes for those that are larger. It is worth while testing, if you are in any doubt, by placing two or three seeds between pieces of damp blotting paper and keeping them moist until such time as they should normally sprout. While it may be a waste of time and effort to save the seed of many common flowers, it can be a valuable procedure with those that are rare, expensive, or difficult to find.

Quality Whether a whole packet of seed is needed, for
edging or bedding purposes, for instance, or whether one wants only a few plants, it is foolish to economize on seed. As with bulbs only the best is worth growing. It is even a good idea to buy specific varieties, or to choose by color, when this is possible, for indiscriminate mixtures and especially bargain offers are likely to be made up of leftovers, or of unpopular varieties.

Medium for Sowing  The next consideration is the medium in which seed is to be planted. There are several possibilities, and every grower is apt to swear by his own particular mixture. Sand, vermiculite, peat moss, sieved sphagnum, and ordinary garden soil, in combination or alone, are used. The truth is, again as for bulbs, that the fertility of the mixture is not nearly so important as its physical texture. Even seed so fine that it looks like grains of pepper has stored within it the food necessary for sprouting. Until this is used up and the little plant has two or more true leaves, it does not require nutrients from the soil. What is necessary for good germination is a growing-medium of fine texture, which will hold moisture and still allow for some circulation of air.

Whether the medium should be sterile or not is a moot point (see Chapter I), and one to which there is, perhaps, no overall answer. Weed or other unwanted seeds are not likely to be a problem. Soil-borne fungus diseases on the other hand, especially that known as “damping-off,” can be a serious threat to young seedlings. Unfortunately, the conditions most conducive to good germination also foster the growth of the fungi which cause this disease. Sprouts may appear one day looking healthy and robust, and the next day may have withered at soil level and fallen into a lifeless tangle. Precautions against this disaster are certainly worth taking.

Planting seed in vermiculite or sieved sphagnum, either of which is so nearly sterile that the fungus is not present, would seem the obvious answer. The only trouble is that these two materials, while meeting the requirements for germination, contain no nutriment and so make necessary careful fertilizing soon
after the seed has sprouted. When nutriment is added, that is, when soil and compost are used in the mixture, these ingredients can be sterilized in small quantities, as already suggested, by being baked in a large kettle in the oven for two hours at 200°. This is practical when only a few seeds are to be planted but is time-consuming if not completely impossible for a large operation.

Chemical Treatment My own usual compromise is to use the mixture of one part each of sand, garden soil, and compost, eliminate sterilization, and treat the seed with a disinfectant. This procedure, already mentioned as an aid to prevent the rotting of bulbs, makes use of a group of synthetic chemical compounds which are adding a new chapter to the age-old story of horticulture. Although I found myself skeptical at first of their use by amateurs, my reluctance is gradually being broken down. Treating the lawn with a growth-regulator to keep it an even two inches still worries me. Suppose one gave an overdose and the grass dwindled away to nothing? Producing fruit without pollination, and preventing fruit altogether on flowering trees, seem to me best left to the expert. But I have sprayed our strawberry patch with a hormone and had a bumper crop as a result. My satisfaction in watching dandelions or poison ivy curl and die after treatment with one of the ‘hormone’ weed-killers knows no bounds, and disinfecting seed to keep it healthy seems to be happily aiding and abetting nature.

Certainly nothing could be simpler as a preventive for "damping-off" than using one of the many products on the market for seed disinfection. Only a minute quantity of the dry powder is needed to treat a packet of seed. A little on the end of a knife or potting stick can be put right in the packet, which is then shaken to coat the seed before planting. When only a part of the seed is to be used, the powder can be added to it in a small dish. Either operation takes no more than a minute or two, and a twenty-five-cent envelope of the powder will last for a long time.
The three-part mixture with disinfection is especially labor-saving with large seed, when two or three can be planted in individual small pots. By pulling out all but the sturdiest sprout, it is possible to grow seedlings on in this way, without transplanting, often until they are large enough to go right in the garden.

Seed Sowing Methods

Fine seed can be mixed with a little dry sand, or shaken gently from a creased paper, to distribute it thinly and more or less evenly. Except when a large quantity of plants is wanted, I like to sow fine seed in a large pot or bulb pan, with a small pot placed in the center. By plugging the drainage hole of the small pot with a cork or waterproof adhesive, it can be kept full of water, which will seep through the clay sides and keep the soil mixture in the outer pot uniformly moist.

It is just a plain nuisance to try to grow several different kinds of seed in rows in one flat, unless they will all germinate at approximately the same time. Some seeds need dark to germinate; others need light. With pots of one variety a damp newspaper can be gently laid across the top, or a piece of glass can be used, with newspaper or cardboard on top to keep out the light. The same procedure is, of course, possible with a flat. However, if one has a row of dwarf petunias, which take from six to ten days to germinate, next to a row of annual lupines, for instance, which may take twenty or twenty-five days, the petunias will be ready to be placed in the sun while the lupine seed still needs dark.

Seed must be planted at the right depth. A general rule is to cover it with a layer of fine soil to the depth of twice its diameter. This means that powdery seed may be scattered on the surface and merely pressed lightly with the palm of the hand rather than be covered at all, whereas large seeds may need as much as a quarter of an inch of soil over them. I have found an ordinary flour-sifter, the kind that can be manipulated with one
hand, filled with a little dry sand, an efficient way to cover seed that requires a mere sprinkling. By remembering the comparative weight of what the tiny sprout must push through to reach the light, it is easy to refrain from planting seed too deeply.

**Moisture and Temperature**

Care must be taken in watering both seed and seedlings. The soil should be moist when seed is planted and kept as nearly in that condition as possible not only until germination but until the seedlings are large enough to transplant. At any point during these first crucial weeks of life, drying out may spell disaster. Saturation of the soil, on the other hand, may be almost as bad, causing seed to rot or wash to the surface, eliminating the air necessary for tiny roots to develop. This happy medium, neither too wet nor too dry, is one of the most important growing conditions in the greenhouse in general, or in the outdoor garden either for that matter. It is sometimes described as that condition of the soil which, when a handful is squeezed, contains enough moisture that it holds together a little and then quickly and easily falls apart. In the bench, or when a plant in a large pot is watered, it may be necessary to loosen the surface of the soil afterward with a fork or small cultivator. This is not possible with seed or seedlings, and so a fine spray should always be used when it is necessary to water from above. It is even better to water from below if possible. No amount of description can take the place of experience itself in understanding how soil looks and feels, when it has the right degree of moisture for germination and root formation.

Temperature is of vital importance. Even seed easy to germinate falls into two classes, that requiring a cool start, and that which must have a warm start. Many plants from the north temperate zone, including most of the hardy annuals and a large number of perennials, belong to the first class. They sprout best at an average temperature of 53° or 54°, but there is enough leeway to have them respond quite satisfactorily in the cool
greenhouse. Any seed whose natural habitat is tropical or semi-tropical, on the other hand, needs a temperature of 68° or more to start the life cycle. In this group are the tender annuals, some perennials, and most of the foliage and greenhouse plants.

Extra heat, usually referred to as “bottom heat,” can be provided in a cool greenhouse in several ways. Where hot water is used to heat the greenhouse, the seed box or a container to hold seed in pots can be placed right over the hot-water pipes. This is often enough. Another method is to rig a tin box under the seed bed, and burn a small candle in it. Probably the best way is to buy a unit of electric coil, with which the temperature can be controlled. I have not tried this myself. I must admit that when I am in doubt, and have some rare treasure that I am especially interested in, I take a pot of seed into the kitchen, putting a piece of glass on top to keep it moist, and place it on a shelf near the wall which is heated by the central chimney. It is almost always possible to find room indoors for a few pots of seed that need a warm start. For any large quantity, however, added warmth must be managed in the greenhouse.

With attention, then, to good seed to start with, a medium of fine texture, the proper depth to plant, maintaining the proper moisture, and meeting requirements for a cool or a warm start, success will result with most common flowers. It has been estimated that ninety per cent of the seed offered by the big growers is of species easy to germinate. Indeed, many of the most popular annuals will grow even when some of these conditions are neglected. Their ease of culture is one important reason why they recur in catalogs year after year, and remain favorites.

Adventuring with Novelties

The most casual perusal of a garden encyclopedia, however, will suggest how small a fraction of possible plant material is utilized in general gardening. Sooner or later, the greenhouse owner is likely to want to raise from seed not only more unusual annuals and perennials for the garden, but some of the so-called
greenhouse plants themselves. Certainly this desire should be indulged. It may even result in success with no more attention to requirements than those mentioned above. Necessary conditions can vary to such an extent, however, that it is a very wise procedure to learn as much as possible about them before trying to raise any rare plant from seed. Dealers who sell such seed often give specific cultural directions. Books containing such information are available. Whenever possible, I have tried to include individual peculiarities in the appendices. And with plants especially difficult from seed, I have frankly advised leaving them to experts.

For instance, the need for a cool or a warm start is far from the whole temperature story, even with many common flowers. The seed of some plants, including *Dianthus*, *Antirrhinum*, and *Gypsophila*, has to be prechilled before planting. That of *Heuchera* must not only be kept cold, but moist and cold, so that it will only germinate in the spring if it has spent the winter in a coldframe, or has been mixed with damp sand and kept in the refrigerator. Some seed, including that of dahlia, cosmos, heliotrope, and salvia, needs a fluctuating temperature, 68° by night and up to 86° by day, to germinate. A few, in both warm and cool groups, do best when there is no fluctuation.

When gardeners have success without knowing these conditions, it is either because necessary steps, such as pre-chilling, have been taken by the seedsman, or because normal temperature ranges, when the seed is planted, meet the requirements.

There are seeds which only germinate after a period in direct sunlight. These include *Viola* and most grasses. Others are benefited by being plunged into boiling water before being planted! All seed with a hard coat, like that of sweet pea and morning glory, germinates more quickly if soaked overnight first. The coats of some seeds are so hard that they must be soaked in sulphuric acid or abraded with a file if one does not care to wait several years for a seedling. That of cathedral bells, on the other
hand, is so prone to rot that it must be planted on edge and watered very carefully until it is sprouted. Some seed will not germinate well when it is fresh, and some will only take hold if planted immediately after ripening. Although the average period for germination is from one to three weeks, certain pinks may show in four days, and one variety of primrose takes three years!

If the intricacies of seed germination might fill a book in themselves, I suggest a few not to discourage the greenhouse gardener, but perhaps to stir curiosity about the answers that may be found, even for the most difficult subjects. In general, failures are at a minimum and rules are not rigid. When we consider the multitudinous forms of seeds, the intricate and amazingly clever methods evolved through the ages to assure growth where no human being will be on hand to plant or tend or water, we should be encouraged to experiment with any species we want to grow.

Our commonest flowers come from all over the world: zinnias from Mexico, asters from China and Japan, petunias from South America, daisies from Africa. As they grow side by side in our gardens, we tend to forget the differences in climate, soil, and altitude from which they came. Certain of the most adaptable are grown from Maine to Florida, from New York to California. No matter how beautiful these may be, they can surely be said to “grow like weeds.” And indeed, there are flowers which self-sow to an extent which makes them pests in one section of the country, while they may be prized in another. Modern hybridization works not only for new colors and large bloom in old species, but is continually experimenting to grow healthy, easily germinated strains of new and rare varieties. With the advantages of a greenhouse, it is not beyond possibility to develop such a strain yourself.

In any event, once a certain amount of experience is gained, the sky can be the limit in taking a chance with any plant for which you can obtain the seed. There are, when all is said and
Plate 5. The author sprays her greenhouse plants whenever trouble threatens in the form of insects or diseases. (Photo by Charles R. Sutton)
Plate 6. Gloxinias (above) give glorious bloom under glass. (Gottschol-Schlesner photo) In late February or March flats and pots of seeds are sown for outdoor as well as indoor culture. (Roche photo)
done, no blanket rules, no sure guarantees of success, no easy substitutes for a lot of thought and care and interest, in raising seedlings. The work involved is lessened by ordering seed well in advance, and starting operations with clean pots, flats, fine sprinkler, and disinfectant ready at hand. Markers on which each stage of the proceeding is recorded help not only at the time but in the future. A lot of time will be consumed before the seedlings flourish and flower. But it is well worth it when you can point to a rare anemone or even to a healthy row of such a common annual as the petunia, and say, “I grew that from seed.”
8. April

A MULTIPLICITY OF TASKS

There are times during April when I almost wish that the greenhouse were perched on top of a skyscraper in New York. As the outdoor tasks multiply, it grows harder and harder to find time for all that could or should be done in the greenhouse. Instead of hoping for a sunny day, as I do so often in the winter, I find myself looking forward to a good downpour, when I’ll be forced to remain under a roof. The sound of rain on the sloping glass, as a matter of fact, makes a fine accompaniment to such jobs as staking luxuriant new growth, starting cuttings, and repotting and transplanting the seedlings sown last month.

Shading the Glass

Certain essentials cannot be neglected under any circumstances. With the sun higher in the heavens each day, and its rays stronger, the overhead glass must be shaded. In some parts of the country, this will even have been done during a warm spell in March. Commercial growers use a thin whitewash or a soupy mixture of mud and water, usually splashing it on the outside of their houses in a most unattractive way. I had what I thought was a bright idea one year, and applied a thin coat of the window cleaner known as glass wax, on the inside. This can be put on with a celotex mop (the kind sold for waxing or polishing floors) with a minimum of effort and a smooth neat
result. However, after it has baked in the sun for several months, it does not come off with the ease I anticipated the first time I used it. In one way, this is an advantage, since during the summer, one often uses a fine spray of water, hitting all the glass, in order to raise the humidity and lower the temperature in the greenhouse. This does not remove the glass wax. It takes a solution of ammonia and water, and considerable elbow grease, to clear the panes in the autumn. I still think, however, that the advantages of being able to apply the shading from the inside and of the far more attractive appearance make this worth while. When whitewash is used on the outside, if it is too thin and the summer is rainy, it may have to be repeated. And if the coat is too thick, it may not weather off, in which case when it is removed, it is just about as hard a job as removing the glass wax. I have seen commercial houses still partially shaded in the middle of winter. This of course, reduces the sun through the glass, when every possible ray is beneficial.

The side walls may or may not need shading in April, depending on what is being grown. I like to leave them clear, myself, as long as possible, because I have certain plants which can stand full sun, even at this time of year. By training a vine or two along the east rafters, and setting a row of such sun-lovers as geranium or lantana on the top shelf, there is plenty of diffused sunlight, as well as spots of full sun for those plants that benefit by it.

Nutrients for Spring Growth

At no time of year is fertilizing more important than it is in April. Even with plants in active growth, care must be taken not to overfeed during cool, gray weather; but once spring has come, the program is stepped up. Once a month or even once in six weeks may be often enough during the winter. Now, for best results, especially for plants about to flower and seedlings that have made several inches growth, fertilizer should be given at least every two weeks, and for some every week. For the
beneches and for many of the potted plants, I have found that the new liquid fertilizers, absorbed by the leaves as well as by the roots, are beneficial and easy to use. Exceptions are usually limited to those plants with hairy or fuzzy foliage, such as gloxinia, and even for these the same fertilizer can be applied to the soil in which they are growing.

For general use the manufacturer’s directions should be followed exactly. Not only are you not benefiting your plants by being “generous” with your proportions, but you may be doing irreparable harm. If a level teaspoon to two quarts of water is called for, be sure it is level and not heaping. If for any reason you cannot be accurate, err on the side of less rather than more fertilizer. In fact, the exceptions to the general rules are almost all a matter of giving less rather than more. Orchids, for instance, need only a half or a third of the ordinary strength. And when the soil has been properly prepared, certain plants, notably geraniums, do better without further fertilizer, because if they are heavily fed, they run to foliage rather than to flower.

Some growers swear by manure water. I use it myself during autumn and winter, even though I may use commercial fertilizer in the spring. To the uninitiated, this may sound like a messy and odoriferous method of feeding plants. I found that dried cow manure, while having a faint odor in its dry form, so that it should be kept in a closed container, does not smell once it is seeped in water. I fill the foot of an old nylon stocking with the cow manure, and immerse it in a five-gallon pail. After a day or two, the stocking is removed and the resulting liquid is a rich dark brown. This must be diluted to the color of weak tea before being applied to the roots of the plants.

One of the few rules in the greenhouse without an exception is the importance of always watering a plant before fertilizing. I like to choose a sunny day, water the whole greenhouse the first thing in the morning, and then return in an hour or two, with the soil damp but springy, to do the fertilizing. When only a few plants are to be fed, it can be done immediately after
watering, but a pot, for instance, should at least be given enough time for any excess water to run out of the drainage hole.

**More Seeds in the Greenhouse**

There is still seed to sow in April. It is the best time to start certain flowering plants, such as *Primula malacoides*, cineraria, and streptocarpus, for next winter's bloom. Annuals like calendula, marigold, tritonia, and gypsophila can be started for color in the late summer and autumn garden. Tomato and broccoli seed sown in the warmth of the April greenhouse will provide a fine fall crop. And although many seeds can be planted directly outdoors by this time, any variety that needs special care and attention can be started under glass—providing there is time and room for the operation.

**Additional Cuttings**

Even though rooting of cuttings may have been going on ever since January, there is always a wealth of possible material from the plants making new growth in April. It is still not too late to take chrysanthemum cuttings, though most commercial dealers do this in February or March. Three- or four-inch tips of coleus, ivy, crassula, kalanchoë, begonia, and other easy-to-root plants, cut cleanly below a node with a sharp knife, will root in water at this time. If kept in the shade, they make healthy young plants in as little as a few weeks' time. Others, including camellia, fuchsia, and osmanthus, seem to like the pressure of a damp aerated mixture, like that already mentioned, half sand and half vermiculite, in which to form roots, and benefit by being rooted in a closed case.

**Aftercare of Bulbs**

Another essential in April is care of the bulbous plants which are through flowering but still wanted for another year. They must be watered, fertilized and kept in the sun until their foliage shows signs of yellowing, which is a signal that the bulb
has finished storing away food for next year's flowers. Care of those which are evergreen continues sometimes all summer. Hardy bulbs can be put in a coldframe in April, relieving the congestion in a crowded greenhouse; but room in the sun must be found for tender bulbs until all danger of late frost is past.

Attention to Seedlings

No one of the operations mentioned, however necessary some of them are, is the major job in my own greenhouse in April. I am kept busiest taking care of the seedlings which have resulted from the March sowing. So many of them must have at least one transplanting before going out that it is easy to see why I plant individually in small pots or plant bands whenever possible. The English custom of “potting on” from one size to the next largest, with as many as four or five transplantings before they are grown, is undoubtedly ideal. Roots seem to establish themselves best in a pot where they make use of the space allotted to them. There is also danger of soil becoming compressed and losing its “live” quality with a small plant in a large pot, no matter how gently one tries to water. Some compromise, however, is essential, at least for me, with this ideal setup where a head gardener had his apprentices and time was no object.

I am reminded of Old Herbaceous in the charming book of that name by Reginald Arkell. He had his traditional code, and felt that the end of the world was coming whenever a new-fangled change threatened his domain. He would certainly have disapproved thoroughly of my short cuts; but even though I may never learn to be the gardener he was, I must stand up for every possible time-saver in order to be a gardener at all. What wouldn't I give for even one of the boys he had on hand, learning to spend the rest of their lives tending a greenhouse!

Transplanting So, as soon as possible after they have developed their first set of true leaves, I transplant my seedlings either into pots large enough to hold them until they are ready for the outside world, or into flats with room enough to grow
to the same size. This usually means a three-inch pot or, where many are wanted, two or three dozen to a flat.

The first two leaves that unfold as the sprout pushes above ground are usually the cotyledons, or seed leaves; some plants have only one. The part played by the cotyledons is very obvious in the common bean, for instance; they are swollen with food which is used in the formation of the first root and the growth of the stem. In many seeds the cotyledons remain below ground during germination, and it is the true leaves which first show. Other seeds send up cotyledons more like ordinary leaves, which make food as leaves generally do. The first true leaves are more or less like those of the mature plant. There is a special charm in watching the development of a tiny plant as the minute leaves unfold—tiny replicas of the later leaves which will be five, ten, or a dozen times as large.

If it is not possible to get seedlings transplanted as soon as the first true leaves appear, it must still be done before crowding and reaching toward the light cause the plants to become tall and spindly. And there is a certain point, which a gardener comes to recognize, beyond which it is scarcely worth while bothering to transplant crowded seedlings at all. This depends on so many factors that no general rule can be given, but one can't go wrong by transplanting as soon as possible.

**Medium for Transplants** The best medium for seedlings is that already mentioned for seed, one part each of sand, soil, and compost. A small quantity of bone meal can be added, but any dry commercial fertilizer is positively harmful, as there is danger of burning the tender roots. In general, it is best to wait until seedlings have a good growth before feeding them. Whether pots or flats are used, care should be taken to provide good drainage, especially if the seedlings are to be transplanted only once. I put a piece of crock over the drainage hole in a pot and add a little sand, just as I do when repotting larger plants. The small pot, however, is filled to the brim with the damp soil mixture, and a shake or two on the potting table provides space for watering. A hole is
then made with a pencil or a dibber, and the seedling inserted, the soil gently but firmly pressed around it. In a flat, the procedure is much the same. There should be holes in the bottom, or space between the boards. A thin layer of small gravel or crushed crock is then spread out, a mere covering of sand added and soil to within a half or quarter of an inch of the top. This is pressed lightly down with the palm of the hand or the flat of a board, and holes for the seedlings made at the required intervals.

Procedure in Handling In pricking seedlings out of the container in which they were sown, practice brings skill. They often seem so small and fragile that the beginner is apt to feel all thumbs. In a surprisingly short time, however, one learns the knack. They must be watered before being disturbed, and handled as little as possible. After being lifted carefully out, by inserting dibber, knife, or some other slender tool well under them so as to disturb the roots as little as possible, they should be separated and replanted quickly. For this reason, pots and flats should be prepared first.

The proper depth leaves the stem buried up to the first pair of true leaves. When the soil has been pressed around each one firmly enough to ensure that there are no air-pockets, but not firmly enough to cake, the pot or flat is ready for a thorough watering. This is done either from the bottom, with pots, or by a fine spray, with flats. Newly transplanted seedlings, just like larger plants that have been moved, should be kept in the shade a few days. This gives them a chance to get over the shock of transplanting.

Trying to describe this process seems to me even clumsier than doing it for the first time, and gives no hint of the speed with which a large pot of seedlings can be transferred, once one is in the swing. A good way to learn the procedure is to watch an expert. An old hand will work so swiftly and with such artistry that it is a pleasure to see. I like to happen into a commercial greenhouse in our neighborhood when the owner, an
elderly Italian who has been growing flowers all his life, is busy potting up hundreds of young plants for the spring trade.

When I tell him I am in no hurry, he goes right on with his work, talking to me as unconcernedly as though he were idle. Always generous with interest and advice, no matter how much or how little I buy from him, he usually plunges into a discussion of my most recent problems. My eyes are not missing a motion, meanwhile, as his old gnarled fingers scoop soil into a pot, pick up a seedling (usually by one tiny leaf), hold it in position, and press soil around it. There is never a wasted movement, never a miss. Only when I ask him something of his own affairs, how the mimosa he grafted is coming along, or whether the fig tree he brought long ago from Italy as a slip is going to have a good crop, does he break the rhythm to use his hands for emphasis. That mimosa! That fig tree! "Come," he will say, "I show you."

I doubt if old Luigi ever heard of a rooting hormone. He knows so well, by instinct born of long practice, just how much sun, how much warmth, how much water, just what kind of soil each plant needs, that he has little or no need for any such aids to success. As for me, although I use a hormone more often for cuttings difficult to start, I bring it out also when I am trying a new species, or one likely to be lost in this early stage, and dust the root before planting. It is never, perhaps, so important as dusting seed to prevent damping-off, but it is worth the extra effort for some seeds. I have read, as a matter of fact, that its general use will assure better root growth and huskier plants.

**Hardening Off**  Luckily, as newly transplanted seedlings are demanding so much additional space, there are others which are ready to go outdoors for the process known as "hardening off." Any plant grown in the greenhouse is coddled. Even the sturdiest annuals transplanted directly into the garden without protection are likely to be set back by high winds, fluctuating temperature, too much sun, or spring downpours. The best way to harden them is to keep them in a coldframe for a week
or so before planting them out. If the coldframe is full to overflowing, as mine is likely to be at this season, I sometimes compromise by putting a flat or a tray of seedlings in the lee of a tall hedge along one side of the vegetable garden. Here they are sheltered from the prevailing wind and have some shade. They must be watered carefully, just as they would be in the greenhouse, but otherwise need no attention until they are planted in their permanent positions a few days later. This, of course, is only possible after all danger of frost is past. The average date of the last killing frost in our area is April 18th. So by the end of the month hardy annuals can be planted out, and such half-hardy subjects as verbena, ageratum, and nicotiana can go in the coldframe.

**The Coldframe as an Adjunct**

I have mentioned a coldframe a good many times. If it is at all possible, it is a very great aid in greenhouse gardening. In raising any considerable number of seedlings for the outdoor garden, it is almost a necessity. I have a friend who accomplishes wonders with a frame which is nothing more than three old storm window sash hinged to a long piece of board, on a box made of scrap lumber. The south side of this contraption is buried in the ground enough to give the glass a little slant in that direction.

My own coldframe is homemade, but in the interests of permanence we used redwood, joined it carefully at the corners, and painted it green. Much more elaborate prefabricated models, some of them made of aluminum, are advertised, spring and fall, in garden magazines.

Their use in growing hardy bulbs, both for the cold rooting period and to mature the foliage after flowering, has been mentioned. Seedlings cannot only be hardened off in such an enclosure, but during the late spring and summer can be grown right in the coldframe, for fall and winter bloom in the greenhouse. Many perennials and various small spring-flowering
shrubs can be potted in the fall, kept in the coldframe until after Christmas, and then be brought in for early flowering. All but the tenderest chrysanthemums can be wintered in a coldframe and will develop good shots for rooting there when the March sun starts them into growth. So it is useful the year round, and with space almost always at a premium in the amateur greenhouse, it makes room for many more plants in full bloom.
9. May

PREPARING FOR THE
WARM MONTHS

By the middle of May, the greenhouse invariably has a wild and overgrown appearance. Vines have gone rampant without being tied properly, annuals that flowered in a regular burst of enthusiasm have been allowed to go to seed, all sorts of plants have outgrown their pots, and, most ignominious of all, a number of weeds have reared their ugly heads. All of these signs of neglect are ignored by visitors who exclaim about lush growth, a riot of color, and a divine smell (the latter especially if it is evening with both nicotiana and jasmine in bloom). I am quite frank to admit that I enjoy the jungle period myself.

Moving Plants Outdoors

If a thorough overhauling is put off as long as possible, it is not only because it seems a shame to interfere, but because of all that must be done at this busiest season of the year. Seedlings continue to go out, the tender annuals and more delicate perennials joining their hardier neighbors in the flower beds and vegetable garden. Hardy bulbs whose foliage has matured are either transferred to the border, or, especially in the case of tulips, removed from their pots, dried out, and put away for fall planting. Tender bulbs must also be taken care of, according to their kind. With such tasks added to the outdoor work, it is often late in the month before I get around to the second
over-all clean-up of the year in the greenhouse. In general, this
takes the form of a mass exodus, for very few permanent cool­
house plants thrive under glass during the summer. It is not
much of a task to empty the benches, taking the spent annuals
out to the compost pile, but settling the permanent stock for
the warm months is another matter.

**Pots for Shade and Sun** I first sort them after a fashion, into
several groups. By far the largest number need shade during the
hot months. These go under an elm, with several nearby for­
sythia bushes and an ancient mock-orange providing a break
against the wind. Some may need repotting, if they are making
new growth; others may need staking; others trimming back.
When they are thus groomed, I dig holes for them in the bed
under the elm tree, put some gravel in each hole, and set the
pots so that their rims are even with the soil. This is often re­
ferred to as plunging pots outdoors for the summer. With
plants that like a constant moisture, I may line the hole with
a layer of peat moss. I usually put peat moss in the top of each
pot as well. Those that require full shade go nearest to the tree;
those best in semishade, out a little farther where they will get
sun except when it is high overhead.

Another group is set aside to go in the window boxes, another
to spend the summer in their pots on the terrace, and still an­
ter to be planted in rows in the vegetable garden, tended, but
not allowed to bloom until they are put back in the greenhouse
in the autumn. For the residue—and there is always a residue—
I walk out around the place, looking for the ideal spot. A spot
that gets morning sun, for instance, with support from a fence
post, will suit the night-blooming cereus, or a sheltered pocket
in dappled shade in the rock garden for a fuchsia, where it can
droop to its heart's content and finish out its season's blooming.

**Plants for Window Boxes** Geraniums (or more correctly,
pelargoniums) remain for me the ideal plant for window boxes.
I realize that many annuals of medium height and bushy growth
can be used for this purpose. I use other material to soften the
edges of the box and offer contrast, according to what I have on hand. It may be white petunias, sweet alyssum, various of the sedums, or lobelia. For the real splash of color, however, three or four geraniums of the common zonal variety highlight each four-foot box. They bloom steadily all summer with a minimum of care. More than this, once one has acquired good stock, the process of growing cuttings from them in a cool greenhouse is so simple that one can be sure of a supply year after year.

I start mine from three- or four-inch slips in September, in the mixture of sand and vermiculite, and in an open box. The slips should be of new growth, short-jointed and squat, rather than cut from straggling ends. They require shade, as do most cuttings in the process of forming roots. It takes three or four weeks in the damp medium for the roots to form. The small plants should then be put in 3-inch pots and grown in the sun. The central growth should be pinched out, at least once, to make the plants full.

In January or February they are repotted into 5-inch pots, which they fill with roots, making proportionate top growth, by the time they can go into the window boxes in May. They may start to flower much earlier, but if good summer bloom is wanted, buds should be removed until April. Zonal geraniums can be brought into flower at any time of year, but are not continuous bloomers, so the process of starting them from slips should begin in March for plants for the winter greenhouse. These can be carried along outdoors, during the summer, but in their turn kept from blooming.

It is also possible to grow geraniums from seed. They may not come entirely true to the parent plant, but a package of mixed seed may produce many interesting specimens. If planted in September, they will bloom by summer, just as do those started from cuttings. A third possibility is to cut back old plants in the autumn, keep them on the dry side on a back shelf in the greenhouse, and bring them back into active growth again in March or April. This is usually not so satisfactory as
either slipping or seed, because old plants never develop as good form a second year. They also take up more room and are unsightly, while young plants from either slip or seed are attractive in their foliage, even when not in bloom.

A word should be said of the type known as 'Lady Washington' geraniums. These have larger flowers, and are in general more spectacular than those of the zonal type, but they take a full year to grow, or at least must be started in July for the next summer, which means careful watering and care for at least three months longer. They also tend to be more fragile, and even when grown require more protection from wind, drought, and the heat of the summer sun than do the sturdy zonal geraniums. They are eminently worth a place in the winter greenhouse, however.

A third type of geranium includes those grown primarily for foliage, notably the fancy-leaved and scented-leaved varieties. These have become more and more popular in recent years and hybridization has led to an amazing choice. One catalog I saw recently listed no less than sixty-five different named varieties of these two types. One could choose not only from half a dozen of the more familiar rose geraniums, but others with leaves that when bruised were reminiscent of lime, strawberry, peppermint, lemon, apple, orange, almond, or nutmeg. When it came to fancy leaves, two-zoned and three-zoned combinations of gold, silver, white, wine, purple, and chocolate were mentioned, as well as forms that included cut-leaf, ruffled, and crinkled. Sowing a mixed packet of seed from these groups should be a fascinating experience, and it is one—among so many!—that I hope to try some day.

Last but far from least, there are the ivy geraniums, which are so weak-stemmed they might almost be called vines. They will blossom either drooping from a basket or window box, or trained to grow upward, on a trellis. In either place they are attractive in both foliage and flower, and root as easily as any of the other varieties from cuttings.
Tubs and Other Containers  On the terrace just beyond the greenhouse, which we use as an outdoor living-room, I have half a dozen tubs at intervals along the top of the retaining wall, for emphasis and color. Mine came from Vermont and are old wooden sap buckets, once used for gathering maple sap at sugaring time. They are painted green and hold about half a bushel of soil. Many other receptacles can be used for this purpose, and they can be placed at many points around a house or garden to heighten the landscape effect. Cheese or butter tubs, old stoneware crocks, ceramic jars of various sizes and shapes are but a few of the possibilities. I have seen painted nail kegs used effectively to flank the doorway of an old Connecticut farmhouse, and large asymmetrical glazed planters equally dramatic in the patio of a modern house in the Middle West. More and more, movable plant material for the outdoor garden is being suggested by landscape architects and garden magazines. For anyone with a greenhouse, it is not only a practical and time-saving way to accomplish a dramatic effect with a small amount of material, but a fine opportunity to give many tender plants a summer in the open.

When planters are used in a semishaded position, the wax plant (*Hoya carnosa*) makes a fine subject, trained on a small trellis, and, if it is three or more years old, providing fragrant waxy clusters of white or pink and white flowers all summer long. A large plant of king's crown (*Jacobinia*) will bloom intermittently. And of course nothing could be more spectacular than tuberous begonias, started in the greenhouse in January or February for the purpose.

There are some greenhouse plants which can be used in tubs in the sun. One good subject is the asparagus fern (*A. sprengerii*). I have an old plant which stays in its tub the year round, filling a gap between bench and door in the greenhouse during the winter, and spilling over the top of the wall in the summer. Some of its feathery, drooping branches reach a length of four feet, and it has to be cut back and given a top dressing of new
soil and fertilizer every autumn. Many of the summer-blooming bulbs require sun, and are very effective in planters. My favorite, without a doubt, is agapanthus. A large tub of this in its full cerulean beauty is a sight not easily forgotten.

The plants which do best under the shade of a tree, in the lee of a shrubbery border, or in a pergola where they get dappled sunlight are for the most part winter-bloomers in the greenhouse, and lend only more green to the summer landscape. Amaryllis, clivia, camellias, azaleas, and such orchids as cypripedium are among the plants that are best handled this way. Some of them will be having a rest period, others making new growth after flowering. When you choose a spot for them, be sure that it is not too far from a water supply, for a thorough soaking once a week or so during a dry spell is the one attention they must have. It is also wise to watch for insects and to spray accordingly. One year I found, to my dismay, that grasshoppers had been feasting on the pseudo-bulbs of my prized odontoglossum orchids!

A lath house is, of course, ideal for such plants, and some growers of rare and valuable specimens even provide screening. That is another of the possibilities that I hope to have “some day,” for I think such a structure, carefully planned, could be an attractive addition to outdoor living quarters, as well as a useful adjunct to greenhouse gardening. In the meantime, I get along, and with remarkably little loss, with more makeshift arrangements.

Outside Appearances

While the May reorganization of the greenhouse is in progress, it is a good time to consider the landscaping outside. Does the glass house stand out like a sore thumb from its surroundings? Or is there planting to make it an integral part of the home grounds? Obviously any tree or even a tall bush near enough to shade the glass is to be avoided, but there are many low-growing shrubs suitable to plant along the foundation. Dwarf
cydonia, dwarf barberry, certain low spreading evergreens, and some of the common hedge materials that can be kept cut to three or four feet are all possibilities. In my own garden, the long concrete-block wall below the glass is hidden by four plants of the arctic willow, *Salix purpurea var. nana*. It provides lovely soft, bluish-green foliage in summer and a screen of thick, smoke-colored twigs in winter. Even if it did not suit the purpose so well, I think I would use it, for its story represents to me much of the fascination of the evolution of plants.

One usually thinks of a willow as large, more or less sprawling, and a lover of moisture, whether it be the brookside osier, the pussy willow growing in the swamp, or the weeping willow whose roots will grow such fantastic distances underground to running water. The arctic willow is a member of this family in good standing, yet its compact growth rarely or never exceeds 4 feet, and it flourishes through the hot dry summers in central Ohio with no attention whatever.

The explanation of these remarkable variations goes back millions of years in geologic time. Before the Ice Age, the Arctic region had a temperate climate, and a person from Boston or Chicago would have felt quite at home there, and found around him a forest of many familiar trees. Among these were willows. When the last great glacier that was to sweep down over so much of our continent started to form in Labrador, the Arctic region slowly grew colder with the inevitable climatic changes. The forests disappeared—sowing themselves ever southward. Wide stretches of the land became covered with snow which in turn was compressed into solid blue ice. As this happened, over thousands and thousands of years, there remained pockets with a southern exposure where ice did not form to any depth and the heat of the midsummer sun warmed the ground and provided moisture for a short period each year.

Only certain plants were able to withstand these rigorous conditions and live on in such comparatively sheltered places. No one knows just how plants evolved which were adapted to
such an environment; but they did. The arctic willow was the result of such an evolution, through thousands of years; its less evolved relatives were exterminated, at least in that part of the world. So today, against my greenhouse wall, having reached its full height in one season, the arctic willow transfers its energy into a wealth of foliage and the storage of every drop of rain that falls on it, to grow in health and vitality through seasons of both extreme heat and extreme cold.
June, with its transition from spring to summer, is a good time to consider the use of the greenhouse for raising vegetables, herbs, and fruits. Most of the winter-blooming plants have been removed by then and benches are free for a useful crop, if one chooses. There is more to the story than this, however. With a little forethought, even when the main objective is growing flowers, many edible plants can be fitted into the greenhouse scheme all through the year.

Utilitarian Crops in the Summer Greenhouse

In choosing vegetables or fruit for the summer greenhouse, care should be taken to pick out only those which respond well to warmth and humidity. At least in central Ohio, my cool house becomes a hothouse under the rays of the summer sun, no matter how I shade it. This situation is relatively the same in all sections of the country where days are predominantly clear from late June to September.

A few plants each of parsley, of okra, and of peppers, both sweet and hot, are useful to have growing. A full bench of lima beans will give a larger and more succulent crop than the same space outdoors would provide. Most satisfactory of all, however, are the vine crops. One tomato vine, pruned to a single leader and trained up a side wall, will grow to prodigious size, pro-
ducing a wealth of tender fruit. Cucumber, melon, zucchini, or even the new small-fruited watermelon might be chosen. But not all at once! In fact, two or three vines of any of these will fill a small bench and grow so rampantly under glass that they provide a sea of green as well as an excellent crop.

Pole beans offer another possibility. There is a climber known in some rural areas as the posy bean which is decorative as well as edible. It is usually sold as the scarlet runner, and its Latin name is *Phaseolus coccineus*. Although largely grown for ornament because of its bright green foliage and prolific red flowers, the pods are delicious when picked young and cooked like string beans. The seeds are a beautiful mottled lavender. They also can be used as shell beans when mature. Trained against a fence or on poles, posy beans are a pleasure in the vegetable garden and equally worthy of a try in the summer greenhouse.

**Melons in Particular**  Melons are my own choice. They are practically impossible outdoors in our part of the country because it is so dry. Watering and fertilizing them properly in the bench is, in comparison to what must be done for any fruit outdoors, no work at all. And when it comes time to pick the first melon, ready to fall off the vine and thoroughly sun-ripened, no edible product that I can think of—unless it be tomatoes—differs more deliciously from the object sold in the stores under the same name.

Melon seeds should be planted in April, two or three to a three-inch pot, with the strongest chosen to grow on. Germination is hastened by soaking the seed overnight and it is worth while to dry it a little between two pieces of blotting paper and dust it with a disinfectant before planting. Sprouts appear in ten or twelve days and the young plants should be kept coming right along, with at least one transplanting into a five-inch pot, before they are put in a permanent position. Melon vines resent root disturbance and so must be carefully knocked out of their pots and replanted with the root ball intact.

If bench space is wanted for something else, melon vines can
be grown in large pots or tubs on the floor and trained up the side of the greenhouse. Training them upright however, requires more work. The vines must be carefully tied to some strong support, such as wires strung from pegs in the ground to the rafters. And as the fruit develops, each melon must be cradled in a string basket to keep it from pulling the vine down.

The temperature should never go below 70° at night, and must be kept as near 80° or 85° as possible during the day. The daytime temperature will be more difficult to maintain than the night. No matter what is grown in the summer greenhouse, precautions have to be taken against the heat of the sun refracted through the glass. Shading, frequent watering, and hosing down the whole house are the only means of combating high temperatures. More will be found on this subject in the next chapter. Shading, however, should not be too dense for melons, for they require an abundance of light.

Melons that are grown in a bench take up a great deal of room, but they are easier to handle. The only special protection needed for the fruits is a piece of waterproof paper or a little straw slipped beneath them as they start to ripen, to prevent their rotting on the side that lies against the soil.

Pollination for Fruits and Seeds For the production of any fruit there must be pollination. This vital factor in plant reproduction is largely ignored by the outdoor gardener. It is of little concern in the greenhouse when the sole objective is raising flowers. On the other hand, when edible fruit is desired or when the seed of a flowering plant is wanted for propagation, it is very much a matter of concern to the greenhouse gardener.

In nature, pollination is accomplished either by the wind, which carries the male pollen to the female pistil, or by insects, which serve the same function as they fly from flower to flower. The mechanisms evolved in the plant kingdom for assuring the transfer of pollen are varied, intricate, and ingenious.

Bees are perhaps the most important of the pollinating insects. Wherever nectar is present at the heart of a flower, they
will fly from store to store, sucking nectar and packing pollen in the “baskets” on their hairy legs. They may make their way into the greenhouse through the open ventilators as early as February, deliriously busy at finding such a feast when there is still so little for them outdoors. Later in the season they become far more discriminating and pay only casual attention except to their favorites. Among these are lima beans, sweet clover, and many of the salvias, and when a summer fruit crop is being raised, it is good to grow some of these plants to attract them. Butterflies and an occasional moth may also visit the greenhouse; other nectar-lovers, less welcome even though they aid pollination, are ants, flies, wasps, and snails.

By far the safest method, essential in winter and perhaps wise in summer, is hand-pollination. This can be a complicated business when hybridization is involved, but for general purposes it is very simple indeed. For a vine on which the flowers are growing one above another, a gentle shake may be all that is needed. This works very well for the tomato, for instance. In the bench it is better to use a soft camel’s-hair brush, collecting pollen from one flower and dusting it on another. Some kinds of fruit cannot be obtained unless the pollen is taken from a flower of another variety.

Many flowers have both stamens and pistils; in other plants, there will be separate male and female flowers on the same plant. In still others, male flowers grow on one plant, and female on another. Tomatoes belong to the first class, melons to the second. An example of the third is holly, in which male and female plants must be grown near each other to have berries set.

Other Fruits The culture of such perennial fruits as grapes, peaches, nectarines, and oranges is perhaps best left to experts, for they generally require permanent ground beds and professional care. However, certain dwarf varieties of fig, orange, lemon, and even tangerine will produce fruit as well as provide decoration. When mature, they take no more room than a large
clivia or a sizable camellia. Members of the citrus group have the peculiar property of setting fruit even without pollination. Such fruit is seedless but otherwise is like that from pollinated flowers, and just as good to eat.

**Winter Opportunities**

While the best edible crops for the summer greenhouse are those which require warmth to mature, success in the winter depends on choosing crops which prefer cool conditions. Salad greens, many herbs, celery, mushrooms, rhubarb, and asparagus all are possibilities. I have also seen carrots, beets, and spinach suggested for the winter greenhouse. These three seem less practical not only because a considerable number of plants would be needed for an adequate supply, but because the crop would differ little from the product obtainable in the stores throughout the winter. If I were to choose a plant for cooked greens, it would be Swiss chard. With judicious cutting, a short row of this handsome plant will provide a meal for several people and soon grow again. As the stalks become taller they can be braised, as one braises celery.

**Border Plants**  
Often, in a house primarily devoted to flowering plants, useful material can be introduced as a border for the benches. Such a row of Bibb lettuce, garden cress, escarole, or a combination of these will not only be attractive but will supply a garden-fresh harvest for the salad bowl for months. By taking every other plant when the leaves are quite small, those that remain will grow and fill in the spaces. When these in turn are picked, strawberry plants which have been kept in a cold-frame until after a period of hard frost, can replace them. It is best to pot strawberries in the fall and hold them, as one holds hardy bulbs, until they are wanted. Brought into a cool house in January, they will ripen in April or May. My one experience with strawberries yielded only two meager servings from half a dozen plants in six-inch pots. Therefore, I estimate that for any sizable quantity at least fifteen square feet of bench or its equi-
valent should be devoted to them. Planting them as a border might be a decorative compromise.

Many low herbs can be used in the same way. Some of the mints grow too tall, but I usually have at least one plant of lemon mint trailing over the corner of a bench. Several of the thymes, including *Thymus serpyllum*, which has half a dozen varieties, and *T. vulgaris*, make good edging material. These not only add fragrance to the air in the greenhouse, but a few leaves in soup, salad, or the Christmas turkey dressing greatly enhance the flavor. Small plants of dwarf basil or winter savory are both useful and attractive; parsley will grow under glass as well in winter as in summer; and a greenhouse should never be without chives. This last herb is best grown away from the edge of the bench, where one might accidentally bruise a leaf or two and stir up a smell of onion. Tarragon is another herb worth growing. One plant will provide enough leaves to change many bottles of ordinary cider vinegar into a special aromatic ambrosia for French dressing.

**Under the Bench** A surprisingly practical possibility for the winter greenhouse is celery. What is more, it takes little or no room from other plants, for the seed can be planted outdoors in August or September, and the seedlings, in a deep flat, brought in and given a place under the bench before frost. There must be some filtered light for the tops, but the stalks can be entirely shaded by boards or cardboard, with a very professional-looking blanched product as the result.

Another crop grown under the bench, thus utilizing space not acceptable to many plants, is mushrooms. Trays already prepared with the proper soil and mushroom spawn can be bought in the late autumn, and this is undoubtedly the easiest way to raise them. If one is experimental, spawn is listed in several garden catalogs, a fairly large quantity for fifty cents or so. However, the difficulty in obtaining fresh horse manure, and using it at just the right temperature for the initial stages in mushroom culture, make this a very complicated procedure.
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Even though the prepared trays are relatively expensive, once the mushrooms start coming, each tray provides a large quantity over quite a period of time.

Besides celery and mushrooms, both rhubarb and asparagus can be grown under the bench. Rhubarb roots, potted in the autumn, must have a period of hard frost before being started into growth again. Asparagus roots, planted in tubs or in deep flats, can be put right under the bench in the fall, as soon as their summer growth has been cut down. In the cool greenhouse, rhubarb will have developed stalks tall enough to use in six weeks after being brought in. Watered well and given a mild dose of fertilizer, asparagus can be cut in even a shorter period after being established under the bench. It takes a good many roots of asparagus, however, to produce a fair-sized bunch for the table.

Seedlings for the Vegetable Garden

With the advent of early spring comes the opportunity in the greenhouse to raise vegetable seedlings for the outdoor garden. Many vegetables take so long to mature that it is impossible to get a summer crop by planting seed outdoors after the weather has warmed up. At the proper time, small plants of cabbage, broccoli, and tomato are usually available; but even so, there are advantages to growing one's own. If brussels sprouts, artichokes, okra, eggplant, green and red peppers, or some of the less common vegetables are wanted, it may be necessary to start one's own seedlings in order to have them at all.

One vegetable which takes a long time to mature (at least two and a half months) is the lima bean. Since the seed cannot be planted outdoors until the ground has warmed up, a crop is seldom harvested before the middle of August. In this country, lima bean seedlings are seldom started early under glass. This may be because they can be shipped north from southern truck gardens. In England, however, it is a common practice to grow seedlings for an earlier crop. Since no method of handling quite
preserves the full flavor of fresh picked limas that are plunged immediately into boiling water, it might be well worth while to extend their local season.

Ordering and Timing Seed should have been ordered early in the year when other greenhouse orders have been sent off. Even more important, space must be allotted to the young plants until they are ready to go outdoors or to be planted in a permanent position in a bench. The actual procedure of sowing the seed and caring for the vegetable seedlings is the same as that described in Chapters 3 and 4 for raising flowering plants from seed. One word of caution, though: there is no advantage in planting vegetable seeds too early, for even under glass most of them need the longer days and stronger sun of late spring to develop properly. All of them moreover, transplant best when quite small. In general, those that are hardy should be started six or eight weeks before the last frost in the area; those that are tender, eight or ten weeks before the ground has warmed up enough for them to go out.

When vegetable seedlings are raised at home, not only is it possible to have all that one can use for a fraction of what it would cost to buy them, but with average care they will be far healthier. The commercial grower crowds as many as he can into a flat, with the result that they are often spindly and their roots tangled together. By using plant bands or small individual pots, which are practical for a small number of seedlings, you can eliminate further the shock of transplanting.

Keeping the Family Interested What is more, by starting your own seeds, you can choose varieties best suited to your personal needs or to your family's desires. The large sweet yellow tomato, for instance, offers a welcome addition to the more common red varieties such as 'Marglobe' or 'Ponderosa.' There are also the miniatures—the cherry, plum, and pear tomatoes—both red and yellow, which are delicious in salads, or served with salt or as a sauce.

These suggestions for practical crops by no means exhaust the
possibilities. As with any gardening, indoors or out, it is worth trying any plants that interest you. Common sense as to the practicality in terms of space and season should be the only deterrents. There is a certain satisfaction in adding a useful product to the decorative greenhouse. Often the two objectives can go hand in hand, for no plant is ugly, and many edible plants are grown for fragrance, bloom, or foliage. I have also found that members of a gardener's family, who may not understand at times the fuss being made over a rare orchid or a new fuchsia, can become extremely interested in the day-by-day growth of rhubarb shoots or crisp lettuce leaves.
Enthusiasm for gardening of any sort is likely to wane during the summer months. This is especially true in the hot, dry midseason in the Middle West. There comes a time, usually in July, when almost any activity seems to require a great effort. The one task that rouses me from my lethargy is that of watering down the greenhouse. The satisfaction of keeping this small area moist and humid and the pleasure in the resulting luxuriance of growth have deterred me from ever leaving the greenhouse bare when I am at home during the summer. I may remember ahead of time the inertia that will overtake me when the thermometer hovers in the nineties for days on end, and then I plan to fill the house with material that takes a minimum of care. On the other hand, if catalog descriptions have inveigled me into exotic rarities previously unknown, I am still apt to find that they come along surprisingly well with little attention, when my energy lags. The truth is that it is easy to have a tropical greenhouse during the warm months, no matter at what temperature it is run the rest of the year.

At least two summers out of three, however, I am away for July and August. Having taken care of my permanent plants and made certain preparations for return, I go off without a qualm—or scarcely a qualm—and thoroughly enjoy myself. So in this chapter, I will say something of these two summer possi-
bilities, first describing certain steps that I have found helpful when a vacation is in the offing, and second, giving some idea of the plants which will thrive under shaded glass in the heat of July and August.

**Part-time Operation**

Most of the literature on greenhouse gardening seems to take it for granted that the owner will be on hand the year round to take care of a full cycle of activities. This undoubtedly is the ideal condition. I have been guilty of the same supposition in suggesting the best time to start certain seed, to take certain cuttings, and other such operations. That it is not only possible, however, but abundantly rewarding to operate a part-time greenhouse, I know from experience.

It has already been pointed out that every autumn sees a fresh start in the greenhouse. This is especially true of one run at a cool temperature, but many winter-blooming plants that require a warm house also benefit by a period outdoors in the summer. Few plants, indeed, are best grown under glass during the whole year. That a fresh start by no means implies starting from scratch in September has, I hope, also become apparent. To buy new stock from a commercial grower every year would not only be too expensive for most people, but would defeat some of the most rewarding possibilities of greenhouse gardening. So over a period of years I have worked out ways of growing my own flowers from seed, and of carrying over perennials to bloom more than one season, even when I am not always on hand to take care of them. I count heavily, it is true, on annuals and bulbs that can be started in the fall, but I also force several garden flowers, and have a varied collection of permanent plants which must spend the summer outdoors. I do try to resist plants which need special coddling at this season, but there remains tremendous scope for operation.

**Foolproof Seedlings** Among the seeds that I start in the greenhouse in early spring are some which I have learned will
more or less take care of themselves while I am away. These include some perennials that bloom the first year from seed, and several annuals that are slow to mature. One favorite for this handling is the Jerusalem cherry (Solanum pseudo-capsicum). Seed sown in early March will produce husky seedlings by late May or early June. I choose a place outdoors in the sun for them, working the soil deeply and incorporating compost and a dose of some general-purpose fertilizer. A little bone meal is a good addition, for it releases phosphate so slowly that it is available for months. After the seedlings are planted, they are given careful attention as long as possible. They should not dry out, and as soon as they are well established, top growth should be pinched back to induce good form and more berries. Most important of all, just before I leave, all plants left to grow with no further attention are well mulched with peat moss, buckwheat hulls, or grass clippings. This serves both to keep down weeds and to conserve moisture at the roots of the plants. With this treatment, I return after Labor Day to find the Jerusalem cherries large, healthy plants, their fruit already set and ready to redden in time for Christmas. It only remains to pot and stake them, and find room for them in the greenhouse.

Other seedlings especially successful in this way are vines such as cathedral bells (Cobaea scandens) or the passion-vine (Passiflora). Given early attention in the greenhouse, watered and cultivated for a week or two outdoors before being left, and heavily mulched as a final precaution, they will cover a trellis or fence with healthy growth during the summer. Except annuals which have produced a full quota of seed, such vines can be cut back and brought in to grow again under glass.

The two vines mentioned are old friends, and I have found them extremely versatile. Their foliage is attractive in itself, and lends grace to the winter greenhouse. Both spend the winter comfortably in my house, with the temperature often down to 45°. It is true that they grow slowly during the cold months, but this an advantage, for they inch high enough to soften a
bare north wall, or outline the door to the living room, and it is not good to have the glass covered at that season. When it starts to warm up in the spring, however, their well-established roots lend strength to a veritable burst of luxuriant growth. If the ends of their new leaders are pinched off, they will branch out and cover the whole roof area. This dappled shade is a welcome addition when the house is to be planted during the summer. If not, the vines can be cut back a little, carefully lifted, and grown outdoors. They will bloom the first summer from seed. However, plants can be used for several seasons, and bear more blossoms each year as their roots develop, even though they are cut back to two or three feet in the fall. I have had a first flower on the cobaea as early as January. Both will bloom intermittently from early spring on, even though their full display may wait for warm weather.

*Reseeding Annuals* When one is to be away during the summer, another good source of plants for the September greenhouse is found in the annuals which reseed profusely. Ageratum, nicotiana, larkspur, feverfew, and many other annuals, planted out as soon as possible in spring, will complete their cycle by autumn. The young seedlings found around the mother plant are all ready to be brought in before frost. Even when I am home to start seed of less common material in August, I cannot resist a few of those I mentioned. They will bloom from October to April if faded flowers are removed, and all add to winter bouquets. I have had one plant of sweet alyssum cascade two feet or more over the edge of the bench, almost reaching the ground. And once I kept two large ageratums in a wooden bucket in which they went right on producing a wealth of powder-blue flowers until spring. Plants grown in the outdoor garden for autumn seedlings should not, of course, be heavily mulched, or the seed might not find its way into the ground. This is almost the only reason that mulching is not an advantage.

*Risks and Warnings* It is hard, I must admit, to leave the
Plate 7. A few weeks later, seedlings (above) are ready for transplanting. Angel's trumpet (below) gives the greenhouse a tropical air. (Roche photos)
Plate 8. Orchids—the greenhouse gardener's dream. All except dendrobiums (lower left) and cattleyas, with large ruffled lips, can be grown in coolhouse. Others shown include cymbidiums (across top); cypripediums, with slipperlike pouches; and odontoglossums, in a long spray near left. (Gottschalk-Schlesner photo)
potted plants to the not always tender mercy of the weather. Even when they are plunged up to the rim in a sheltered spot, mulched with peat moss, and those that need constant moisture set in holes lined with an inch or two of peat, there is always danger of damage. I used to take my tender greenhouse perennials to a local nurseryman whenever I went away for any length of time. I would still recommend this when it is practical. As my own collection grew, however, it became too expensive to give them all this luxury. I may pick out half a dozen of the oldest that have been coaxed into top form, and board them out. I have gardening friends who offer in good faith to care for any I will give them, and while I would not burden them with the lot, I may choose a few more, especially any that bloom during the summer, and gratefully hand them over.

Even so, there are many left under the elm tree. I have even learned not to spoil my vacation by worrying about them. I may find, on returning, that without a bi-monthly spraying, leaf-hoppers have found calla leaves to their liking, or that the white fly has discovered the new growth on an azalea, but seldom is a plant lost. They may in general have an uncared-for appearance, and they must be carefully examined for pests, but once brought into the greenhouse, they almost always recover.

One precaution I do take. Whoever is to cut our lawn is carefully instructed to water this group of plants once a week. If the house stands empty and it is a man from the village who comes to mow, this is usually a satisfactory arrangement. If we rent for the summer, on the other hand, I have found that a tenant may promise, and then forget all about it.

Leaving the Greenhouse Bare Although I am pleased when a tenant wants greenery in the benches, and quite willing to start a summer display since this augurs well for the general upkeep of the place, there are actual advantages in leaving the greenhouse bare. When I have stripped the benches, I remove two-thirds of the soil. If I have time or can get some help, I may even take the opportunity to paint the wooden framework,
inside and out, wherever it shows signs of wear. With tools and pots left clean, and all refuse taken out and burned, the dry heat of the summer sun, beating through unshaded glass, seems to do a good job of sterilizing. I have no pests when I return in September, unless I am careless enough to bring in an infested plant.

There is a group of plants more safely left outdoors during the summer than those mentioned above. It includes geraniums, the asparagus ferns, kalanchoës, *Erica*, *Acacia*, and night-blooming cereus, all of which should be given places in the sun, and begonias, *Hoya*, ivies, and foliage plants such as coleus, which require some shade. With the exception of fibrous-rooted begonias and coleus, which are almost indestructible anyway, and easily started anew from slips to boot, it will be seen that this group is made up of plants which naturally can stand some drought. Many of them come from areas where the summers are hot and dry, such as Australia or South Africa. This category is a good one from which to choose material that must be left unattended for any considerable part of the season.

Replenishing In September then, I take stock. After bringing in the permanent plants, and those started in the spring for winter bloom, I can lift seedlings from the flower beds and usually find a few perennials that promise several weeks of bloom. I've already mentioned that large-flowered chrysanthemums must have summer care. I have never managed any other way to have them in shape for anything but possible cuttings at a later date. This is not true of cushion mums, however. These seem to thrive even with neglect, and while they may not be so spectacular as the typical greenhouse varieties, they lend color and gaiety to the autumn benches. There may also be hardy dwarf asters and a Japanese anemone or two in full bloom, suitable to bring in.

If there still is not enough color to suit me, I have only to cross the road and beg a few annuals such as petunias, calendulas, and marigolds from a friend who has been at home all
summer. I believe her when she tells me she is glad to have
them saved from the frost that will soon be coming. By this
time, the greenhouse is usually well filled. More often than not,
there is absolutely no excuse to buy anything, yet I may go off
and get one new treasure for the place of honor in the little
bench.

Tropical Effects in Midsummer

If, then, I can take a summer away in my stride, with what
pleasure I anticipate the full year ahead, when I know that I
am to stay home! My head starts buzzing with plans in Sep-
tember, I revel in the catalogs at the turn of the year and by
late spring every available inch in the benches and on the
shelves is likely to be taken up with seedlings which I antici-
pate caring for individually, right through to maturity. Even
when the heat comes in July, I scarcely give a thought to the
cool mountains of Vermont, or the sights to be seen in Europe.
With windows and doors wide open, the greenhouse becomes
more a part of the house than ever, and forms a fragrant, tropi-
cal passageway between living room and terrace, that has an
appeal even when some of the projects so ambitiously con-
templated are not a complete success.

Using Common Plants Material for a tropical house in July
and August is plentiful and varied without the expense of costly
exotic plants for one season's use. I have already mentioned
filling the benches with a few vines of melon, squash, or cu-
cumber, and letting gourds or the posy bean ramble overhead.
With a few flowers on the shelves, such as ruffled petunias,
verbena, and lobelia, and a few plants of nicotiana and evening
stock for fragrance, especially at night, it is amazing what an
exotic atmosphere is created.

It is interesting to note how many of the ordinary summer
flowers are of tropical or subtropical origin. When their native
conditions are duplicated in the way of humidity as well as
warmth, many of them respond dramatically under glass. The
petunia comes from Argentina, salpiglossis from Chile, and
nasturtiums, ageratum, zinnia, hunnemannia, and leptosyne
from Mexico, for instance. One has to have been in the tropics
when the rains came to fully realize the vital part that moisture
plays in growth. A lesser demonstration, but still one that seems
to verge on the miraculous, is given in the summer greenhouse.
I once came across an article on annuals under glass written by
a famous English horticulturist. He used such adjectives as
“superb,” “magnificent,” and “marvelous” in describing the
performance of such common flowers as salpiglossis and snap-
dragon, and I raised my eyebrows a little, wondering what had
happened to the usual British fondness for understatement.
But when I had tried some of these ordinary flowers myself,
especially in the summer greenhouse, I realized that at least
he had not overstated. It is difficult to realize the potentialities
of all those I have mentioned, when they have only been seen
growing outdoors. Godetia, Nigella, Phlox drummondii, and
indeed almost all of the tender annuals, might be added to
the list.

For Exotic Appearance No matter how satisfactory or truly
tropical many of the common flowers may be under glass in the
summer, some people associate the idea of a tropical garden with
unfamiliar and exotic material. To fill this requirement, noth-
ing could be better than *Datura*. It must have room. Three or
four plants will sprawl over a small bench, filling it with large
dark green leaves from which rise the white angel’s trumpets,
sometimes ten or twelve inches long. These flowers have a faint,
musky fragrance, and although they fade in a day, the plant
blooms in such profusion, once it is established, that there are
always more to take over. They will bloom in summer from
seed, if it is planted as early as possible. Once it is grown, a
better method is to take cuttings of new growth in September
and carry the young plants through the winter in the green-
house. They will not grow very large so long as it is cool, but
once it warms up you can almost see them expanding.
Another source of exotic material, especially of foliage plants, is provided by offering to care for the house-plants of friends who are going away. Various palms and ferns, the unique *Monstera deliciosa*, *Moses-in-the-bulrushes Rhoeo*, the slender miniature trunk and strange deep-cut leaves of a young papaya (*Carica*), cut-leafed philodendron, several bromeliads; all these have been welcome summer visitors in the greenhouse. Nor do I have a qualm in “borrowing” them, for a shady spot under glass will agree with them far better than any porch or outdoor corner. Indeed, there is every chance that after a winter in the dry air of a living room, they actually need a humid atmosphere to make further growth.

**Bulbous Material** Of course any of these can be bought, and then perhaps carried on in the house when the greenhouse becomes too cool for them. If I have money for summer material, however, I am far more likely to use it for bulbs. Not only are most of them as foolproof as those brought into bloom during the winter, but they can be planted out when I am not at home and so preserved to use another time. Or I, in turn, may “lend” them to a friend when I am away. As they increase, I can share them, and still have some when I want them for a summer display. It has always seemed curious to me that gardeners who are willing to dig gladiolus and dahlias in the fall and store the tubers so seldom experiment with the wealth of tender summer bulbous material, satisfactorily handled the same way. To me, many other varieties are far more beautiful, even though not always so brilliant in color.

Tuberous begonias have, it is true, grown in popularity until they are quite common in summer gardens. They do extremely well in a heavily shaded greenhouse. In fact a display of the various types and colors would be anything but monotonous, even if nothing else were grown. The same might be true of gloxinias, or of garden lilies, many of which flourish under glass. Then there is the so-called Peruvian daffodil which is neither Peruvian nor a daffodil, but rightly a spider-lily (*Hy-
menocallis). Two good species for use either indoors or out, are *H. calathina* and *H. caribaea*. These are members of the Amaryllis family, which also gives us *Haemanthus*, *Pancratium*, and *Anthericum*.

**Hot-Weather Care** Having decided what to grow, how does one care for plants under glass during the warm months? The one essential is daily, sometimes twice- or even thrice-daily, watering. Unless it is pouring rain outside, the heat of the sun, no matter what the shading, will dry out the benches and evaporate the moisture in the air sometimes in a few short hours.

Humidity is almost more important than the actual moisture at the roots of the plants themselves. It is often necessary to hose down the whole house as well as to water individual plants. With the nozzle set at a fine spray, glass, rafters, duck-boards, and the ground under the benches can all be sprayed. This not only keeps up the humidity, but reduces the temperature which otherwise could easily rise well over 100°. It is good to have shallow pans of water standing in the house as well wherever there is room for them, but this is never enough in itself. Care must be taken that the actual soil is never waterlogged. The general rules for watering still hold, and there may even be plants which like to almost dry out before being watered again. It is practically impossible, however, to have the air become too humid, so long as it is hot and dry outdoors.

Attention must also be paid to keeping the house as pest-free as possible. Insects in general not only breed more prolifically in a warm house than in a cool one, but during the summer months they find their way in from the garden. It is possible, of course, to screen the inside of the ventilators, but this is difficult, and no protection against many small insects which can come right through any ordinary screen.

The best way of combating pests is to keep up a regular spraying schedule every ten days or two weeks, using some one of the new insecticides designed to kill a variety of insects, although
they are sometimes poisonous and must be used carefully according to directions.

Fungus diseases encouraged by dampness are more difficult to cope with, especially if they are not caught in their initial stages. Luckily, with a few exceptions, including the tuberous begonia and gloxinia, summer hot-house plants are fairly immune. One should be on the lookout, just the same, and at the first sign of mildew or rust, either spray or dust with powdered sulphur. If such a disease persists, the affected plant should be discarded, or at least removed to the dryer outdoor atmosphere in hopes of controlling it there.

The need for shading has already been mentioned. If the first coat of glass wax is put on the overhead glass in April or so, another coat applied in June, including some on the sides of the house as well as the roof, will usually suffice for the season. This is especially true if vines are trained to protect further the plants grown below.

Shading, watering, and spraying for pests, then, are the three main chores in a summer greenhouse. Success depends on them. With this care, however, plants respond with lavish growth. There is no other time during the year when the greenhouse smells and feels so much the way one thinks it should as on a hot afternoon in July, just after it has been hosed down, with water evaporating on the glass so rapidly that one can actually see steam rising. Foliage and soil, as well as flowers, give off a heady fragrance and it is easy to imagine the atmosphere in the rain forests of Brazil.
Since August is proverbially the vacation month, let us consider some of the possible experiences a greenhouse owner may have away from home, if he is on the lookout for them. Whether it is a week-end motor trip or two months in Europe, it is rarely that opportunities will not present themselves.

A glasshouse attracts me as surely as a candle attracts a moth. My husband insists I have some peculiar sixth sense which tells me when there is one in the vicinity. If we are driving and he suddenly points to the left, requiring my attention for some oddity on that side of the car, it will as like as not be an effort to distract me from a greenhouse whizzing by on the right. In a strange city, he knows that I will sooner or later find a botanical garden or conservatory if there is one to be found. And he considers himself lucky if I start a trip without having jotted down the address of some pet nurseryman in the area for which we are heading, a visit to whose establishment will take us only fifty miles or so out of our way.

If there is pleasure for the greenhouse gardener in merely walking through other houses, it is very seldom that there is not profit as well. No other interest or hobby or profession that I can think of is more likely to be beneficially shared. I have learned several helpful tricks in growing geraniums from the owner of a hardware store in Vermont who gives over a huge south display
window to the rambling, twenty-foot branches of one ancient geranium plant in a large tub. I discovered some of the secrets of germinating tropical plants from a young ceramist who was experimenting with them to fill the planters he was turning on the wheel. And I could never pay my debt to the garden store clerks, seedsmen, and commercial growers who have listened cheerfully to my questions and told me, or shown me, the answers. There must be a real interest. Idle conversation won't do. But once a grower of plants, whether he be amateur or professional, farmer, floriculturist, or plain dirt gardener, is convinced you are in earnest, it may become a matter of finding a polite avenue of escape!

Perhaps this tendency—one might almost call it an instinct—to pass on information, has some atavistic connotation. From time immemorial until the last minute fraction of man's long span on earth, handing down such lore from generation to generation often meant the difference between sickness and health, and sometimes the difference between life and death from starvation. In our mechanized, urban-centered civilization, we tend to forget that the culture of plants is as vital today as it was a thousand, five thousand years ago.

Visiting Other Greenhouses

In any event, there is no need to be diffident about visiting other greenhouses, whether you go to buy, to ask advice, or merely to wander around and see what is growing. When it comes to adding to your collection, no description in a book, magazine, or catalog can be as helpful as seeing the actual plants themselves. If you have a plant which is ailing, by all means look up any literature you have on hand on its peculiarities, experiment with cures, send a cutting if possible to your local agricultural station and ask for help. But if there is a grower of that particular plant anywhere near, go to him first. Not only is he likely to solve your problem, but the sight of his healthy plants will spur you on to try again, even if your one
failure may be past recovery. And with no thought of a motive, it is very seldom that one returns from a garden trip without new ideas, fresh knowledge or further ambitions.

**Treasures from Nurserymen**

Once when I was quite far away from home, I saw a double red oleander that so took my fancy that I asked the grower if he had any small plants. When he said that the one in question was his only specimen, but that he would slip it for me, I told him not to bother and forgot all about the experience, until several years later when I was again traveling that way. I stopped at the greenhouse, and what was my amazement to find my oleander waiting for me! The grower had started a slip soon after I left, and it had become almost as large and beautifully in bloom as the parent plant. When I went to pay for it, he smiled at me and said, "Well, you could have had it a couple of years ago for a dollar. It hasn’t cost me anything but a little space and some manure water since. Suppose we say a dollar and a half."

Naturally all nurserymen are not so obliging—nor so un-business-like—as this. There are many who will charge just as much as they think the traffic will bear and others who show little interest unless you are prepared to place a big order. There are busy seasons, when it would be thoughtless as well as useless to expect any grower to give you much of his attention. The week before Easter, for instance, would not be the time to go asking how to raise lilies, nor the week before Christmas a time to ask anything! Nor, alas, do all greenhouses live up to their reputations. Last summer I made a point of visiting one commercial house whose catalog had intrigued me because of the wealth of rare material it contained. I found the plants all there, and many that hadn’t been listed. But in what condition! The outside of every pot was covered with moss. Whole benches were suffering from mildew. Signs of neglect and of pests were so obvious that even the tangled beauty of many species never
seen before could not divert me. I resisted temptation, and came away empty handed.

Orchid Adventure

My first lesson in orchid culture was learned in one of the largest orchid houses in the country, where I had gone in search of a particular species that I had read would do well in a cool house. As I approached past what were literally acres of glass, I found a sign on the main entrance which read, "Members of the Orchid Society of America welcome. All others keep out." I was not only not a member, but the rankest amateur, and I would have retreated had it not been for the fact that the door was open. I couldn't resist poking in my head. There was a man working at a long table, evidently preparing cut flowers for market, and as I saw the wealth of bloom, more orchids than I had ever laid eyes on before, I was inevitably drawn nearer.

"Hello," the man greeted me. "Are you looking for the boss?" I replied in some confusion that I just wanted one plant, a Coelogyne cristata, if they had it. "Oh, we have 'em, all right," he told me, "couple of hundred, I guess. But we only sell wholesale, lady. Sorry." He was so friendly that I screwed up my courage and asked if I could look around. "Sure," he answered. "Go right ahead. Just be careful not to brush against any of them. I'd go with you, but I've got to finish this batch."

With this cheerful permission I started off and it was like stepping into another world. There were several girls and another man or two working along the benches, but they paid no attention to me. The houses were large, wide, and far higher than the ordinary commercial house. Each unit was separated from the next by a door, so that temperature could be controlled. Some were steamy hot, others warm, others quite cool. All the orchids were grown in pots and sometimes there would be a whole house with rows of lush foliage and no bloom. It was those in bloom, however, that fairly took my breath away. Not only cattleyas, lavender, lilac, purple, in every shade and com-
bination, but species and hybrids with long sprays of delicate white, of yellow and chestnut red, of chartreuse and palest cream. Each one was carefully marked, not only the genus and species being given but the parentage when it was the result of a cross. I soon gave up trying to keep the names straight. Some of them were so sweet a whole house was perfumed. Some had curious mottled leaves, others queer, awkward canes that were five feet tall.

Finally I reached the farthest corner, and as I retraced my steps, I stopped once more before a pure white bloom, some ten inches wide, with a delicate frilled lip, that I had decided was my favorite. At this point my admiration got the better of me and I spoke to a man who was working nearby. “That is absolutely lovely,” I announced. He smiled at me and said, “It is, isn’t it? Should be, it’s taken us more than ten years to get that particular hybrid, and it will be ten more before we have any volume for the trade.”

Then he went on to tell me that this was not unusual. Once started, he continued to discourse on his favorite subject. I tried to break away at first, but when I found out he was the owner, and he assured me I was not keeping him from anything important, I forgot my qualms. In fact, I thoroughly enjoyed being shown not only the dozen or more rare beauties that were his particular pride and joy, but the propagating rooms where the powdery seed was started in glass bottles in an agar culture, the rooms of seedlings that would be years coming into bloom and the shipping room where there were great boxes of cut flowers, the stems ingeniously fitted into tiny glass holders filled with water, and fixed into position in such a way that there was no danger of bruising.

By this time I had learned that the present owner’s father had started the collection as a hobby; that it might take another generation to perfect some of the strains being developed; and that thousands of plants were thrown away each year, taken out and put on a compost pile in order to keep the chosen stock
pure and the reputation of the firm intact. Slightly over­whelmed, I murmured that perhaps I had better not try to add to my collection of orchids after all. This would never do! I was told that of course, conditions in a mixed house were not ideal; that the most rewarding orchids couldn’t be raised properly in a cool house at all; but I must certainly not think of giving them up. The Coelogyne I had mentioned was fussy about humidity and he’d suggest another epiphyte. Did I know Odontoglossum grande? He would show me one. It had half a dozen pure yellow flowers banded with brown, on a stem a foot long and I fell in love with it at once.

Not only was I allowed to buy it, but my new friend insisted on taking me to the potting shed to give a demonstration of just how it should be repotted in osmunda fiber when the time came. He used a cull for the exhibit, that is, one of the orchids that was to be thrown away. To my eternal credit let it be said that I neither cringed—nor asked for the plant—as he pulled it out of the pot afterwards and dumped it on a pile on the floor. That in spite of the fact that it had a spray of almost white flowers.

These experiences are chosen at random among many I have had through the years, in my visits to greenhouses. There are few I have not discovered at one time or another, in my own area. On a spring day, or in the autumn when the trees are turning, I may suggest to a friend or two that we take a picnic lunch, and make some nursery farther afield a goal for a day’s expedition. Sometimes they will add goals of their own, a cheese factory, a ceramic kiln, an antique shop, or a museum. Such outings are a fine way to visit, and refreshing breaks at a time when one is almost overwhelmed by the practical side of gardening.

Gardens Abroad

Although no trip nor vacation in this country need lack the experience of viewing a botanical garden, conservatory, or commercial greenhouse, if one is interested enough to look up possibilities, I have had even more rewarding experiences abroad.
There is something in the very nature of travel in a foreign country that makes it easy to include such visits. One is there, more often than not, to explore; to see the countryside as well as the cathedrals and galleries. The growing of flowers reveals much of the people of any country. And the distances are usually so short that an unexpected stop or a detour of a few miles is not likely to disrupt the plans for the day.

How can one really know England without having seen some of those fabulous perennial borders at the height of their summer glory? Or the formal gardens that surround the country houses, so often carefully tended for centuries? A visit to the bulb fields of Holland in the spring when acres and acres of land become shimmering seas of red, yellow, white, and rose is an unforgettable experience as well as a lesson in that country's art, industry, and character. Italian gardens, especially those in the hills around Florence with their ancient cypress, their statuary, their bright beds of annuals, reveal almost as much of the Italian genius as the paintings in the Uffizi Gallery.

**Estates and Botanical Gardens**

All of these opportunities and many more can be arranged by joining groups with a guide. This is sometimes the only way to see private gardens. On the other hand, there are certain famous estates which have visiting hours for the public, and of course all of the great public botanical gardens can be visited at any time. I must admit that I much prefer to explore on my own, or with a few congenial companions. I remember one time in Austria when I saw a greenhouse on a cross-country walk. It was small and unpretentious, but there were some fine primroses showing through the glass and I stopped to look. A little old gnome of a man came out, a gracious smile breaking through myriad wrinkles, and as I answered his "Gruss Gott," I felt at a loss, for I speak no German. His gesture invited me inside and as I went, I struggled to remember a few words for politeness.
sake. "Schön," I said, bending over the primroses, trying to put
some of the peculiar meaning into that word, which it always
seems to have in the voice of a German-speaking person. "Ja, ja,
schön," he repeated, delighted. Then as I looked at the flowers
more closely, I was startled into exclaiming, "Why, you have a
Primula forbesii!" I knew that this delicate plant, with its
whorls of rose-colored airy flowers, was quite rare at least in
the United States, and I was amazed to find it in a mountain
village in Austria. "Primula forbesii," he echoed, even more
pleased and quickly moving to the group which had first at­ttracted my eye, he said, "Primula obconica." We were off. Far
more often than I, it was he who first announced the Latin name
of his treasured plants, but each time I recognized one, I spouted
the name before him. It was a very fine game indeed, and that
old man and I saw exactly eye to eye. He knew I was impre
ssed with everything he grew so tenderly and I knew that he was
amazed to find a stray tourist who understood the slightest
thing about them. By this chance encounter alone, familiarity
with a few Latin names was justified!

It was on the same trip that I visited the Botanischer Garten
in Munich. It happened that we arrived in the city on the first
day of spring. There was little to suggest that soft and promis­ing
season however, in the bare trees, the cold raw air still sweeping
down from the mountains, or the somber war-torn atmosphere
of the city itself. Even the thorough way in which the bombed
out areas had been cleared and the obvious industry of the
people spoke more of recovery from destruction than rebirth.
The year was nineteen-fifty.

I was with three professors of history, one of them my hus­
band, and a Munich student. We had driven over on Hitler's
Autobahn, reminiscent in its modern efficiency of the Pennsyl­
vania Turnpike, from the ancient town of Salzberg in Austria,
where the three professors were teaching in an international
seminar. With the terrible recent past at their fingertips, and
its impact a matter of tragic personal experience on the part of the student, our three days' stay in the city that had been Hitler's headquarters was a unique and thought-provoking—if not exactly happy—experience. It was merely to satisfy a whim on the part of the "Frau Professor," an obviously frivolous waste of several hours of our limited time from the point of view of Hans, our young guide, that we went to the conservatory at all.

And yet, at least to me, the magnificent glasshouses had much to say of Munich, of the German people, and of life itself. Happily out of the range of Allied bombers, or else miraculously preserved by chance, the buildings remained intact, their collections obviously well cared for even during the war years. They were crowded with people, of many types and all ages, who had come just as we had, to pay their 60 pfennigs and be routed through the big central pavilion with its towering bamboos and ancient palms, in and out of the long side houses, to see the orchids, a fascinating series of water plants in tanks, and the crowning exhibit, a riot of spring color: azaleas, cineraria, amaryllis, mimosa. Returning to the entrance, we passed through a large house with nothing but ferns, planted among rocky ledges in a naturalistic setting that time had softened into an illusion of reality.

Most people were hurrying by, having seen the spring show, but with a sudden overwhelming realization of the actual reality which had occupied our last few days, I fell behind the others, lingering in the fern house. I thought of myself very definitely as not an historian. I was reluctant, I realized, to return to the outer world. Yet what is history? What, reality? The descendents of one of the ancient forms of life, brought from all over the world, grew and flourished all around me. There were giant tree-ferns with ten-foot fronds uncurling, and there was the delicacy of maidenhair. I don't know when I have been more impressed either with the thought of world-wide space as a unit of nature, or of time as one of her integral dimensions. The beauty of form, the infinite variety, a little knowledge of the
part these living plants had played in the evolution that led to fruiting tree and flowering vine combined to revive my spirit. I finally went out to join my companions, ready to face again the ruin, the confusion, the bewilderment in the immediate man-made world.
ABBREVIATIONS

USED IN THE APPENDICES

(The common abbreviations for inches and feet and for the months of the year need no explanation.)

A, annual; C, cool start for seed; da. germ., number of days required for seed to germinate; ev., evergreen; fam., family; fls., flowers; H, hardy; HH, half-hardy; lvs., leaves; mo., month(s); P, perennial; p. m., potting mixture; prop., propagation; rt. per., rooting period; sum. tr., summer treatment; T, tender; var., vars., variety, varieties; W, warm start for seed; win. tr., winter treatment; wks., weeks; yr(s), year(s); yrs. vi., number of years seed is viable.

NOTE: Latin names in parenthesis are names (other than the accepted ones) by which the plants are sometimes offered for sale.
APPENDIX A

BULBS FOR WINTER
OR SPRING BLOOM

The more familiar greenhouse bulbs, tulips, narcissus, amaryllis, and the like, certainly offer a wealth of material, added to each year by new hybrids. Because of the pleasure, however, which comes from bringing the more unusual bulbous plants into flower, many in that category are here listed. Since most of them need to take up no space in the sun until after Christmas, and then can be brought into growth at intervals, there is little danger of starting too many. Add to this their decorative quality as house plants and the fact that they make ideal gifts, and only the cost need deter one from ordering. Space in the sun after blooming is another matter, but if foliage is allowed to mature, the majority of bulbs can be used another season, either indoors or out. Most bulbs need little or no fertilizer until the flower appears, at which point a dose every two weeks while the foliage ripens will aid the development of next year’s bulb.

ALBUCA (Lily fam.), S. Africa. A. aurea, yellow; A. crinifolia, A. nelsonii, white; 3 ft.; bloom spring into summer. Pot Sep.–Feb., one bulb to 6-in. pot or 3 in 12-in. pot; set bulb high, \( \frac{1}{2} \) above soil; sun; related to Ornithogalum and of similar culture. (HH; p. m. 3; rt. per. 2–4 wks. in coldframe in fall or under bench, cool; sum.

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tr. after bloom, let foliage ripen, then dry and store bulbs in dry sand in dark; prop. by offset.)

AMARYLLIS, amaryllis (Amaryllis fam.), Mexico, West Indies, and trop. America. *A. belladonna*, *A. reginae*, *A. vittata*, many hybrids; white, shades of red, red-and-white-striped; 3–4 ft.; bloom erratic but usually Jan.–Mar. Use pot only 1 in. wider than bulb, with 1/3 of bulb exposed; fls. best when root-bound; rest period (in cool house) Sep.–Jan. so best potted Jan.–Feb.; does not need repotting for several yrs., until roots almost grow out of pot; from Jan. on water and fertilize regularly; 65° will bring fls. sooner, but will bloom in cool house. (T; no dark necessary for rt. per.; sum. tr. out in shade, during which time foliage matures and should be syringed and watered until there are signs of yellowing; some bulbs tend to be ev. but should be given dry rest period by Sept.; prop. by division of bulb.)

ANEMONE, wind-flower (Buttercup fam.). *A. hortensis*, *A. coronaria*, *A. fulgens* (all from S. Europe), many hybrids, varicolored, 10–18 in., bloom for 6–8 wks. Jan.–Mar. according to when started. Pot Sep.–Nov., tubers with pointed side down, 1 in. deep. 6–8 to 6–8-in. shallow pot, treating first with disinfectant; can also be planted directly in bench; must have sun, good drainage, and fresh air daily for good bloom; grow cool throughout. (HH; p.m. 4; no dark necessary for rt. per.; sum. tr. as for *Albuca*; prop. by offset or seed, C, da. germ. 15, sown spring or fall.)

ANTHOLYZA, "Aunt Eliza"—see Chasmanthe, Curtonus.

BABIANA, baboon flower (Iris fam.), S. Africa. *B. stricta*, varicolored, 8–10 in.; bloom Jan.–Mar. according to when planted. Culture like that for freesia. (HH; p.m. 3; rt. per. 2–4 wks. at 45–55° under bench or in coldframe; sum. tr. as for freesia; prop. by offset or sow seed in June for bloom in 7–8 mo.)

BRODIAEA—see Ipheion, Dichelostemma, Triteleia.

CALLA LILY—see Zantedeschia.

CHASMANTHE (Iris fam.), S. Africa. *C. aethiopica*, (Antholyza aethiopica) red-yellow, to 4 ft.; bloom in spikes, Apr.–May. Pot. Nov.–Jan., 6–7 corms in. 8–10-in. pot or grow in small flat (best for cutting), cover with 1 in. soil; stake at 7–8 in.; sun, moisture, and weekly feeding in active growth. (T; p.m. 3; rt. per. 2–4 wks. under bench, on dry side until top growth appears; sum. tr.
as for *Albuca*; one authority states that corms can be started into growth any time after a 3-mo. dormant period; prop. by offset, many new corms each yr.)

**CHIONODDXA**, glory-of-the-snow (*Lily fam.*). *C. luciliae*, blue with white center, *C. sardensis*, blue (Asia Minor); 3–6 in. Culture throughout like that for crocus.

**CLIVIA**, Kafir lily (*Amaryllis fam.*), S. Africa. *C. miniata* and hybrids, shades of scarlet, orange, yellow, ev. foliage 3 ft. with even wider spread, flower-scape to 4 ft.; bloom erratic as with all amaryllids, usually between late Jan. and early Mar., the umbel having 10–20 long-lasting, slightly fragrant fls.; attractive plant year around. Pot snugly with bulb-like swellings at base of lvs. above soil; fls. best when pot-bound; shade from noon sun even in winter, or foliage will burn. (T; p. m. 3; dark unnecessary for rt. per.; once established, do not let lvs. die down, giving enough water during rest period, Nov.–Jan., to keep them healthy; sum. tr. out in shade, with plenty of moisture and syringing of lvs. prop. by offset.)

**CROCUS** (*Iris fam.*), Mediterranean to southwestern Asia. *C. vernus*, common crocus, *C. sativus*, saffron crocus, *C. imperati*, and hybrids; clear and triped forms in white, yellow, purple, blue; 2–8 in. Pot Sep.–Oct., 8–10 corms in 5–6-in. shallow pot, barely covering with soil; successful in greenhouse only if given cool treatment throughout, and left in dark for full rt. per., even if top growth has started; then gives fine bloom, late Jan. through Mar.; must have sun, steady supply of moisture while in growth. (H; p. m. 3; rt. per. at least 10 wks. in dark and cold, in coldframe, root-cellar, or buried in trench outdoors, covered with straw or peat with dirt on top; sum. tr. never use same bulbs to force twice; can be used outdoors, if foliage is matured after bloom; a healthy outdoor clump may be dug after foliage dies in late spring, the largest stored in cool place until fall for greenhouse use, the rest replanted, but the easiest method is to buy new top-size bulbs each yr.; prop. by offset, only suitable for outdoor use if from potted plants.)

**CURTONUS** (*Iris fam.*), S. Africa. *C. paniculata* (*Antholyza paniculata*), red-yellow, to 4 ft.; for culture see Chasmanthe.

**CYCLAMEN** (*Primrose fam.*), Mediterranean. *C. persicums*, many hybrids, single and double forms in white, pink, red; to 12 in. Pot Sep.–Oct., one corm to 6–7-in. pot with top above soil; subject
to rot, good drainage essential; best watered from below; must have
cool treatment throughout; fls. follow one another, many open at
same time on mature plant over long period Dec.–Apr.; foliage at-
tractive; spray for cyclamen mite. (T; p. m. 4; no dark necessary
for rt. per.; sum. tr. when foliage yellows dry gradually and store
in pot, on its side, in shade.)

DAFFODIL—see Narcissus.

DICHÉLOSTÈMMA (Lily fam.). *D. pulchellum* (*Brodiaea
* capitata*), blue dicks (western U. S.), blue-violet, to 24 in.; long
shallow pot, barely cover with soil; sun and good drainage impor-
tant. (HH; p. m. 3; rt. per. 8–10 wks. 40–50°; sum. tr. dry in cool
place; prop. by offset.)

FREESIA (Iris fam.). S. Africa. *F. refracta*, “*F. hybrida*,” many
named varieties; varicolored (white the most fragrant); 12 in. Pot
in early Aug. for Christmas bloom, to late Sep. 6–10 corms in 8–10-
in. pot, or grow in small flat; needs staking; not attractive plant but
fils. excellent for picking and fragrance; must have cool, moist treat-
ment throughout. (HH; p. m. 3; rt. per. 2–4 wks. at 45°; sum.
tr. after bloom allow foliage to ripen, dry gradually and store in
pot, in sun; repot in fall.)

GALANTHUS, snowdrop (Amaryllis fam.), Eurasia. *G. nivalis*,
common snowdrop; *G. byzantinus*, *G. elwesii*, white and green;
7–18 in. Culture throughout like that for crocus.

HIPPEASTRUM—see Amaryllis.

HYACINTHUS, hyacinth (Lily fam.). *H. orientalis* (E. Medi-
terranean) and many hybrids; white, blue, pink; 6–12 in.; in bloom
3–5 wks., Feb.–Apr., earlier with pretreated bulbs. Pot in Oct.,
1 bulb to 4- or 5-in. pot, barely cover with soil; can be grown in
water and discarded after bloom, if bulb is suspended just above
water; do not give sun until flower-stalk is well up, to prevent
stunted bloom; giant exhibition bulbs best for greenhouse; fra-
grant. (H; p. m. 3; rt. per. 8–10 wks. in cold, pretreated bulbs can
be started under bench; sum. tr. as for tulip; prop. by offset, best
to buy commercially raised bulbs.)

IPHEION (Lily fam.), Argentina. *Ipheion uniflorum* (*Milla
uniflora*), spring star-flower, white, tinged blue, 8 in. For culture
see *Dichélostemma*. 
IRIS (Iris fam.). A huge and widespread genus complicated by hybridization. Bulbous iris, the so-called Dutch, English, and Spanish, with many named vars. (e.g. 'Wedgewood'), are here considered, as well as the early spring dwarf iris such as *I. recticulata*. Many rare tender species also make good subjects for the cool greenhouse; varicolored, 4 in. to 4 ft. Individual needs usually given by nurserymen; bulbous iris can be planted in pots or in flats, and makes a colorful display from late winter to spring; also good for cutting. (H, HH, T according to var.; p. m. 3; rt. per. 8–10 wks. under bench for bulbous iris, rhizomatous iris needs no rt. per. in the dark; sum. tr. according to variety: bulbous, rest period dry in pot or flat; rhizomatous, often ev. in cool greenhouse; prop. by offset, division, and seed.)

IXIA (Iris fam.), S. Africa. *I. campanulata*, *I. maculata*, crimson or yellow, with named vars.; *I. viridiflora*, a curiosity with green flowers; 12–18 in.; bloom Mar.–Apr. Pot in Sep.–Oct., 4–7 corms in 5-in. pot, cover with 1 in. soil; be careful not to overwater while rooting; can be kept outdoors until black frost threatens; weak stems need support; long period of bloom. (T; p. m. 3; rt. per. 12–14 wks. at 40–50°; sum. tr. after foliage has matured, dry in pot; prop. by offset.)

LACHENALIA (Lily fam.), S. Africa. *L. pendula*, *L. tricolor* (including vars. *nelsonii* and *aurea*), yellow, orange, or red, 12–18 in. Pot. Aug.–Sept. for bloom Dec.–Feb., 4–5 bulbs in 5–6 in. pot; sun and moist while in active growth; *L. pendula* a good basket plant; long period of bloom. (T; p. m. 3; rt. per. 2–4 wks, under bench; sum. tr. store dry in cool place; prop. by offset; seed takes 3 yrs. to bloom.)

LEUCOCORYNE, glory-of-the-sun (Lily fam.), Chile. *L. ixioidees*, blue or white, 12 in. Culture throughout like that for freesia.

LEUCOJUM, snowflake (Amaryllis fam.), Europe. *L. vernum*, *L. aestivum*, white, green-tipped, 9–12. Pot Sep.–Oct., 4 bulbs to 7-in. pot; fls. first appear at soil level and grow up to full height, long in bloom; culture in general like that for crocus. (H; p. m. 3; rt. per. 8–10 wks. cold; sum. tr. save after maturing foliage to plant out.)

LILIUM, lily (Lily fam.), mostly from North Temperate Zone. Among garden lilies *L. auratum*, *L. candidum*, *L. japonicum*, *L.
rubellum, *L. brownii*, *L. hansonii*, and the 'Rainbow,' 'Chalice,' and 'Henryi' hybrids are recommended for forcing in a cool house; varicolored, 6 in. to 4 ft.; bloom early spring to summer. Lilies especially need disinfection before potting, and should be planted as soon as possible after being dug; usually delivered Sep.–Nov.; keep on dry side until top growth appears, then steady supply of moisture as lvs. develop; plant fairly deep in tall pot; bloom in cool house, 2–6 wks. earlier than outdoor date. (Mostly H; p. m. 4; rt. per. cool, under bench, 10 or more wks.; sum. tr. plant out right after flowering; prop. by offset or bulbils to buy top-size bulbs for forcing.)

MILLA—see *Ipheion*.

MUSCARI, grape hyacinth (Lily fam.). *M. comosum* (Mediterranean) and hybrids; blue, white, pink vars., 4–8 in. Pot Sep.–Nov. for bloom Jan.–Mar.; culture throughout like that for crocus, except that it may take a little longer to flower.

NARCISSUS, including daffodil (Amaryllis fam.), mostly European. Trumpet vars. from *N. moschatus* and *N. poeticus* best for forcing; *N. tazetta* 'Paper White,' 'Soleil d'Or,' Chinese sacred lily easiest of all bulbs to force; dwarf forms such as *N. bulbocodium*, hoop-petticoat daffodil, and *N. triandrus*, angel's tears, are well worth trying in cool house. Pot Sep.–Oct., 4–5 bulbs on large vars., 6–8 of miniatures to 6–7-in. shallow pot; *N. tazetta* can be potted in pebbles or vermiculite; the one bulb not bothered by mice; start into growth at 2-wk. intervals for succession of bloom; home-dug bulbs (using only largest in clump) can be started in Aug. with correspondingly early bloom; general culture like that of tulip. (Mostly H; p. m. 4, using bone meal but no manure; rt. per. 8–10 wks. cold; sum. tr. save for outdoors after foliage ripens; prop. by offset but use only top-size bulbs for forcing.)

NERINE (Amaryllis fam.), S. Africa. *N. sarniensis*, Guernsey lily, with hybrids, crimson, 12 in.; *N. curvifolia* var. *fothergilli*, scarlet, 12–14 in.; potted in Oct., should bloom for Christmas; can be brought into bloom almost any time, after 4–5 mo. rest period; lvs. usually follow flower-spike, and must be matured. Pot 3 bulbs in 5-in. pot, with top of bulb showing; give plenty of water and fresh air daily. (T; p. m. 3 + peat; rt. per. unnecessary, start in light; sum. tr. store dry in pot on its side, in sun; prop. by offset.)

ORNITHOGALUM, chinkerinchee (Lily fam.), S. Africa. *O.
oxalis (oxalis fam.). o. pes-caprae, bermuda buttercup, yellow; o. bowiei, rose-purple; o. hirta, rose (these from s. africa); o. peduncularis (s. america), yellow-orange; 6-12 in. pot sep.–oct., 6 to 6-in. shallow pot, 1 in. deep; on dry side till top growth starts; of easiest culture, multiply so rapidly that they can be a nuisance once started in the bench; ideal for hanging baskets, with long period of bloom; fls. open a.m., close p.m. and on gray days. (t; p. m. 3; no dark necessary for rt. per.; sum. tr. dry in sand; prop. by many offsets.)

ranunculus (buttercup fam.). r. asiaticus (eurasia), with hybrid forms called persian, french, turban, and peony-flowered; shades of cream, yellow, orange; 18 in. culture throughout like that for anemone.

scilla, squill, bluebell (lily fam.), eurasia. s. sibirica; s. hispanica (campanulata); s. nonscripta, the bluebell of england; blue, white, and pink, 6-18 in. culture throughout like that for crocus, except best potted 5–6 to 6-7-in. pot.

sparaxis, wand-flower, harlequin flower (iris fam.), s. africa. s. grandiflora with hybrids including ‘bloem erf’; s. tricolor, yellow, purple, rose, red, 12-18 in. culture throughout like that for ixia.

triteleia (lily fam.). t. ixioides (brodiaea ixioides), pretty face (western u. s.), salmon streaked with dark purple, 10-18 in. culture throughout like that for dichostemma.

tulbaghia (lily fam.), s. africa. t. fragrans, t. violacea, lavender, 8–20 in. pot almost any time to bloom 6–8 wks. later; most effective, 3–4 rhizomes in 8-9-in. pot; long period of bloom, 2-3 mo., and several times a year; ev.; foliage of t. violacea with slight garlic odor, of possible use for flavoring. (t; p. m. 3 + leaf-mold or peat; rt. per. 2–3 wks, under bench; sum. tr. on dry side in shade; prop. by offset.)

tulipa, tulip (lily fam.), western asia. garden tulips mostly
the result of centuries of hybridization; early single and double forms, 'Mendel' and 'Triumph' vars. best for amateur forcing; the small "species" tulips interesting to grow, with success dependent on even cool temperature in greenhouse; 6 in. to 2 ft. Pot in Oct., 4-8 bulbs in 6-10-in. pot for garden vars. 6 to 6-in. pot for species; water once well, then only enough to keep soil from drying out until tips appear; if pots are sunk in peat, they will stay damp enough; must have full rt. per. in cold; can be brought in every 2 wks. for succession of bloom; give sun, fresh air, perfect drainage but plenty of water during top growth. (H; p. m. 4; rt. per. as for narcissus; sum. tr. allow foliage to ripen, then store dry in cool place for use outdoors; prop. by offset but best to buy fresh top-quality bulbs for forcing.)


VELTHEIMIA (Lily fam.), S. Africa. *V. viridifolia*, red with greenish tips, low foliage in attractive basal circle, lvs. crimped and ruffled, flower-stalk 2 ft.; bloom 3 wks. or longer in late winter. Culture like that for *Amaryllis*.

ZANTEDESCHIA, calla lily (Arum fam.), S. Africa. *Z. aethiopica*, common florists' calla, white, 18–30 in.; *Z. callianthus*, yellow, 7–10 in.; *Z. rehmannii*, pink or red, 15 in.; other hybrids. Pot Aug.–Oct., one tuber to 7–8-in. tall pot, cover with 1 in. soil; water copiously throughout growing period and give fertilizer once a wk. until bud forms; bloom Jan.–Mar.; fls. fragrant and long-lasting; old tuber may have 3 in succession; repot Aug.–Sep. (T; p. m. 4; rt. per. 6–8 wks. under bench; sum. tr. out in shade with plenty of moisture; prop. by offset.)
APPENDIX B

ANNUALS FROM SEED

Two main categories are represented in this list: annuals for the outdoor garden which must have an early start in the greenhouse for summer bloom, and annuals which give a good performance in the benches at various seasons of the year. A few perennials which will bloom the first year from seed are included. Plants grown from seed provide the expendable material both under glass and outdoors. Each year, each season in the greenhouse, offers the opportunity to try new species. This list no more than suggests the variety possible in color, height, form, and use as cutting material. For explanation of the abbreviations used throughout the list, see page 134.

AGERATUM, floss-flower (Daisy fam.). *A. houstonianum* (Mexico), lavender blue; T; 18–24 in., dwarf forms 4–9 in. Sow Aug.–Sep. for greenhouse bloom in 3–4 mo., Mar. for outdoors; will bloom for months in greenhouse; good for cutting; self-sows outdoors, providing greenhouse seedlings in fall. (W; 10–12 da. germ.; 4 yrs. vi.)

ALONSOA, mask-flower (Snapdragon fam.), Peru. *A. warscewiczii* (*A. compacta, A. grandiflora*), scarlet; *A. acutifolia*, vermilion; to 36 in.; tender. Sow Aug.–Sep. for greenhouse bloom by Christmas, late Feb.–Mar. for outdoors; does not like heat; tends to sprawl; pinch when young and stake. (C; 12–15 da. germ.)

ANCHUSA, bugloss (Borage fam.). *A. azurea* (*A. italica*) (Mediterranean), bright blue, to 5 ft.; P treated as A. Sow Feb.–Mar.
for outdoors; good for back of border. *A. capensis* (S. Africa), bud red, open fl. blue, 18 in.; biennial treated as A, long season of bloom. Sow seed Aug.–Sep. in pots for bloom in greenhouse in 3 mo.; as above for outdoors. (C; 14–20 da. germ.; 3 yrs. vi.)

**ANTIRRHINUM**, snapdragon (Snapdragon fam.). *A. majus* (Mediterranean), many named vars., many colors; P grown as an A to 5 ft., dwarf forms 6–8 in. Sow in June for fall and winter greenhouse, Feb. for outdoors; pinch top at 4–6 in. to induce branching; does not like heat; seed very fine. (C; 10–15 da. germ.; 3–4 yrs. vi.)

**ARCTOTIS**, African daisy (Daisy fam.). *A. stoechadifolia* (*A. grandis*) S. Africa, white with lavender on under side of petals, 18–20 in.; T. Sow in Sep. for greenhouse bloom in 4 mo., Mar. for outdoors; foliage downy-white; excellent for cutting; tolerant of poor soil and drought; pest-free. (C; 10–12 da. germ.)

**ASTER**—see *Callistephus*.

**BABY'S BREATH**—see *Gypsophila*.

**BALSAM**—see *Impatiens*.

**BRACHYCOME**, Swan River daisy (Daisy fam.), Australia, *A. iberidifolia*, blue, white, rose, 8–18 in.; T A; showy but short season of bloom. Successive sowings every 2 wks. from Mar. for outdoors, Aug.–Oct. for greenhouse bloom in 3 mo. (C or W; 10–15 da. germ.; 3–4 yrs. vi.)

**BROWALLIA** (Potato fam.), S. America. *B. speciosa* (*B. major*), blue; *B. viscosa*, blue; *B. americana* (*B. elata*), blue or amethyst; 10–20 in.; first species best for greenhouse. Sow in July for bloom in 4–5 mo., Feb. for outdoors, planting out as soon as possible; does not transplant well; grow in pots; pinch at 6 in. (All T except *B. viscosa* H; C; 25–40 da. germ.; 2–3 yrs. vi.)

**CALENDULA** (Daisy fam.). *C. officinalis* (S. Europe), many hybrids, orange, yellow, apricot; 12–24 in.; T. Sow Aug.–Sep. for greenhouse bloom in 2–3 mo., Mar.–Apr. for outdoors; fall seedlings can be kept in coldframe until hard frost; cut fls. last well. (W or C; 6–10 da. germ. 5–6 yrs. vi.)

**CALIFORNIA POPPY**—see *Eschscholtzia*.

**CALLISTEPHUS**, China aster (Daisy fam.), China and Japan. *C. chinensis*, many named vars. and hybridized strains, all colors but yellow, 10–24 in.; T; good fl. for summer greenhouse, difficult outdoors in hot dry situations. Sow in Mar. for either use.
CANDYTUFT—see Iberis.
CAPE MARIGOLD—see Dimorphotheca.

CELOSIA, cockscomb (Amaranth fam.). C. argentea var. cristata (probably Asian), many named hybrids, red, magenta, white, yellow, bronze, etc.; to 40 in., dwarf 12 in.; recently introduced hybrids a far cry from grotesque originals; lend an exotic touch to summer greenhouse or garden. Sow seed in Mar. for either use (W; 6-10 da. germ.; 4 yrs. vi.)

CHINESE FORGET-ME-NOT—see Cynoglossum.

CHRYSANTHEMUM (Daisy fam.). C. parthenium (Europe) and hybrids (Matricaria parthenoides, M. capensis, etc.), feverfew; white and yellow, single and double forms, 12-30 in.; P treated as A, long period of bloom, good for mixed bouquets. Sow in Aug. for greenhouse bloom in 4 mo. or lift self-sown seedlings from garden, in Feb. for outdoors; attracts white fly so should be sprayed every week or so. (C; 14-21 da. germ.; 2-3 yrs. vi.)

CINERARIA—see Senecio.

CLARKIA (Evening Primrose fam.), western N. America. Many hybrids of C. elegans and C. pulchella, single and double forms, wide color range, to 25 in.; H. Sow in Jan. for bloom May-Sep. in greenhouse, in Mar. for outdoors; long-flowering; likes cool nights; blooms best if slightly crowded. (G; 7-14 da. germ.; 2-3 yrs. vi.)

COCKSCOMB—see Celosia.

COLEUS (Mint fam.). C. blumei var. verschaffeltii (Java), multi­shaded foliage plant, to 24 in.; tender; C. thyrsoides (Cent. America), perennial treated as an annual, with racemes of brilliant blue fls. Sow seed of the foliage plant in Sep. for greenhouse, in Mar. for outdoors; sow C. thyrsoides in Mar. for bloom in Dec.; both are also easy from cuttings of new growth, with warmth. (W; 10-20 da. germ.; 2 yrs. vi.)

CUPHEA (Loosestrife fam.). C. ignea (C. platycentra) (Mexico), red, 8-15 in.; C. micropetala (Mexico), red and yellow, to 24 in.; T. Sow Aug.–Sep. for bloom in greenhouse in 3-4 mo., Feb.–Mar. for outdoors; tends to be everblooming if dead fls. are picked; may be slow to germinate; semishade in summer. (W; 8 or more da. germ.)

CYNOGLOSSUM (Borage fam.). C. amabile (E. Asia), Chinese forget-me-not, and hybrids, blue and white forms, to 24 ft.; biennial

DAHLIA (Daisy fam.), Mexico. Unwin hybrids (dwarf), varicolored, 12–18 in.; excellent bench or garden flower, blooming in 3–4 mo. from seed; tubers may then be saved if desired; plant Aug. or Feb. for greenhouse, Feb.–Mar. for outdoors. (W; 7–10 da. germ.; 2–3 yrs. vi.)

DATURA (Potato fam.), . D. suaveolens (Mexico), angel’s trumpet, white, 3–5 ft.; P treated as A; although T, will self-sow outdoors seedlings appearing with warm weather. Sow in Feb. for summer bloom in 4–5 mo. either in or out; needs room, 3–4 sq. ft. to a plant; spectacular under glass with trumpets 6–8 in. wide. (W; 15–20 da. germ.; 3–4 yrs. vi.)

DELPHINIUM, larkspur (Buttercup fam.), D. ajacis (Europe), many named vars., pink, purple, white, 3–5 ft. Plant in Sep. or as soon as nights are cool for winter greenhouse; best planted out where wanted in fall or spring; good bench plant; excellent for cutting. (C; 20–28 da. germ.; 1–2 yrs. vi.)


DIANTHUS (Pink fam.), D. caryophyllus (Eurasia), carnation, many hybrids, wide range of colors. P usually renewed annually for good bloom in 6–8 mo. from seed or from cuttings of vigorous growth taken Nov.–Feb., planted outdoors during summer and benched in Sep. for bloom Oct.–May; must have cool even temperature, 50° at night, 60° during the day ideal; many plants needed to produce average supply for cutting; in small house, a few plants add fragrance and occasional fls. for mixed bouquets. (W; 5–15 da. germ.)

DIDISCUS—see Trachymene.

DIMORPHOTHECA, Cape marigold (Daisy fam.), S. Africa. D. pluvialis (D. annua), white, yellow, orange, 8–14 in.; perennial treated as a hardy annual; good in pots. Sow Aug.–Sep. for bloom in 3 mo. in greenhouse, Mar.–Apr. for outdoors. (C; 15–21 da. germ.; 1 yr. vi.)
ESCHSCHOLTZIA, California poppy (Poppy fam.), western N. America. E. californica, shades of yellow, 12-20 in.; T; with sun, gives long season of bloom. Sow Aug.–Sep. for greenhouse bloom in 3 mo.; best planted where wanted outdoors. (C; 10–12 da. germ.; 2 yrs. vi.)

FEVERFEW—see Chrysanthemum.

FIG-MARIGOLD—see Mesembryanthemum.

FORGET-ME-NOT—see Myosotis.

GODETIA, satin flower (Evening Primrose fam.), western N. and S. America. G. amoena (including G. grandiflora), G. bottae, white and shades of red, 8–30 in.; tall and dwarf vars. T; good for cutting; stands crowding. Sow in Sep. for greenhouse bloom in 3 mo., Mar. for outdoors; better germination with cool start. (W or C; 5–18 da. germ.; 2 yrs. vi.)

GYPSOPHILA, baby’s breath (Pink fam.), Eurasia. G. elegans, named vars., white or pink, to 18 in.; H; excellent for cutting, one of the quickest annuals to come into bloom, 5–7 wks. from seed, but in flower only 2–3 wks. Successive sowings for long season of bloom. (W; 5–14 da. germ.; 4 yrs. vi.)


HUNNEMANNIA, golden cup (Poppy fam.), Mexico. H. fumariaefolia, yellow, 12–20 in.; perennial treated as a hardy annual; attractive blue-green deeply cut lvs.; needs sun for good bloom. Sow in Aug. for greenhouse bloom in 4 mo., in Mar. for outdoors; in pots as roots are brittle; needs 86° for best germination. (W; 12–20 da. germ.; 2 yrs. vi.)

IBERIS, candytuft (Mustard fam.). I. amara (Europe), white, 12 in.; I. umbellata (Mediterranean), pink, lilac, violet, 8–15 in.; H; bloom in only 6 wks. from seed; bloom well if watered copiously and dead fls. picked. Sow any time there is sun for young seedlings for greenhouse; where wanted outdoors. (W or C; 5–7 da. germ.)

IMPATIENS, balsam (Balsam fam.). I. balsamina (trop. and subtrop. Asia), single and double vars., white and varicolored; T. Sow Sep. or Feb. for greenhouse bloom in 6 wks.; where wanted
outdoors; keep moist for good bloom. (C; 8–14 da. germ.; 2–3 yrs. vi.)

LATHYRUS (Pea fam.). *L. odoratus* (Italy), sweet pea, many hybrid strains, varicolored, 4–9 ft.; H; needs full sun and ventilation; do not pinch. Sow in Sep. for greenhouse bloom in 3 mo. (best to get florist’s winter-flowering strains if possible); in pots in Feb. for early bloom outdoors; need support, best grown on trellis or with strings. (C; 9–14 da. germ.; 5–6 yrs. vi.)

LINARIA, toadflax (Snapdragon fam.). *L. maroccana* (Morocco) and hybrids, purples and reds, to 12 in.; fragrant H A, needs support. Soak seed before planting in Sep. or Jan. for greenhouse, Feb. or where wanted for outdoors; cannot stand heat; 2 mo. to flower, longer in winter. (C; 14–28 da. germ.; 2–3 yrs. vi.)

LOBULARIA, sweet alyssum (Mustard fam.). *L. maritima* (Mediterranean); winter-blooming variety known as *L. benthamii* or *Alyssum benthamii*; white or lavender, 6–12 in.; P treated as A; both will bloom all winter in cool house; good for hanging baskets, edging benches, small bouquets. Sow July–Sep. for greenhouse, or bring in self-sown seedlings from garden before frost; Feb. or where wanted for outdoors, 4–5 mo. to fl. (W; 10–20 da. germ.; 3–4 yrs. vi.)

MARIGOLD—see *Tagetes*.

MASK-FLOWER—see *Alonsoa*.

MATTHIOLA, stock (Mustard fam.). *M. incana* var. *annua* (Europe), 10-week stock, good for small greenhouse; varicolored, 2–4 ft.; 4–6 flower-spikes to a plant; fragrant; likes cool weather. Sow in Sep. for bench, Mar. for outdoors; fls. in 10 wks.; taller florists’ varieties take longer to flower, have only one spike, and may grow to 5 ft. under glass. (C; 10–20 da. germ.; 2 yrs. vi.)

MATRICARIA—see *Chrysanthemum*.

MESEMBRYANTHEMUM, fig-marigold (Carpet weed fam.). *M. bellidiforme* (*M. criniflorum*), varicolored; *M. pomeridianum*, yellow (both from S. Africa); 6–8 in.; T; need sun, heat, good drainage. Sow in Mar. for bloom in greenhouse or outdoors in 4 mo.; *M. bellidiforme* makes excellent edging or basket plant for summer greenhouse. (The genus has been divided into several, but for convenience the older names are here retained.) (W; 12–18 da. germ.; 3–4 yrs. vi.)
MYOSOTIS, forget-me-not (Borage fam.). *M. arvensis, M. sylvatica* (Eurasia), blue, 9–12 in.; H; like some shade and plenty of moisture; good for cutting; easy, will even grow under bench. Sow in Mar. or Sep. for greenhouse bloom in 3 mo., Mar. for outdoors. (W; 6–20 da. germ.; 2 yrs. vi.)

NASTURTIUM—see *Tropaeolum*.

NEMESIA (Snapdragon fam.), Africa. *N. versicolor* var. *compacta*, dwarf, 8–10 in.; *N. strumosa* var. *suttonii*, 18–24 in.; varicolored; H; need pinching; like cool temperature, good in pots in winter; give rich soil. Sow in early Aug. for greenhouse bloom in 5–6 mo., in Feb. for outdoors. (C; 10–20 da. germ.; 2 yrs. vi.)

NEMOPHILA, baby-blue-eye (Waterleaf fam.), western N. America. *N. menziesii*, blue or blue and white, 6 in., soft feathery lvs. Sow in Mar. or Aug. for greenhouse bloom in 10–12 wks.; best sown where wanted outdoors; good ground cover for tulips. (C; 5–10 da. germ.)

NICOTIANA, tobacco (Potato fam.), Australia and America. *N. alata* (*N. affinis*) and hybrids; white, hybrid pink-maroon forms; P treated as A; fragrant, excellent for summer bench. Growth slow in winter unless buds are formed by Oct. Sow in July or Feb. for greenhouse bloom in 3 mo., Mar. for outdoors. (W or C; 14–25 da. germ.; 3–4 yrs. vi.)

NIEREMBERGIA, cup-flower (Potato fam.), trop, and subtrop. America. *N. gracilis*, white tinted purple at center, 5–8 in.; *N. frutescens*, white or lilac, blue-tinted, 1–3 ft.; *N. repens* (*N. rivularis*), cream-white, some rose- or blue-tinted, almost prostrate, creeping and rooting at the joints to form a dense mat; P grown as A; almost continuous bloom. Sow in Aug., Sep., or Feb. for greenhouse bloom in 3–4 mo., Mar. for outdoors. (W; 5–20 da. germ.)

NIGELLA, love-in-a-mist (Buttercup fam.), Mediterranean. *N. damascena*, blue or white, 12–18 in., fern foliage; H; good for cutting. Sow in Aug. for greenhouse bloom in 3 mo.; best sown where wanted outdoors. (C; 15–30 da. germ.; 2 yrs. vi.)

PANSY—see *Viola*.

PETUNIA (Potato fam.), Argentina and Uruguay. Many hybrids traceable to *P. axillaris* and *P. integrifolia*, many called *P. hybrida*; varicolored, 6–18 in.; T; best for spring and summer greenhouse, need sun and warmth. Sow Feb.–Mar. for greenhouse or outdoors,
bloom in 2½ to 3 mo. (W; dwarf forms 6–10 da. germ., tall forms 10–20 da. germ.; 2–3 yrs. vi.)

PHLOX (Phlox fam.). *P. drummondii* (Texas), annual phlox, many named vars. varicolored; 15 in., dwarf 6–8 in.; H; very showy bench plant for easy culture. Sow Aug.–Sep. for greenhouse bloom in 2–3 mo., best planted where wanted outdoors. (W; 15–25 da. germ.; 1–2 yrs. vi.)

SALPIGLOSSIS, painted tongue (Potato fam.), Chile. *S. sinuata*, varicolored, to 36 in.; HH; pinch for bush growth; excellent pot plant. Sow in Aug. or Feb. for greenhouse bloom in 5–7 mo., in Feb. for outdoors; needs to make good growth in cool weather for best flowers. (W; 10–14 da. germ.; 6–7 yrs. vi.)

SCABIOSA, pincushion flower (Teasel fam.). *S. atropurpurea* (S. Europe), with many named vars., lavender, pink, white, 2–3 ft.; T; good for cutting; does not mind being crowded in the bench. Sow in Aug. for greenhouse bloom in 3–4 mo., in Feb. for outdoors. (W; 10–20 da. germ.; 2–3 yrs. vi.)

SCHIZANTHUS, poor-man’s orchid (Potato fam.), Chile. *S. retusus*, *S. pinnatus*, and hybrids, variously two-toned, to 24 in.; HH; one of the best annuals under glass for pots or even more spectacular in the bench, allowing at least 2 sq. ft. per plant; less successful outdoors because of delicate lacy foliage, harmed by wind or drought. Sow Aug.–Sep. for prolific bloom in greenhouse in 3–4 mo., in Mar. for outdoors; pinch for bushy growth; long-lived as cut fls.; short season but worth it. (W or C; 10–14 da. germ.; 1–2 yrs. vi.)

SENECIO (Daisy fam.). *S. cruentus* (Canary Is.) is the parent of the florist’s cineraria, with many named hybrids, white, pink, rose, purple, sometimes two-toned, 1–3 ft.; P treated as A; like carnation, must have even, cool temperature, 50° at night, 60° by day during growth. Sow seed in May for late fall bloom, in Sep. for spring bloom in greenhouse; must be kept in active growth; heavy feeder; pinch and remove buds until large enough for 6-in. pot, then allow one head of fls. to develop; must have cool temperature throughout. (C; 12–21 da. germ.; 3–4 yrs. vi.)

SNAPDRAGON—see *Antirrhinum*.

STOCK—see *Matthiola*.

SWAN RIVER DAISY—see *Brachycome*. 
SWEET ALYSSUM—see Lobularia.
SWEET PEA—see Lathyrus.

TAGETES, marigold (Daisy fam.), southwestern U. S. to Argentina. *T. erecta* and hybrids, so-called “African” marigolds; *T. patula* and hybrids, “French” marigolds; yellow, orange, red; to 24 in., dwarf forms 6–10 in.; best for fall or spring greenhouse; withstand drought and heat outdoors. Sow in July or Feb. for bloom in bench in 3 mo., in Mar. for outdoors, or where wanted for late summer bloom. (W; 8–10 da. germ.; 2–3 yrs. vi.)

TRACHYMENE, lace-flower (Carrot fam.). *T. caerulea* (Australia) (*Didiscus caerulea*) pale blue, 2 ft.; T; excellent bench plant, good cut fl.; does best when slightly crowded. Sow in Sep. for spring bloom in greenhouse, in Mar. for outdoors. (W; 12–14 da. germ.; 2–3 yrs. vi.)

TROPAEOLUM, nasturtium (Nasturtium fam.) S. America. *T. majus*, including dwarf and double hybrids. (See Appendix D for other species), yellow, orange, red, etc., 8 in. to 10 ft.; T; spectacular in greenhouse under ideal conditions but must have sun, cool nights, and a soil not too rich; best in spring and fall greenhouse; soak seed over night before planting; 3 mo. seed to flower; plant out where wanted. (W; 10–14 da. germ.; 6–7 yrs. vi.)

VIOLA, pansy (Violet fam.), widespread. *V. tricolor hortensis* with many named vars.; varicolored, 4–10 in.; P treated as A. Cool weather plants, will winter in coldframe. Seed expensive but worth buying the best; sow in Aug. for either winter bloom in greenhouse or spring bloom out; bloom in 2–3 mo. in cool house. (C; 14–18 da. germ., new seed best.)
APPENDIX C

PERMANENT PLANTS

In a small greenhouse, permanent plants should be chosen with care, for there is not room for a great many of them, and once acquired, their performance is apt to grow better and better with each blooming-season, so that one is reluctant to discard them. This list has been chosen for variety in period of bloom, habit of growth, and form of foliage. Since evergreen foliage is attractive the year round, plants with this characteristic are in the majority. For explanation of the abbreviations used throughout the list, see page 134.

These plants do best in a cool house unless it is otherwise noted.

ABUTILON, flowering maple (Mallow fam.). *A. hybridum* (of garden origin), many named vars., *A. vitifolium* (Chile); varicolored, to 3 ft.; almost everblooming woody shrub, showy fl., and handsome foliage. Pinch when young for good form; prune in Sep. for winter bloom. (p. m. 4; sum. tr. out in semishade; prop. by cuttings of new wood, spring or fall; seed, W, 20 da. germ., buds in 4 mo.)

ACACIA, wattle (Pea fam.). *A. pubescens, A. armata* (Australia), most common greenhouse species; yellow, 3-5 ft.; spring-blooming woody shrubs with gray-green feathery foliage; resent root disturbance. Repot with ball of soil; prune after flowering. (p. m. 3; sum.
Appendix C

tr. out in sun, keep moist; prop. by cuttings of half-ripened wood, difficult; seed, W, plunge in hot water then soak in cold for 2 days before planting, germ. 4-5 wks.)

AGATHAEEA—see Felicia.

ARDISIA (Ardisia fam.). *A. crispa* (southeastern Asia) (*A. crenulata*), to 3 ft.; ev. shrub with wavy-margined lvs. resembling holly, fls. insignificant, but red berries brilliant, lasting several winter months. Drainage important, but roots must not dry out; spray foliage often. (p. m. 5; sum. tr. out in shade; prop. by cuttings, half-ripened wood, bottom heat.)

AUCUBA (Dogwood fam.), Asia. *A. japonica*, 4-5 ft.; ev. shrub grown for glossy dark green foliage, yellow-specked in *A. japonica* var. *variegata*, the gold-dust tree; male plants necessary for scarlet berries. (p. m. 4; sum. tr. out in semishade; prop. by cuttings of half-ripened wood any time under glass.)

AZALEA—see Rhododendron.

BEGONIA, fibrous-rooted begonia (*Begonia* fam.). *B. feastii*, beefsteak begonia (hybrid origin), light pink; *B. fuchsioides* (Mexico), scarlet; *B. incana* (Brazil), white; ‘President Carnot’ hybrid, coral-pink; *B. rex* (Assam), many hybrids with large varicolored leaves, rose-pink; *B. sanguinea* (Brazil), white; *B. semperflorens* (Brazil), the common bedding or wax begonia, with many hybrids including ‘Fire King,’ ‘Triomphe de Lorraine,’ and ‘Giant Tea Rosea,’ in all shades, white to red, 8 in. to 2 ft.; a huge genus of succulent plants, grown for both foliage and fls., the latter often almost everblooming. Does best in warm house, but with plenty of moisture and frequent doses of liquid manure can be grown in a wide range of temperatures; remove dead fls. and prune severely when plants grow leggy. (p. m. 4; sum. tr. out, most varieties in shade, *B. semperflorens* will stand sun except at noon; prop. easy from stem cuttings in sand with warmth; *B. semperflorens* can be divided, *B. rex* roots from leaf cuttings.)

BEGONIA, tuberous-rooted begonia—see Appendix E.

BORONIA (Rue fam.), Australia. *B. elatior*, rose-red; *B. megastigma*, yellow inside, purple outside, to 5 ft.; fragrant shrubs blooming late winter to early summer. Grow on dry side; pinch small plants; cut back severely and repot yearly after bloom; best renewed
every 2 or 3 yrs. (p. m. 5; sum. tr. out in sun; prop. by cuttings of new growth under glass; seed, W, difficult to germinate, bloom in 1 yr.)

BOUVARDIA (Madder fam.). Hybrids of B. longiflora (Mexico) (B. humboldtii), white, 3-5 ft.; ev. shrubs with attractive foliage, bloom in fall and early winter, best grown at 50° but can take 40°. Do not overpot; rest period on dry side, Jan.–Feb.; when growth starts, cut back severely, give liquid manure every 2 wks. through summer and plenty of water. (p. m. 5; sum. tr. out until Sep., semishade; prop. by cuttings of new wood, spring or early summer with bottom heat.)

CAMELLIA (Tea fam.), Asia. C. japonica, C. sasanqua, many hybrids, white through pink to red, 3-5 ft.; ev. woody shrubs, attractive foliage, bloom possible with varied group from fall to spring; bloom best at 42°–45°. Must have good drainage; resent drafts and sudden changes of temperature; frequent syringing of foliage beneficial; prune only when necessary as buds form at tip of last yr.’s growth; repot in fall, firmly, when necessary. (p. m. 5; sum. tr. out in shade with copious watering at least once a week; prop. by cuttings of half-ripened wood in winter, treated with rooting hormone before inserting in sand; bloom in 2 yrs.)

CEREUS (Cactus fam.). The genus has been divided into many species called night-blooming cereus or found in Hylocereus, Selenicereus, Nyctocereus, etc., southwestern U. S. to northern S. America, West Indies, Argentina; white, 3-10 ft.; awkward, often spiny plants, grown for the spectacular fls., to 12 in. across, in summer, opening at midnight and fading by morning; tough, but must have dry conditions in winter, more water as growth starts; alkaline soil. (p. m. 6; sum. tr. out in sun or semishade; prop. easy by cuttings of new growth.)

CHIRONIA (Gentian fam.), S. Africa. C. baccifera, pink, 2 ft.; soft shrubby plant; summer fls. gentian-like, followed by red berries, attractive in winter greenhouse. (p. m. 4 + peat; sum. tr. out in semishade; prop., Feb. cuttings rooted in sand will bloom by summer; seed, 1 yr. to bloom.)

CHOISYA (Rue fam.). C. ternata (Mexico), white, to 6 ft.; handsome ev. shrub with fls. like orange blossoms in late spring at 45°, in Mar. at 55°. Keep moist while in active growth; prune after
Appendix C

bloom to keep within bounds; feed with manure water every 2 wks. June–Sep. (p. m. 4; sum. tr. out in semishade; prop. by cuttings, spring or fall, of almost mature wood, at 55°–60°.)

CHORIZEMA (Pea fam.) , Australia. C. cordatum, scarlet and purple; C. varium, orange; C. lowii, red and yellow; to 4 ft.; ev. shrubs with tendency to sprawl, blooming spring and early summer. Pinch young plants several times; full sun, plenty of water, manure water every 2 wks. while in active growth; rest in winter on dry side; can remain in same pot several yrs.; repot in Jan. when necessary. (p. m. 4 + acid peat; sum. tr. out in semishade or shaded greenhouse; prop. by cuttings of young wood at 60°.)

CHRYSANTHEMUM—see Chapter 3, November.

CORONILLA (Pea fam.). C. glauca (S. Europe), yellow, 2–4 ft.; ev. shrub with gray-green foliage, clusters of pea-shaped fls. in spring and summer. Prune in Mar. for bushy growth; culture as for Cytisus. (p. m. 4; sum. tr. out in semishade; prop. by cuttings of half-ripened wood under glass, July–Aug.)

CRASSULA (Crassula fam.). C. argentea (C. portulacea) and C. multicava (S. Africa) commonest greenhouse species; succulent P grown as foliage plants; rarely bloom under glass. Give dry atmosphere during winter rest period; pot with plenty of crock for good drainage. (p. m. 6; sum. tr. out in full sun; prop. by cuttings of new growth in sand, barely damp to avoid rotting stems.)

CYTISUS, broom, genista (Pea fam.). C. canariensis (Canary Is.), C. racemosus (hybrid), yellow, 4–6 ft.; ev. shrubs; faintly scented fls. in racemes, Mar.–summer; resents heat. Dry rest period, fall and early winter; resume watering in Feb.; cut back after bloom and repot. (p. m. 4; sum. tr. out in semishade; prop. by cuttings of new wood in spring, difficult; seed, W, in spring 2 yrs. to bloom.)

DAPHNE (Mezereon fam.). D. odora (China and Japan), rosy purple; D. cneorum (Europe), common hardy var., pink; and hybrids; 3–5 ft.; ev., slow-growing, mostly winter-blooming shrubs with attractive foliage and sweet-scented fls. Sometimes difficult to establish; perfect drainage, even cool temperature essential. (p. m. 3 + peat; sum. tr. out in semishade, though D. cneorum stands sun; prop. by cuttings of new wood in spring.)

ERICA, heath (Heath fam.). E. melanthera, rose, E. verticillata, rose-scarlet, E. hyemalis, pink, white-tipped (all from S. Africa);
2–4 ft.; ev. fine-leaved shrubs, showy fls. in winter. Give airy, cool atmosphere and perfect drainage; allow to dry out between waterings; cut back after bloom. (p. m. 5 + peat; sum. tr. out, cool as possible in semishade; prop. by cuttings of half-ripened wood with mild bottom heat.)

FELICIA, agathae (Daisy fam.), Africa. *F. amelloides*, blue, 1–3 ft.; bushy P with many solitary fls. in winter. Pinch at 6 in., feed every week in active growth, keep cool and moist; good for cutting. (p. m. 3; sum. tr. out in semishade; prop. by cuttings May–June; seed, C, 20 da. germ. in Mar., 18 mo. to bloom.)

FUCHSIA (Evening Primrose fam.). *F. hybrida* includes many color combinations from S. American stock; *F. magellanica* (S. America), scarlet and purple; *F. procumbens* (New Zealand), orange-purple basket plant; woody shrubs with pendent, two-toned, showy fls., early spring bloom in cool house. Pinch to induce branching or train as espalier or standard; rest period during late fall and winter; renew stock every year or two for best form and bloom. (p. m. 3; sum. tr. out in shade; prop. by seed in spring, W. 20 da. germ., 12 mo. to bloom; and by cuttings, easy, new growth in spring, rooted in sand at 65°.)

GAZANIA (Daisy fam.), S. Africa. *C. rigens* (including *G. splendens*), orange; *G. pavonia*, white; *G. pottsii*, bronze; and hybrids; 9–12 in.; P with attractive, sometimes woolly lvs., showy fls. in late spring and summer, closing at night but long-lasting. Easy at cool temperature. (p. m. 3; sum. tr. excellent in sunny border or in greenhouse bench if kept cool; prop. by division of basal shoots in Aug.)

GERANIUM, Pelargonium—see Chapter 9, May.

HELLEBORUS, Christmas rose (Buttercup fam.). *H. niger* (Europe), *H. orientalis* (Asia Minor), and hybrids; white, sometimes pink- or green-tinged, 12 in.; P forced at cool temperature for bloom in late fall and winter; attractive foliage. Brittle roots, pot with care. Lvs. and rhizome of *H. niger* are poisonous. (p. m. 3; sum. tr. out in semishade; hardy vars. can be planted out in permanent protected spot after greenhouse use; prop. by division Aug.–Sep.)

JACOBINIA, king's crown, plume plant (Acanthus fam.). *J. carneae*, pink, *J. velutina*, rose, *J. pauciflora*, red (all from Brazil)
(Justicia); 1-3 ft.; handsome ev. shrubs, intermittent bloom in warm house, bloom for long period, fall and spring, in cool house. Pinch new plants to induce branching; full sun in winter; keep moist in active growth, with only short periods of rest between periods of bloom; cut back after bloom. (p. m. 4; sum. tr. out in shade or shaded greenhouse; prop. easy by cuttings in Apr.)

KALANCHOE (Crassula fam.). K. *carnea* (S. Africa), pink; K. *kewensis* (hybrid) and hybrids, yellow, red, rose; 1-3 ft.; fleshy P with attractive foliage, bloom around Christmas in warm house, in spring in cool house. Culture like that for *Crassula*. (p. m. 6; sum. tr. out in sun or lightly shaded greenhouse; prop. easy by cuttings of new growth; seed, very fine, W, early spring, 10-15 da. germ.; 2 yrs. to bloom, for me.)

LIGULARIA (Daisy fam.). *L. kaempferi* (Japan), leopard plant, yellow; *L. clivorum* (Japan and China) (*Senecio clivorum*), orange; 2-4 ft.; handsome P, related to *Senecio*; *L. kaempferi* often grown for foliage alone; of easy culture. Winter in cool house for summer bloom outdoors or in lightly shaded bench. (p. m. 3; sum. tr. as above; prop. by cuttings or division.)

LINARIA, toadflax (Snapdragon fam.). *L. dalmatica* (south-eastern Europe), *L. purpurea* (southern Europe), and hybrids; varicolored, 2-4 ft.; mostly hardy P almost everblooming in cool house. Pinch for bushy growth; do not let dry out; good for cutting. (p. m. 3; sum. tr. out in semishade; prop. by cuttings of new growth, division in spring; seed, C, 10-12 da. germ., bloom in 2 yrs.)

NERIUM, oleander (Dogbane fam.). *N. indicum* (Persia to Japan), white, pink, scented; *N. oleander* and hybrids, from European stock, varicolored; to 20 ft.; quick-growing ev. shrubs, bloom in spring and summer, some varieties with occasional fls. all year. Rest on dry side, cool, in winter; prune severely to keep in bounds. (p. m. 4; sum. tr. out in sun; prop. by cuttings in summer, in sand or water.)

OSMANTHUS (Olive fam.). *O. fragrans* (Asia), tea olive; *O. ilicifolius* (Japan), Chinese holly; white, to 10 ft.; ev. shrubs with glossy foliage, small but extremely fragrant fls. intermittently, fall to late spring. Prune after bloom for control and form; must have good drainage, otherwise undemanding. (p. m. 4; sum. tr. out in
shade; prop. by cuttings, half-ripened wood under glass in summer; seed, 2 yrs. to germ.)

PIQUERIA, stevia (Daisy fam.), Mexico, Cent. America, Haiti. *P. trinervia* (*Stevia serrata*), white, to 4 ft.; perennial good for cutting in Dec. and Jan.; old plants tend to sprawl. Cut back after bloom. (p. m. 3; sum. tr. out in semishade; prop. by cuttings Feb.–Mar.; seed, W, 5–8 da. germ., bloom by Dec.)

PLUMBAGO—see Appendix D.

PUNICA, pomegranate (Pomegranate fam.), Persia to India. *P. granatum*, orange-red, and double-flowered dwarf hybrids; to 4 ft.; shrubs bearing fls. and fruit often at the same time, decorative the year around; dwarf vars. best for small house. Keep on dry side in winter. (p. m. 4; sum. tr. out in semishade; prop. by basal shoots in sand.)

RHODODENDRON, including azalea (Heath fam.). *R. obtusum* (Japan) includes hybrids known as Kurume and Kaempfer's azaleas; *R. indicum* (Japan), parent of many hybrids with Japanese and Chinese species; *R. yedoense* (Japan and Korea); white through pink to red, 2–5 ft.; shrubs with abundant showy fls., variously from late fall to spring. Give cool, sunny position; roots must not dry out; mulch with peat or dried cow manure; can remain in one pot several yrs.; when necessary, repot after bloom. (p. m. 5; sum. tr. out in shade, fertilize and keep moist as buds appear in late summer; sprinkle foliage all dry spells; prop. by cuttings in spring.)

RONDELETTIA (Madder fam.), S. America. *R. cordata*, pink or white; *R. odorata* (*R. speciosa*), orange-red; 4–7 ft.; ev. shrubs almost everblooming at 55°, healthy but less bloom at 45°. Prune to keep in bounds; high humidity in active growth; winter rest period on dry side. (p. m. 5; sum. tr. out in semishade; prop. by cuttings, half-ripened wood in spring.)

SENECIO—see Appendix B.

SOLANUM (Potato fam.). *S. pseudo-capsicum*, Jerusalem cherry (Old World), white, to 4 ft. (for *S. jasminoides* see Appendix D); P grown for bright orange-red fruit, holding well on plant in winter in cool house. Cut back in Jan.; new growth will start after rest period; for compact Christmas gift plants, start from seed in Feb.; older plants, trained to standard or espalier, attractive in greenhouse. (p. m. 3; sum. tr. in or out, sun or semishade; prop. by cut-
tings. new wood in spring; seed, C, 20 da. germ., in Feb., young plants grown out during summer, pinched, mulched, fertilized, watered well, and potted up in Sep.)

STEVIA—see Piqueria.

SWAINSONA—see Appendix B.
APPENDIX D

VINES

There is more diversity, perhaps, in this group of plants for the greenhouse than in any other. Although more perennials are here listed, annuals are also included. Some are grown solely for foliage, others for their flowers. Some reach a height of thirty or forty feet if not kept within bounds, others never exceed three or four. Variation in method of climbing, such as those with tendrils and those which wind themselves around a support; inclination to droop or to grow upward; best performance in sun or in shade; all these characteristics and others are represented. In summer, there are actual advantages in letting vines run riot up supports and across the rafters. In winter, it is equally important to keep them within bounds in order that all available sunlight can reach the benches and shelves. Unless it is otherwise noted, summer bloomers can be left in the greenhouse or moved outdoors. It is also taken for granted, unless an exception is made, that vines should be given a dose of manure water or all-purpose fertilizer every two weeks while they are in active growth. Like permanent plants—and indeed many of them fall into that category—they must be chosen with care, for even in the summer there is not likely to be room for many of them. For explanation of the abbreviations used throughout the list, see page 134.
or ALLAMANDA, gold trumpet (Dogbane fam.). *A. cathartica* var. *hendersonii* (S. America), yellow, to 30 ft.; *A. nerifolia* (Brazil), yellow, dwarf to 4 ft.; *A. violacea* (Brazil), maroon, dwarf to 5 ft.; free-flowering summer climbers, dwarf forms easiest to control in small house. Allow heat and moisture in summer; keep on dry side, no lower than 50° in winter; cut back and repot in Jan.; relatively pest-free. (P; ev.; p. m. 4; prop. by cuttings in Mar.)

ANTIGONON, coral vine, rosa de montana (Buckwheat fam.). *A. leptopus* (Mexico), rose, to 30 ft.; profuse bloomer, spring and summer; tendril-climbing. Winters in cool house, on dry side; or can be cut back; tubers sprout when pot is watered in early spring; grows in poor soil, do not overfertilize. (P; p. m. 3, without cow manure; prop. by division of tubers or from seed in Mar.; C; da. germ. 20.)

ASPARAGUS (Lily fam.). *A. asparagoides*, “smilax” of the florists, *A. plumosus*, *A. sprengeri*, *A. crispus*, *A. scandens* var. *deflexus* (all from S. Africa), asparagus fern, fls. insignificant, grown for feathery, fern-like foliage; *A. plumosus* to 12 ft., others 3–5 ft., all easily controlled; will trail or climb; good for baskets or bouquets. Sun yr. around for *A. sprengeri*, others need shade in summer. (P; ev.; p. m. 4; prop. by seed in Mar.; W; da. germ. 30; or by cuttings of new growth.)

BOUGAINVILLEA, paper flower (Four-O’clock fam.). *B. spectabilis* (Brazil), many named hybrids including the crimson ‘Barbara Karst,’ to 40 ft.; fls. insignificant, showy bracts in red, rose, magenta, pink; bloom spring to fall with heat and moisture; will winter in cool house on dry side. Cut back after flowering to 2–3 in. from old wood to control; best planted permanently in greenhouse but possible in large pot or tub. (P; p. m. 4; prop. by spring or summer cuttings of half-ripened growth, in sand, under glass.)

CESTRUM (Potato fam.), trop. and subtrop. America. *C. aurantiacum*, orange-yellow; *C. diurnum*, day jasmine, *C. fasciculatum* var. *newellii*, *C. nocturnum*, night jasmine, *C. parqui*, willow jasmine, all white or cream-colored; *C. purpureum*, coral jasmine, red-purple; 4–15 ft.; sprawling shrubs, some almost vine-like, all needing support; fls. fragrant. Water well and syringe foliage in active growth; cut back severely after flowering, which occurs in
most species in late spring or summer; C. nocturnum continues
bloom until Dec.; culture similar to that for Bougainvillea. For true
jasmine see Jasminum. (P; ev.; p. m. 4; prop. by cuttings of half-
ripened wood in spring or summer.)

CLEMATIS (Buttercup fam.). Widely distributed; most modern
hybrids from crosses of Asiatic and European stocks; large-flowered
hybrids, both T and H, in a wide range of colors, can be brought
into bloom in early spring in cool house; 4–20 ft. Prune carefully
as some produce fls. on previous year’s growth; keep moist; a mulch
of cow manure is beneficial; best plunged outdoors in sun or light
shade in summer. (P; p. m. 4; prop. difficult and best left to spe-
cialists who graft hybrids.)

CLIANTHUS (Pea fam.). C. dampieri, glory pea (Australia); C.
puniceus, parrot’s bill (New Zealand); both red, 4–6 ft.; creep-
ing plants with spectacular fls. in summer; not easy to establish;
must have perfect drainage. Water moderately in winter, more in
spring and summer, with syringing of foliage; best plunged out in
semishade in summer. (P; p. m. 3; prop. from seed, W, or cuttings
in Mar. over bottom heat, the glory pea more difficult than par-
rot’s bill.)

COBAEA, cathedral bells, cup-and-saucer vine (Phlox fam.). C.
scandens (Mexico), pale green turning to lavender or white, to 25
ft.; one of the most satisfactory vines for the greenhouse, attractive
the year around; tendril-climbing. Pinch to branch and for good
bloom, intermittently from spring until late fall; pest-free. (P; p. m.
3; prop. by seed, C, da. germ. 21, planted on edge with care not
to overwater until germinated, Feb.–Mar.; or from cuttings of new
growth in Feb. with bottom heat.)

CYMBALARIA (Snapdragon fam.). C. muralis (Europe), lilac-
blue, to 3 ft.; a creeping or trailing vine of easiest culture, good for
baskets or to cover small trellis; will even thrive under the bench,
spreading a carpet of green; grows in sun or part shade. (P; p. m.
3; prop. by seed, division, or cuttings, with roots forming at joints.)

DISTICTIS (Trumpet-vine fam.). D. lactiflora (D. cinerea)
(San Domingo), purple, to 4 ft.; tendril-climbing vine with showy
fls. in summer. Do not overwater; will winter in cool house. (P; p. m.
3; prop. by cuttings of half-ripened wood.)

ECCREMOCARPUS (Trumpet-vine fam.). E. scaber (Chile),
orange-red, to 5 ft.; ev. tendril-climbing vine. Will bloom the first summer from seed; should also winter in cool house. (P; p. m. 3; prop. by seed, W.)

FICUS (Fig fam.) . *F. pumila* (China, Japan, Australia), to 4 ft.; small-leaved foliage plant which stands heat or cold; will grow up or down, but best trained up a wall or trellis which it will cover. (P; p. m. 3; prop. by cuttings of new growth almost any time.)

HARDENBERGIA (Pea fam.), Australia. *H. comptoniana*, blue; *H. violacea* (*H. monophylla*), violet-rose; to 15 ft.; woody ev. vines with long racemes of small flowers in winter. Syringe foliage often; plunge out in shade for summer rest period. (P; p. m. 3 + acid peat; prop. by cuttings of new wood under glass; seed takes 18 mo. to bloom.)

HEDERA, ivy (Ginseng fam.), widespread. *H. helix*, English ivy, includes many vars. such as 'Ruffled,' 'Glacier,' 'Gold-Dust,' 'Sweetheart,' 'Marbled'; to 6 ft.; of easiest culture, will grow up or down; for edging, baskets, dish gardens, etc. Shade in summer to prevent burning. (P; p. m. 3; prop. by cuttings any time in sand or water.)

HOYA, wax plant (Milkweed fam.). *H. carnosa* (China and Australia), to 15 ft.; a slow-growing, easily controlled vine; takes 3 or more yrs. to reach blooming size but foliage most attractive the year around; fls. fragrant, blush-pink or white, in open cluster, in summer. Needs warmth and moisture in summer; keep almost dry and cooler in winter. (P; p. m. 4; prop. by cuttings of top growth Feb.-Mar.)

IPOMOEA, morning-glory (Morning-glory fam.). *I. purpurea* (trop. America), hybrids include 'Heavenly Blue'; *I. hederacea* (trop. America) (*I. nil*), the 'Imperial Japanese' strain in its many forms; many colors, to 12 ft.; with warm sun and humidity, morning-glories bloom profusely under glass from June to late fall if dead fls. are picked. (*I. purpurea*, A; *I. hederacea*, P; do well in bench, or p.m. 3; prop. by seed, soaked overnight and planted several to a pot, the strongest seedling kept, W, da. germ. 5–8; tubers of *I. hederacea* can be wintered in cool house and divided in spring; can also be increased by cuttings of ripe wood.)

JASMINUM (Olive fam.). *J. mesnyi*, primrose jasmine (China), yellow, 6–10 ft.; *J. officinale*, common white jasmine (Persia to China), to 30 ft.; *J. sambac*, zambac, Arabian jasmine (India),
white, to 10 ft.; sprawling shrubs or vines of easy culture with extremely fragrant f.ls. in spring. Need partial shade in summer; cut back after blooming. (P; p. m. 3; prop. by cuttings of half-ripened wood under glass.)

LAPAGERIA, Chilean bell-flower (Lily fam.), Chile. L. rosea, vars. with rose, red, and white f.ls., to 15 ft.; pretty climber for summer bloom; needs shade, humidity, plenty of water; long bell-shaped f.ls. hang from vine, especially effective trained on rafters. Keep on dry side during winter. (P; p. m. 4 + peat; prop. by layering or seed.)

LYGODIUM, climbing fern (Curlygrass fam.). L. japonicum (Japan and E. Indies), 3–4 ft.; many ferns need a shaded, humid greenhouse with no less than 55° in winter and 70° in summer for best performance, but L. japonicum will stand some variation; never use manure. (P; p. m. 5 + charcoal; prop. by spores difficult, by division possible, keeping sections in sphagnum moss until well rooted; best to buy plants.)

MAHERNIA, honey bell (Chocolate fam.), S. Africa. M. verticillata (M. odorata), yellow, 10–12 in.; creeping or drooping plant with fragrant f.ls. in pairs and lacy foliage, excellent for hanging baskets; blooms in winter and spring. (P; p. m. 4; prop. by cuttings of new growth.)

MANETTIA (Madder fam.). M. bicolor (Brazil), M. inflata (Paraguay and Uruguay); red with yellow tip, to 10 ft.; spring and summer flowering ev. climbers which need 60° to flower but can be wintered in cool house, kept on the dry side. Water freely, Apr.–Sep. (P; p. m. 3; prop. by cuttings of new growth over bottom heat, under glass.)

MAURANDIA (Snapdragon fam.). M. barclaiiana, purple, M. erubescens, rose-red (both from Mexico), 3–4 ft.; trailing or climbing perennials which can be treated as tender annuals with bloom the same year; fls. showy in winter or spring, like small gloxinias. Repot in early Mar.; water freely in active growth; light shade in midsummer. (P; p. m. 3; prop. by seed, W. da. germ. 5–10, sown in June for winter bloom; or cuttings in Jan.)

PANDOREA, bower plant (Trumpet-vine fam.). P. jasminoides (Australia) (Tecoma jasminoides), white with pinkish throat; P. pandorana (Australia and Malaysia), white and violet-spotted
throat; *P. ricasoliana* (S. Africa), pink with red stripes; to 20 ft; vigorous handsome climbers, needing only enough heat to exclude frost in winter (on dry side) and blooming with summer heat. Syringe and water well, Apr.–Sep.; cut back 1/3 to 1/2 in Feb. (P; p. m. 4; prop. by cuttings of new growth in spring with bottom heat.)

PASSIFLORA, passion-vine (Passion-flower fam.) *P. edulis* (Brazil), white and purple; *P. incarnata* (southern U. S.), white and purplish-pink; *P. caerulea* (Brazil), pink, white, and purple; *P. mollissima* (Andes), rose-pink, to 20 ft.; vines with beautiful foliage the year around and spectacular fls. in summer; tendril-climbing; *P. edulis* produces edible fruit and needs slightly higher temperatures than the others, which thrive in cool house; dry in winter; good drainage always. Water and syringe daily in hot weather; cut back in Oct. or Feb. if desired. (P; p. m. 3; prop. by cuttings of new growth in spring or early summer under glass; seed Feb.–Mar., W, da. germ. 30.)

PLUMBAGO (Plumbago fam.) *P. capensis* (S. Africa), several varieties, blue or white, to 10 ft.; a sprawling or climbing shrub, easily controlled by cutting back after summer bloom; delicate phlox-like fls. in profusion; good for cutting. On dry side in winter; plenty of water and humidity from Feb. on; can be grown in same pot or tub for several yrs. (P; p. m. 3; prop. by cuttings of half-ripened wood, spring or fall; easy from seed, W.)

QUAMOCLIT (Morning-glory fam.) trop. America. *Q. cocinea*, star ipomoea, scarlet with yellow throat; *Q. pennata*, cypress vine, scarlet; *Q. sloteri* (hybrid), cardinal climber, scarlet with white throat; to 15 ft.; useful and easy annual vines for spring, summer, and fall greenhouse. (A; p. m. 3; prop. by seed.)

SOLANUM (Potato fam.). *S. jasminoides* (S. America), white; *S. wendlandii*, paradise flower (Costa Rica), lilac-blue, to 10 ft.; vigorous climbers with many clusters of fls. all summer; start blooming when young and can be kept to 3–4 ft. if desired; or will cover north wall, or climb to rafters. Dry in winter, moist in summer. (P; p. m. 4; prop. by cuttings of new growth in spring with gentle bottom heat.)

SWAINSONA, darling pea, poison bush (Pea fam.), Australia. *S. galegifolia*, vars. with white, rose, and violet-rose fls., to 3 ft;
spreading or partly climbing shrub, almost ever-blooming except for winter rest period. Pinch for form and repot every Feb. (P; p. m. 4; prop. by seed in Mar., W, da. germ. 25; or by spring cuttings.)

TRACHELOSPERMUM (Dogbane fam.). _T. jasminoides_, star or confederate jasmine (southern China), white, to 20 ft.; fragrant; another vine requiring warmth and sun to bloom, which will winter in the cool house on the dry side. Best grown in tub or large pot where it can be pruned to handsome, 3–4 ft. plant; ev.; difficult to establish but then of easy culture. (P; p. m. 4; prop. by cuttings of new growth in spring, which take several yrs. to flower.)

TROPAEOLUM, nasturtium (Nasturtium fam.), S. America. _T. majus_, common nasturtium with many hybrids; _T. peregrinum_, canary-bird-flower, many colors to 12 ft. While nasturtiums need sun and moderate heat to bloom, they cannot stand extreme heat; glass must be shaded with temperature kept down for summer bloom; best in spring or early fall. (Seed, W, da. germ. 7–12, planted in bench or in pots; seedlings difficult to transplant.)
Most of the bulbs on this list can be used either in the summer greenhouse or in pots, tubs, hanging baskets, or window boxes outdoors during the warm months. If used outdoors after having been started in the greenhouse, they will need regular watering, and some will need protection from storm and high wind. Some are benefited by spraying the foliage, some like sun and others flower best in the shade. In general, material used in any of the ways mentioned should have the same attention as that given to the plants grown in the greenhouse. For explanation of the abbreviations used throughout the list, see page 134.

ACHIMENES (Gloxinia fam.). *A. grandiflora* (Mexico), red-purple; *A. longiflora* (Guatemala), violet-blue; most vars. sold today are hybrids from this parent stock, with wide color range; 12–24 in. Plant dormant tubers Mar.–Apr. at 60° in flat of moist peat, covering 1 in.; when 2, 3 in. high, transplant, 8–10 to 8-in. shallow pot ⅓ filled with crock or other drainage material; barely cover tubers with soil; some vars. good for hanging baskets; all need shade and humidity; ft. best at temperatures between 70° and 80°. (p. m. 4; win. tr. store dry at 45°; prop. by division or summer cuttings in moist sand.)

ACIDANTHERA (Iris fam.). *A. bicolor* (Abyssina), white with black center, 18–24 in. Start Mar.–Apr. at 50°, 6–8 corms in 10–12 in. pot or in a deep flat (good for cutting); culture similar to that for
Gladiolus. (p.m. 4; win. tr. store in dry sand at 45°; prop. by offset.)

AGAPANTHUS, lily-of-the-Nile (Lily fam.), S. Africa. *A. africanus*, *A. orientalis*, many hybrids, shades of blue, dwarf varieties, 15 in. to 5 ft. Start Feb.–Mar. at 50°, 6–8 tubers in 8–10-in. shallow pot for dwarf forms (best for small greenhouse), 6–8 in large tub for taller forms; do not repot until necessary, usually no oftener than every 3 yrs.; prolific bloom for long period. (p.m. 4; win. tr. on dry side in pot at 45°–50°; prop. by division, often necessary to chop or saw tough tubers.)

ALSTROEMERIA (Amaryllis fam.). *A. aurantiaca*, yellow; *A. chilensis*, rose-red (Chile); 12–24 in. Start any time Nov.–Feb. at 45°, 6–8 tubers to 8–10-in. pot; stems are weak and need support; give shade and humidity; keep foliage in good growth, bloom will come with increased temperature of early summer; will bloom in spring in warm house; when repotting, be careful of brittle roots. (p.m. 4; win. tr. divide and store in dry sand at 45°, keeping dry for at least 3 mo.; prop. by offset.)

AMARCRINUM (Amaryllis fam.). Hybrid between Brunsvigia (sometimes called Amaryllis) and Crinum. *A. howardii*, shell pink, to 4 ft.; too large for some greenhouses, but worth the space if possible. Culture throughout like that for Brunsvigia.

ANTHERICUM, St. Bernard lily (Lily fam.). *A. liliago* (Mediterranean), to 12 in. Start almost any time, in cool greenhouse, fls. dainty but not showy, in early summer; will even grow under bench; tends to be evergreen and sometimes used as foliage plant (for *A. variegatum* see Chlorophytum); stands shade at all times. (p.m. 4; win. tr. on dry side; prop. by division.)

BEGONIA, tuberous begonia (Begonia fam.). Forms of hybrid origin listed as *B. tuberhybrida* (the common large-flowered form), also *B. lloydii* (good for baskets); varicolored, 8–15 in. Plant tubers Feb.–Mar., concave side up (pink buds often show); culture similar to that for Achimenes; final pot should be 6–7 in. for each tuber; fertilize every wk., preferably with manure water, in active growth; avoid water on foliage; blooms spectacular in warm, humid greenhouse. (p.m. 4; win. tr. store in dry peat at 45°; prop. by division or summer cuttings in sand.)

BLANDFORDIA (Lily fam.). *B. flammea*, yellow-orange, *B.
nobilis, coppery red (Australia), 20 in. Pot snugly in March, and keep in same pot at least 2 yrs.; on dry side, at 45° until leaves show, then increase moisture and give liquid manure every 2 wks.; does not need high humidity; light shade in summer greenhouse. (p. m. 4 + peat; win. tr. Nov.–Mar. almost dry, in pot, at 45°; prop. by offset when repotting.)

BRUNSVIGIA, Cape belladonna (Amaryllis fam.). M. rosea (sometimes called Amaryllis belladonna, but not plant described in Appendix A), (S. Africa); hybrids rose-red, red-and-white striped, white, 12 in. Start Feb.–Mar. at 60°, one bulb to small pot, no more than 1 in. between bulb and rim of pot, 1/2 of bulb above soil; water sparingly and keep in shade for root growth; increase moisture as growth appears; let foliage mature well after bloom, then gradually decrease water; repot only when necessary; add 1 in. new rich soil each yr., and give manure water every 2 wks. from show of bud to bloom. (p. m. 4; win. tr. in pot, almost dry, at 45°–50°, needs long rest period; prop. by offset.)

CHLOROPHYTUM (Lily fam.). C. capense (Anthericum variegatum) (S. Africa), bright green leaves margined in white. Culture same as for Anthericum.

DAHLIA (Daisy fam.), Mexico. Some 14,000 named hybrids; many garden vars. too tall for average greenhouse; dwarf dahlias such as Unwin hybrids are among the most prolific and colorful fls. for summer benches; these are varicolored, 12–18 in. Tubers or young plants should be benched Mar.–Apr. at 50° for summer bloom; can also be grown in flats (for cutting) or large pots; give good drainage, constant moisture, pinch at 6–8 in. for branching. (p. m. 3; win. tr. store in dry sand at 45°; prop. by division of tubers; dwarf vars. can be raised from seed sown in Feb. for midsummer bloom.)

EUCHARIS, Amazon lily (Amaryllis fam.), Colombia. E. grandiflora, sometimes sold as E. amazonica, white, 12–24 in. Start 4–6 bulbs in 8–10-in. pot Feb.–Mar. at 60°; ev., fragrant tubular fls.; culture like that for Amaryllis belladonna. (p. m. 4; win. tr. give only enough water to keep leaves from shriveling, in shade at 45°–50°; prop. by division of clumps.)

GLADIOLUS (Iris fam.). Most garden vars. far removed from original forms and, as with dahlias, dwarf vars. most attractive in
small greenhouse; named dwarf hybrids include 'Spitfire,' brilliant
scarlet with lavender mark; 'White Lady,' pure white; and 'Copernicus,' copper, shaded orange. Culture like that for Dahlia, except
that none can be raised from seed.

GLORIOSA, glory lily, climbing lily (Lily fam.), (Africa and
Asia). G. superba, G. rothschildiana, opening yellow, deepening to
red, to 6 ft. Pot Jan.–Feb. for summer bloom; has 6 mo. cycle of
growth; will bloom twice a yr.; weak vinelike stems need support;
moist when growth appears; does not like heat. (p. m. 3; win. tr. at
least 3 mo. almost dry in pot at 45°; repot each growing period;
prop. by division of tubers, allowing eye to each division, separate
carefully with sharp knife.)

GLOXINIA—see Sinningia.

MONTBRETIA—see Tritonia.

MORAEA, morea (Iris fam.). M. iridioides, M. pavonia (S.
Africa), varicolored, 12–18 in. Culture similar to that for Freesia;
needs cool, moist start Feb.–Mar. at 45°; fls. fade in one day but
continue over long period. (p. m. 3; win. tr. on dry side, in pot at
45°; prop. by division.)

PANCRATIUM (Amaryllis fam.). P. maritimum (Mediterranean), white, 2 ft. Culture similar to that for Amaryllis belladonna; foliage blue-green, fls. fragrant. (p. m. 4; win. tr. almost
dry in pot at 45°; prop. by division.)

SINNINGIA, gloxinia (Gloxinia fam.), Brazil. S. speciosa and
many hybrids including the Buell strain, varicolored, often two-
toned, 8–12 in. Start as for Achimenes; like humidity but foliage
should not be wet; water thoroughly when necessary, then allow
soil to become almost dry before watering again; long period of
bloom. (p. m. 3; win. tr. dry in pot at 45°–50°; prop. by leaf cut-
tings or seed.)

TIGRIDIA, Mexican tiger flower, Mexican shell flower (Iris
fam.). T. pavonia (Mexico and Guatemala), varicolored, 1–2 ft.
Plant corms Feb.–Mar. at 50°; culture like that of Gladiolus; fls. last
only a day but appear in succession. (p. m. 3; win. tr. almost dry in
sand at 45°–50°; prop. by division.)

TRITONIA, montbretia (Iris fam.). T. crocosmaeflora, of garden
origin, and many named hybrids, red, orange, and yellow, 2-4 ft.
Culture like that for *Gladiolus* to which they are closely related. (p. m. 3; win. tr. store almost dry in sand; prop. by division.)

WATSONIA (Iris fam.), S. Africa. *W. angusta*, scarlet, *W. iridifolia*, pink, *W. rosea*, rose-red, 3–5 ft. Culture like that for *Gladiolus*, to which they are closely related. (p. m. 3; win. tr. almost dry in pot at 45°; prop. by offset.)

ZEPHYRANTHES, zephyr lily (Amaryllis fam.). *Z. grandiflora* (Jamaica, Cuba, Mexico, Guatemala), *Z. rosea* (Cuba), red or pink, 10–12 in. Pot Nov.–Feb., 4–5 to 6-in. pot or 10–12 to 10-in. pot; bloom will start with warm spring weather and continue intermittently all summer and sometimes into fall; shade in midsummer, sun at other seasons; do not overwater; after bloom, let lvs. mature fully before drying out. (p. m. 3 + peat; win. tr. almost dry in pot, repotting in early spring; prop. by division when repotting.)
APPENDIX F

PLANTS FOR CHRISTMAS

Red-berried

*Adisia crispa.* Sometimes sold as *A. crenulata.* Attractive ev. foliage and long-lasting scarlet berries.

*Aucuba japonica.* Lustrous ev. foliage, one variety dotted with yellow (gold-dust plant), brilliant red berries.

*Capsicum frutescens* var., *baccatum,* bird pepper. Many vivid red, 1/8-inch fruits on compact plant (hybrid dwarf vars. the best).

*Ilex,* holly. Holly can be wintered in the cool greenhouse and hardy vars. planted out in early spring. For berries a second year, it is necessary to have both male and female plants. Small, compact plants with berries already set are often available in the fall at nurseries.

*Lycopersicum pimpinellifolium,* 'Tiny Tim' tomato. When well grown a compact little plant only 6 or 8 inches tall, covered with bright 3/4-inch fruits. It must have warmth and plenty of food to set fruit, then can be carried on through the fall in a cool house.

*Punica granatum nanum,* dwarf pomegranate. A most attractive small shrub, often with orange-red fls. and small red fruits at the same time. Difficult to find; 'Double Dwarf' and 'Double Red' both have double fls.

*Solanum pseudo-capsicum,* Jerusalem cherry. Attractive clear green lvs. and many light red fruits. Of easy culture. Another var. sometimes called false Jerusalem cherry, is *S. pseudo-capsicum* var.
Appendix F

nanum. And one nurseryman offers seed of hybrids called ‘Craig’s Ornamental,’ ‘Christmas Bell,’ and ‘Scarlet Love Apple’ (the latter S. integrifolium).

Red-flowered

*Abutilon*, flowering maple. There is a red-flowered variety of this attractive shrub.

*Alonsoa warscewiczii*, mask flower, beauty of Peru. An attractive plant with red, winter-blooming fls. in loose clusters that can be treated as a tender annual.

*Begonia*, fibrous-rooted. There are many named red vars. available, including ‘Christmas Cheer,’ a large-flowered crimson, ‘King of the Reds,’ ‘Fire Sea,’ and others. Although begonias come mostly from tropical rain forests, they will bloom in the cool house in winter. It is even possible to root cuttings in an open box in early fall, and have small bushy plants for Christmas.

*Chasmanthe aethiopica, Curtonus paniculatus.* These resemble gladiolus in lvs. and fls. and require much the same culture. They must be started by Aug. for Christmas bloom. One catalog offers a var. ‘Firecracker,’ with red and orange flowers. All have predominantly red bloom.

*Collomia cavanillesii.* This pretty annual is of easy culture and if started in early Sept. should produce many showy clusters of scarlet fls. by Christmas. It is sometimes offered as *C. coccinea* or *C. biflora.*

*Cuphea ignea*, firefly plant, cigar flower. Actually a perennial, this striking plant is usually grown as a tender annual, as it blooms the first season from seed. The fl. has a bright red calyx, with a darker ring at the tip, and an ash-white throat.

*Dahlia*, the dwarf, miniature, and pompon hybrids. There are many beautiful reds among these. Seed sown in Aug. will give blooming plants for Christmas. It is usually sold in mixed colors. Tubers of such named vars. as ‘Spy’ (cardinal red pompon), ‘Bishop of Llandaff’ (scarlet miniature), ‘Ike’ (bright red miniature), or ‘Kochelsee’ (scarlet pompon) could be raised and seed saved. It might also be possible to keep tubers in cool place, moist enough so they didn’t shrivel, and plant them in Aug., though I have never tried this.
Nerine. These beautiful amaryllids, in all shades of red, usually bloom in the fall, but by starting them into growth in October they may be had for Christmas ffs. *N. curvifolia* is a bright scarlet; *N. curvifolia* var. *fothergillii* is a larger edition of the last mentioned; and *N. sarniensis*, often called the Guernsey lily, has as many as ten crimson bells to an umbel; *N. sarniensis* var. *corusca* is a fiery orange-red.

*Pelargonium*, geranium. Among other vars. with red ffs., are ‘Alpha,’ ‘Beckwiths Pride,’ and ‘Poinsettia’ in the large-flowered group, and ‘Red Rose-Bud’ and ‘Pigmy’ in the miniatures.

*Swainsona*, winter sweet pea, darling pea. *S. galegifolia* has red ffs. each about ¾ inch long, in clusters that rise above the feathery foliage.

White-flowered

*Begonia*, fibrous-rooted. Among the white-flowered vars. are ‘White Pearl,’ ‘Geneva White’ (double), and ‘Deliciosa,’ with light green deeply cut lvs., streaked and spotted with silver, adding to the attractiveness of the white ffs. There are many others.

*Helleborus*, Christmas rose. White vars. of the common *H. niger* and of *H. orientalis* can be potted in the fall, and if kept in the coolest part of the greenhouse will open for Christmas.

*Hyacinthus orientalis*. It is possible to buy pretreated bulbs of such vars. as ‘L’Innocence’ which will bloom by Dec. The var. *albulus*, called the Roman hyacinth, is also possible, if bulbs are started by early Sep.

*Narcissus tazetta*, paper-white narcissus. The reliable paper-whites can be counted on to bloom in 6 weeks.

*Pelargonium*, geranium. Although it may be easier to find red vars. than pure white, the latter are possible. ‘Noel’ is a good winter bloomer in the class. ‘Mme. Buchner,’ ‘Snowball,’ and ‘Madonna’ are double whites, and ‘Mrs. Banks’ is white with a faint trace of red at the center.

*Piqueria trinervia*, stevia. Although a perennial, the clusters of white, fragrant ffs. will open by Christmas from seed sown in Mar. They are especially fine for cutting.

*Swainsona*, winter sweet pea, darling pea. *S. galegifolia* var. *albiflora* has pure white pea-like blossoms and feathery foliage.
APPENDIX G

POTTING MIXTURES

1. For potting rooted cuttings
   2 parts sharp sand
   1 part loam
   1 part humus (or peat moss for acid-tolerant plants)

2. For transplanting seedlings and cuttings taken from no. 1
   1 part sand
   1 part loam
   1 part humus

3. For general potting
   1 part sand
   2 parts loam
   1 part humus
   1/2 part dried cow manure
   1 five-inch pot of bone meal to each bushel of the mixture

4. For plants requiring more humus than in no. 3
   2 parts sand
   2 loam
   2 humus
   1/2 part dried cow manure
   1 five-inch pot of bone meal to each bushel of the mixture

5. For potting most hardwood plants
   2 parts sand
   2 parts loam
   2 parts peat moss
   1 part humus
   1/6 part dried cow manure
6. For most cacti and succulents
   2 parts sand
   2 parts loam
   1 part finely broken crock
   1/2 part humus
   1 five-inch pot of bone meal to each bushel of the mixture
   1 five-inch pot of ground limestone to each bushel of the mixture

*Note:* These potting mixtures were taken directly from Norman Taylor's *Encyclopedia of Gardening* with permission of the Houghton Mifflin Company. The same or nearly the same mixtures are found in several other gardening books.
APPENDIX H

SOURCES OF SEED AND PLANTS

Walter Allan, Summerville, S. C. Specialists in camellias, both C. japonica and C. sasanqua. Also fine plants of evergreen shrubs such as osmanthus and ardisia.
The Barnes, Importers, East Aurora 2, N.Y. Wide selection of varieties among commoner bulbs.
Burgess Seed and Plant Co., Galesburg, Michigan. Especially good for unusual vegetable seed but also wide range of flower seed and some house plants.
Cecil Houdyshel, 1412 Third St., La Verne, Cal. Wide selection of amaryllis, calla, gloxinia, and other bulbs.
Margaret Inglefritz, Monroe, Mich. Orchids.
Johnson Bros., P.O. Box 463, Bound Brook, N. J. Imported amaryllis bulbs and limited number of rare bulbs.
Logee’s Greenhouses, 55 North St., Danielson, Conn. Geraniums, begonias, and rare plants.
McLean Bulb Farms, Elma, Wash. Over a hundred varieties of daffodil (Narcissus) and other bulbs. Mostly hardy stock but offers suggestions for forcing.
Merry Gardens, Camden, Maine. Geraniums, begonias, cacti, succulents, and other greenhouse plants.
Oakhurst Gardens, P.O. Box 444, Arcadia, Cal. Excellent source of many rare bulbs.
Geo. W. Park Seed Co., Greenwood, S. C. Seed of many greenhouse plants as well as garden flowers.
Pauer's Greenhouses, Route 1, Box 184, Waukesha, Wis. Foliage plants, begonias, and ferns.
Pearce Seed Co., Moorestown, N. J. Seed of some 3000 decorative plants from all over the world.
Plantation Gardens, R.F.D.1, Rustburg, Va. Specialists in herbs, seed and plants.
Rivermont Orchids, Signal Mountain, Tenn. One of the largest collections of orchids in the country.
Julius Roehrs Company, Rutherford, New Jersey. Wide selection of exotic plants including begonias, bromeliads, and succulents.
R. H. Shumway, Rockford, Ill. Seed of unusual vegetables, herbs, annuals, and perennials.
SunnyBrook Gardens, S. Lancaster Rd., Reynoldsburg, Ohio. Orchids.
Romaine B. Ware, Box F., Canby, Ore. Specialists in lilies.
Wayside Gardens, Mentor, Ohio. Flowering shrubs, plants and seed.
Wilson Bros., Roachdale, Ind. Specialists in all types of geraniums.
APPENDIX I

GREENHOUSE MANUFACTURING COMPANIES

Aluminum Greenhouses, Inc. 14615 Lorain Ave., Cleveland 11, Ohio.
American-Moninger Greenhouse Manufacturing Corp., 1820 Flushing Ave., Brooklyn 6, N. Y.
Balmil, Inc., Box 55, Cogan Station, Williamsport, Pennsylvania.
Lord and Burnham, Irvington, N. Y. and Des Plaines, Ill.
Metropolitan Greenhouse Manufacturing Co., 1855 Flushing Ave., Brooklyn, N. Y.
National Greenhouse Co., Pana, Ill.
New England Greenhouse Co., P. O. Box 69, Rte. 3, Hanover, Mass.
Southern California Greenhouse Manufacturers, 3266 N. Rosemead Blvd., Rosemead, Calif.
Texas Greenhouse Co., Fort Worth, Texas.
Waldor Greenhouses, Box 188, Salem, Mass.
GLOSSARY OF SPECIAL BOTANICAL
AND HORTICULTURAL TERMS

ACID SOIL. Soil with an acid chemical reaction when moist, designated by a scale from pH 7.00 (neutral) to pH 3.00 (very acid).

AERIAL ROOT. A root formed above soil level on a stem. Cuttings with such roots plunged in sand or water, easy method of propagating new plants.

ALKALINE SOIL. Soil with an alkaline chemical reaction when moist, designated by a scale from pH 7.00 (neutral) to pH 9.00 (very alkaline).

ANNUAL. A plant which within a year completes its growth cycle, from seed to flower to seed, and then dies.

APHID. Also called plant lice. Small sucking insects, the young called nymphs, the adult winged flies, which live on the sap of plants.

"B & B." Balled and burlapped. A term used by nurserymen to describe a way of sending nursery stock, dug with earth around the roots, the whole ball wrapped in burlap.

BASAL. Applied to leaves or flowers arising from the soil level, as the leaves of cyclamen.

BENCH. Raised platform with low sides, in which to grow plants in the greenhouse; as a verb refers to planting material in a bench.

BICOLOR. Having two colors.

BIENNIAL. A plant which blooms the second year from seed and then, after setting seed, dies.
BLANCH. To exclude light, preventing the production of chlorophyll in some part of a plant, as the stalks of celery.

BOTTOM HEAT. Heat applied under a propagating box, to give the rooting medium a higher temperature than that of the surrounding air.

BRACTS. Leaves near a flower or group of flowers and different from the foliage leaves; sometimes bright-colored, as those of bougainvillea and poinsettia.

BULB. Applied loosely to many underground parts used in propagation including tubers, corms, etc. True bulbs are composed of fleshy scale-like leaves attached to a flattened stem.

BULB PAN. Unglazed ceramic container, similar to the ordinary flower pot except that it is shallower.

CALLUS. Protective tissue that grows over the cut surface of a cutting, or other wounded surfaces.

CHECK. Temporary retardation of a plant in active growth.

CHLOROPHYLL. Green coloring-matter of plants; with its aid, in the presence of light, plants manufacture food from inorganic materials.

CORM. Main stem which is thick and fleshy, like a bulb or tuber, but without scales and grows underground. Distinguished from a rhizome by its usually vertical growth.

COTYLEDON. The first or seed leaves of a plant (one or two) present in the seed before germination, sometimes containing food used in germination.

COLDFRAME. A bottomless frame with a movable transparent cover (usually with glass panes) set over a prepared seed bed, with a slight slant to the south. Used to protect or propagate plants, utilizing the natural heat of the sun.

COMPOST. Decomposed or partially decomposed vegetable matter, humus.

COOL HOUSE. Greenhouse run at a minimum night temperature of 45°.

CUTTING. A length of stem, 3 to 5 in. long and usually taken from a terminal shoot, used to propagate a new plant. Sometimes referred to as a slip. Leaf cuttings, with or without stalks, and root cuttings are sometimes used for the same purpose.
CROCK. Broken pieces of clay flower pot, used as drainage material.

CROWN. The part of a stem, especially an underground stem, at the surface of the ground, from which buds arise.

DAMP DOWN. To water under benches and over glass areas in a greenhouse with a fine spray, so as to reduce temperature and increase humidity in hot weather.

DAMPING-OFF. A disease due to a fungus, in which young seedlings rot at ground level and die.

DIBBER, DIBBLE. A small round wooden stick with pointed tip of iron or brass, used to make holes in a flat or pot in which to insert seedlings. A pencil makes a good substitute. To dibble is to make the holes and insert the seedlings.

DISBUDDING. Removing side buds or some of the terminal buds in order to strengthen the growth of those which remain.

DIVISION. Propagation of new plants by division of a whole plant, roots and top growth.

DRILL. A shallow trench in which to plant seeds. In a flat, usually no more than a slight depression.

DUCK-BOARDS. Platforms made of slats, nailed to long pieces of board, to use along the walks of a greenhouse.

FAMILY. Plants are grouped into families according to certain flower or fruit structures which they have in common. The related genera of a family may have the outward appearance of similarity, as the flowers of the daisy family; or the connection may be technical and not obvious, as in the rose family, whose genera include not only the rose but the strawberry, the apple, English hawthorn, and flowering quince, to mention only a few.

FEEDING. Fertilizing with either chemical or organic materials.

FLAT. A shallow box (18 × 9 × 3 inches is an average size) in which seed or seedlings are planted. A deep flat may have 5- or even 6-inch sides.

FORCING. Unfortunate term used to describe the process of bringing plants into bloom out of their regular season.

FOLIAGE PLANT. A plant grown primarily for its foliage. The flowers may be insignificant, slow to develop under greenhouse conditions, or lacking altogether as on ferns.

FRIABLE. A term applied to loam in good growing condition for
plants, when a moist handful squeezed together will hold its shape a second and then crumble.

GENERALS. Plural of genus.

GENUS. A group of related species (or one species if it has no close relatives). Relationships within a genus may be obvious or obscure, as with families.

HARDENING OFF. To accustom plants gradually to outdoor conditions after they have been in the heated greenhouse.

HARDY ANNUAL. Annual that can be planted outdoors in early spring while it is still cool. The seed of the hardiest can even be planted in the autumn.

HUMUS. Partly decomposed organic matter; an important ingredient of bench soil, best supplied from the compost pile.

HYBRID. The result of crossing two or more plants usually of different varieties (or species or genera).

INTERMEDIATE HOUSE. A greenhouse run at a minimum night temperature of 50° or 55°.

LEAF CUTTING—See cutting.

LEAN-TO. Greenhouse built against the side of a building, in shape like half of a free-standing greenhouse.

LIQUID MANURE. Fertilizer made by soaking a porous bag of dried or well-rotted animal manure in a pail of water. The resulting solution must be diluted to the color of weak tea, or straw, before using. Artificial manure water can be made by using 1 oz. of ammonium sulphate in 2 gals. of water.

LOAM. Good garden soil made up of a friable mixture of sand, clay, and humus.

MEALY-BUG. Soft-bodied insects covered with a white powdery substance, which attack some greenhouse plants; easily recognized. Best controlled by touching each one with tip of toothpick, wrapped in cotton, and dipped in alcohol, or nail-polish remover.

MILDEW. Many diseases caused by fungi are so called; known usually by a gray web or powdery growth on the leaves of the infected plant. Sulphur is the best preventive.

MULCH. A layer of some material, such as peat moss or dried cow manure, spread on the surface of the soil to conserve moisture and keep down weeds; if eventually dug in, it also improves soil texture and may add some nutrients.
OFFSET. Small bulbs or shoots springing from the base of a parent plant which can be carefully detached and potted separately to provide new plants.

OVERPOTTING. Moving a plant into a larger pot before it is necessary or planting it in a pot that is too large.

PEAT MOSS. A sterile, partly decomposed fibrous soil-conditioner, with an acid reaction, used primarily for its ability to absorb and hold moisture.

PERENNIAL. A plant which lives three or more (usually more) years. A hardy perennial can stand the cold of northern winters. A tender perennial is one that must have a temperature above freezing throughout the year.

PINCHING BACK. Removing some top growth, or the top of a main stem, from a plant, to induce branching.

PIP. A small bulb.

PLUNGING. To place a potted plant up to its rim in soil. Usually refers to tender greenhouse plants so treated during the summer months.

POT. A brick-colored, unglazed ceramic plant-container, in common use, in various sizes, in greenhouses.

POT-BOUND. A plant is said to be pot-bound when its roots almost or quite fill the pot.

POTTING BENCH. A table or stand, usually with low upright boards on three sides, on which to pot plants or seedlings.

POTTING MIXTURE. A formula for potting plants with certain requirements. See Appendix G.

POTTING STICK. A short blunt stick, used to tamp down the soil around a plant when potting.

PRICK OUT or PRICK OFF. To carefully lift, separate, and transplant seedlings from their original seed box or flat.

PLANT HORMONES. Chemical substances formed by plants which regulate their growth. The same and related substances are obtained synthetically and sold under many trade names to stimulate root growth of cuttings. In greater concentrations, some are used to kill weeds.

POTTING ON. Moving plants from one pot to the next size larger, as they grow.

PROPAGATION. Producing new plants by various means, in-
cluding seed, stem, root, and leaf cuttings, division, and air layering.

**RACEME.** Inflorescence composed of flowers on stalks arranged along a central stem. The flowers usually open from the base upward.

**REST PERIOD.** A more or less dormant period, during which a plant makes no new growth, and should be kept on the dry side. Such a period is part of the life cycle of most cultivated perennials, even briefly of plants said to be ever-blooming. It usually precedes new growth and flower-buds.

**RHIZOME.** A horizontal underground stem, such as that found in German iris; usually thick and fleshy.

**ROOT-BOUND—**See pot-bound.

**SCALD.** Areas on leaves which look as if they had been burned; due to too much strong sunlight.

**SEEDLING.** A plant raised from seed, in its initial stage.

**SHADING.** Thin applications of some opaque substance put on greenhouse glass in late spring and summer to lessen the strength of the sun's rays.

**SHOOT.** New top growth.

**SLIP.** A cutting of new, succulent growth.

**SPECIES.** A group or population of plants alike in most of their characteristics. A species is always named with two words, the first being the name of the genus to which it belongs. *Phlox drummondii* is the name of a species of the genus *Phlox*.

**SPIKE.** Inflorescence like a raceme but the flower-stalks very short or lacking.

**STEM CUTTING—**See cutting.

**STOCK.** A particular group of plants, as a certain grower's nursery or greenhouse stock.

**TENDER ANNUAL.** An annual which cannot stand cold weather, and must usually be started under glass to complete its cycle in cool climates.

**TOP DRESSING—**See mulch.

**TUBER.** A fleshy root or underground stem, as sweet potato (root) and potato (stem).

**UMBEL.** An inflorescence formed of flower-stalks which radiate from one point on the stem.
VARIETY. A subdivision of a species; for instance, *Phlox drummondii* var. *grandiflora* is a tall variety of *P. drummondii*, while *P. drummondii* var. *nana*, is a dwarf variety.

VERMICULITE. The trade name of a type of mica, so treated that it is light, sterile, and extremely absorbent. It is useful as a rooting medium, soil conditioner, and source of humidity when placed, damp, in a bench on which pots are stood.

VIABILITY. Life span of ungerminated seed; length of time seed is capable of germinating.

WARM HOUSE. Greenhouse run at a minimum night temperature of 60° or more during the winter.

WHITE FLY. Small sucking insects, the adults resembling tiny white moths, which multiply rapidly and can do considerable damage in a greenhouse if not checked; D.D.T. or parathion will kill them.

WILT. A diseased condition of a plant caused either by inadequate supply of water or by a parasite (fungus or bacterium). If sufficiently prolonged, any wilting may result in death, especially to seedlings.
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