Living

WITH HOUSE PLANTS

PROPERTY OF
WILLIAM R. GARREN

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Caladium. See page 76.

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Introduction

The magic in plants and flowers has captured the imagination of man through the ages. Many civilizations have shared the love for ornamental plants and various reasons have been offered to explain man's interest. These range from mere fascination, or an inherent feeling for their animate qualities and their natural beauty, to something that must be cultivated like the appreciation of fine music and art. Whatever the reason, it is a fact that many people, particularly those of Western Europe, will buy plants and flowers even if it means they must forego some of the mundane necessities of life.

In recent years, plants in the home have become fashionable, in addition to being wanted for their own beauty. Architects and interior decorators now realize and appreciate the atmosphere of warmth and life created by plants. Consequently, contemporary home designs nearly always include locations for plants. Older, more conventionally styled houses also afford appropriate settings, but since less thought was given to plants in their design, the choice of good locations is more limited.

In choosing plants for the home the two major considerations are (1) the brightness of the location and (2) the most suitable size of plant. The brightness of the location largely determines what plants can grow there satisfactorily; some plants require more light than others. The size of the plant should be in keeping with the location. One should not set a five-foot plant on top of a piano or a tiny cactus in a bare corner of a large room. These are exaggerated examples, but they illustrate the need for care in selecting the best plant for a particular location.

Fortunate are those who can appreciate that in the growth and development of a plant they are seeing one of the greatest phenomena of this earth. The tiny thread of living fiber where there was only bare earth the day before; the unfolding of the young embryonic leaves; the gradual development from bud to flower; all these phases in the growth of a plant overshadow even the most intricate nuclear marvel man's genius has ever created. For in the growth of plants we are dealing with life.

As living things, plants must have certain environments and foods to flourish. And since there are many kinds of plants, different conditions are required for growth. Fortunately most house plants are capable of surviving under many conditions. In fact, one of the marks of a good house plant is its ability to withstand abuse.

Chapter I

How Plants Grow

One need not be a plant scientist to be successful with house plants. Some fortunate people, said to have "green thumbs", have the knack of doing the right thing at the right time for their plants. But if you are not one of these gifted people, it helps to have an understanding of how plants grow. The important thing about plant growth is that plants are alive, and because they are living, they respond to environment. Environment can be complex and variable, and to keep plants growing, the effects of the various factors must be appreciated.

Human beings have something in common with plants. Both are living things, composed of cells grouped into various organs to perform certain functions. As human beings, we have organs of sight, of hearing, of breathing, etc. Plants also have various organs, each of which has a specific function to perform. For example, the leaves are primarily concerned with the manufacture of food; the roots absorb moisture and minerals and serve to anchor the plant; the stem supports the plant; and the flowers are the reproductive organs. These various functions are usually called plant growth processes and all are sensitive to the environment. To understand how the environment affects plant growth, let us first consider some of the more important processes and see what the environment does to them.

PLANT GROWTH PROCESSES

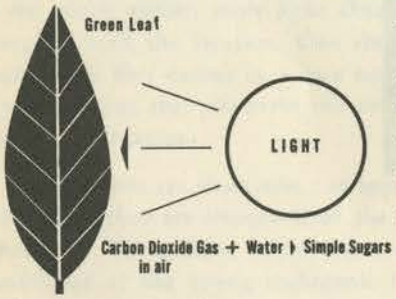

Fig. 1. Photosynthesis is a food manufacturing process which takes place only in the presence of light.

The utilization of light energy to convert gases from the atmosphere and water absorbed by plant roots into stored energy, which can be released later, is one of nature's greatest and most wonderful secrets. In the presence of adequate light the green cells manufacture simple sugars from carbon dioxide and water. This building-up process is called "photosynthesis".

In the illustration above, only the essentials are shown. Actually, the process is very complex and later it will be shown how other environmental factors can affect photosynthesis.

In order to grow and develop, the plant must have energy. This is supplied when the sugar compounds are broken down and the stored energy is released. The burning of a log is much like this. In both cases combustion results in the release of heat energy. This energy releasing process is called respiration.

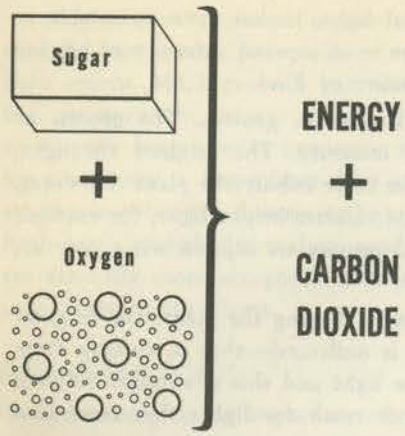

Fig. 2. Respiration is a breaking-down process in which energy is released.

In contrast to photosynthesis, respiration goes on continuously, whether light is present or not. Not all of the sugars manufactured are broken down. Some are changed into more complex sugars and starches; others combine with the chemicals absorbed by the roots, from the soil, to form plant proteins and fats.

As mentioned, the roots absorb chemical nutrients in solution from the soil, but in addition they have the ability to absorb moisture. Both the nutrients and the water pass upward through complex canal systems, to keep the cells turgid and supplied with raw materials. It might be mentioned that the upward passage of the various chemical elements and of water proceed independently. This means that a plant that absorbs twice as much water is not necessarily getting twice as much nutrients.

Plants are constantly giving off water vapor into the air, a process called transpiration and somewhat similar to the evaporation of water from a dish. The amount of water lost by transpiration is great—something like 100 times more than is used by the plant in its various life processes. As yet there is no definite explanation for the role that transpiration plays in plant growth. Humidity, temperature, and light are the main factors affecting transpiration. A low humidity, high temperature, and bright light all increase the rate of water loss. As with evaporation of water from any surface, air movement is also an important factor affecting rate of transpiration.

ENVIRONMENT

The processes that determine how a plant grows are controlled by the tiny bit of world surrounding it. Light, temperature, humidity, soil nutrients, and moisture all have their effect on the plant's height, health, strength and thus on its rate of growth in general.

LIGHT

Light is one of the most important above-ground factors of plant environment, and the most abundant and efficient source of light is the sun. Although man

has been able to produce remarkable artificial light, he has never been able to match sunlight for brightness. Light has three main aspects: intensity or brightness, duration (length of daylight), and quality or kind.

Generally, the brighter the light, the better the growth. The process of photosynthesis is regulated largely by light intensity. The brighter the light, the more food produced and consequently the more robust the plant. However, there are many exceptions. Some plants cannot tolerate bright light, for example plants that originate in the dense forests and jungles are injured when they are placed under high light intensity.

Relative light intensity is also important in shaping the plant; the brighter the light, the shorter the plant. When light is unilateral—that is, coming from one direction—plants often grow toward the light and this is wrongly referred to as "reaching for the light". Plants do not reach for light; they bend that

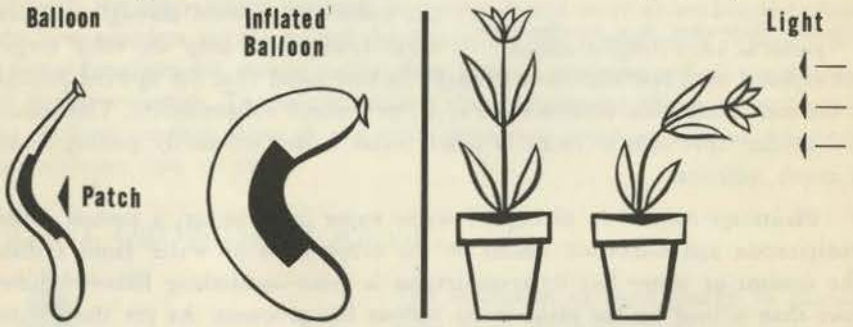

Fig. 3. Plants grow towards light because of uneven growth.

way because of the uneven rate of growth of cells on opposite sides of the stem. Cells do not lengthen rapidly in bright light and this accounts for less growth on the side facing the light and more growth on the side more or less in the shadow. This can be illustrated by fastening a patch to the side of a long rubber balloon. When the balloon is inflated, the patched side is restrained, causing the balloon to curve. To produce plants of even shape, when light is strongly unilateral (as in a window), turn the plant slightly each day.

The duration of light normally means the time of light exposure; but with respect to plant growth, the duration of light refers to the length of light in relation to the dark period in any 24-hour cycle. Whether the days are long or short is important—particularly in the development of flowers in many plants. Some plants like Chrysanthemums and Poinsettias will begin flower development only when the day-length is short. Others need a long day-length and still others respond to either long or short days. Commercial flower growers take advantage of this phenomenon to control the flowering of certain plants almost at will.

Light quality is not important when plants are grown under natural sunlight but it must be considered when artificial illumination is to be the *sole* light source. Much research has been directed on the problem of light quality but the optimum balance is still unknown. Light rich in reds tends to make stems grow longer and is important in the day-length phenomenon. A blue light has a tendency to keep plants short and stocky. Most incandescent types of light are rich in reds while fluorescent lights are more in the blue part of the spectrum. Both kinds of lights have been used for growing plants, but fluorescent lights are generally more acceptable because they give off less heat and thus can be used closer to the plants.

TEMPERATURE

Temperature plays an important role in plant growth; it largely determines the speed of the various processes. The great variety of house plants makes inevitable a wide range in required temperatures, so it is always wise to find out as much as possible about the plants being used and try to place them in an environment as suitable as available means allow.

In general, plants require a lower temperature at night than during the day. This fact fits in with normal house temperatures. Most house plants will tolerate considerable variation in temperature. The Canadian home of today is usually warm, thus tropical foliage plants find the environment to their liking. This is also the reason why so many traditional house plants such as cyclamen and Christmas begonia are losing favor. These plants have fairly low temperature requirements, and with the more efficient heating systems of today there is not always a cool spot for them.

AIR

The gases in the air are usually sufficient to support good plant growth, but the atmosphere in a tightly closed area might be deficient for optimum growth. The two most important gases are carbon dioxide and oxygen. It will be recalled that carbon dioxide is one of the elements required for photosynthesis, while oxygen is needed for respiration or the breaking-down process. In most homes, the opening of doors and the inevitable leaks around doors and windows create the necessary air changes, but ventilation by opening windows will help. In cold weather, do not forget that plants should be taken out of the direct path of the entering cold air. More plants than one would imagine have mysteriously died after such treatment. Gases harmful to plants include those that result from the incomplete combustion of natural gas, oil, or even coal, and some plants are more sensitive than others.

HUMIDITY

Humidity—the amount of moisture in the air—is probably the most serious limiting factor for good plant growth in many homes. This is especially true in winter when homes are heated and the air is very dry. Humidifying systems are helpful but they are seldom effective enough to do the plants much good. More benefit will come from frequent syringing of the plants with tepid water. Not only will this raise the humidity around the plant, but it washes dust and lint off the leaves. Usually, the plants must be carried to the kitchen sink or bathroom for this operation. However, plants may be syringed without moving them if a large atomizer or small sprayer is used carefully.

SOIL

Soil should be basically fertile and friable, with many air spaces, and easily crumbled between the fingers. It should be capable of maintaining this condition for a long time. The soil has three main functions in the growth of plants; it acts as a reservoir for mineral nutrients, it is a sponge from which roots draw water, and it is a source of oxygen for the roots. A rich soil contains a good supply of nutrients but excess applications of fertilizers particularly in inorganic forms can be harmful.

The soil moisture should be carefully maintained as a deficiency would cause the plant to wilt. Slight wilting would mean the slowing down of the growth processes. Severe wilting can cause death to some cells which will show up later as a browning and drying of the leaf edges. An excess of moisture in the soil would fill up the air spaces and prevent the plant from getting its required supply of oxygen. Oxygen is required for respiration in the roots. When a lack of oxygen causes the respiration to slow down or cease, root activity also slows or stops. Poor drainage is usually the cause of oxygen deficiency.

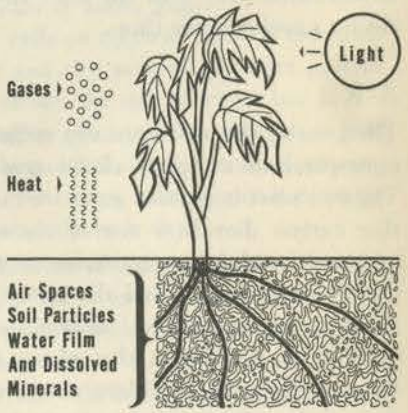

Fig. 4. To grow plants successfully, all plant growth factors must be considered in relation to each other.

SUMMARY

In the growth of plants each factor must be considered in relation to all the other factors necessary for good plant growth. For example, the best soil in the world will not grow plants if water or light or heat is lacking. This balance of the many varying factors provides the flower grower with his greatest challenge.

Chapter II

Plant Growing Practices

In this section the practical side of growing house plants is discussed. Topics range from starting new plants to the control of insects and diseases. There are various ways of doing things and if you happen to be following successfully any particular methods in plant growing by all means stick to them. But if you have had difficulties, follow the outlines presented here and success is practically assured.

GROWING PLANTS FROM SEED

Follow these rules and starting plants from seed will not be difficult. Seeds may be started in peat, soil, sand, a mixture of the three, or vermiculite. Whatever the medium, it should be sterile and well drained. One of the greatest problems in germinating seed is a disease called "damping-off". The organism responsible for damping-off attacks young seedlings at the surface of the soil making them topple over and die. The stems appear as if they have been pinched. A sterile medium is the answer to this problem. How to sterilize any medium will be discussed later. When vermiculate is new, it is sterile and does not require treatment.

Place one inch of soaking wet peat moss at the bottom of the container, cover with one inch of soil, then cover the soil with half an inch of sand. Level

Fig. 5. Preparation of seed flat.

and firm the layers with a flat piece of board, then make shallow trenches with a thin piece of wood and sow the seeds in them. The depth of the trenches should vary with the size of the seed. Fine seeds will do better in an open shallow trench but large seeds will need a deeper trench and will benefit from a light covering of screened soil or a mixture of soil and peat. Cover the seeded flat with a piece of glass to keep the humidity high but be careful to remove this glass as soon as the seedlings grow up to it. To avoid disturbing the seeds, water the flat by placing it in a shallow pan of water and allowing the moisture to soak in. Germination of most flower seeds requires a temperature of between 65 and 70° F. When the seedlings are large enough to handle, transplant into flats or directly into pots.

STEM AND LEAF CUTTINGS

Raising young plants from cuttings requires very little equipment. Although Saintpaulia leaves, Philodendron, and Chinese Evergreen can be rooted in water, most cuttings, including the ones just mentioned, root better in sand, a mixture of sand and peat moss, or vermiculite (horticultural grade). Rooting hormones are useful in the propagation of house plants. In most cases they shorten the time required for rooting. Some of the hormones are in a dust form and these are applied by dusting the cut end lightly with the powder. Others are liquid and are used by dipping the cuttings in the solution.

Cuttings should be trimmed at the ends with a sharp knife so that no ragged edges remain, otherwise they may rot and spoil a good cutting. The size of the cutting does not matter except that the larger the cutting the more difficult it is to keep it from wilting.

When the cuttings are ready make a hole in the medium with a pencil or pointed stick and insert the cutting just deep enough to remain upright, then water thoroughly to settle the medium around the stem. If an air pocket is left around the stem, it will dry out and damage the cutting. If cuttings are rooted in water alone, cover the top of the container with heavy wax paper and fasten the paper with an elastic band. Then poke holes through the paper and insert the cuttings through the holes into the water. Success with this method depends on changing the water frequently to replenish the oxygen. Blowing into the water with a straw aerates the water and thus increases the oxygen content.

When the cuttings are all set, they should be put under conditions of high humidity, warmth, freedom from drafts and out of direct sunlight. These conditions can easily be provided by inverting a large jar over the cuttings.

Never let the medium dry out. Check every day to be sure that it is damp because a single period of drying out can set the cuttings back or may even ruin them. When the cuttings show roots about one-half inch long lift them out and plant them in soil. The first soil used should be low in nutrients since a very rich soil will burn the roots.

Figure 6 shows the preparation and rooting of Saintpaulia leaves, Chinese Evergreen stems, Sansevieria leaf, Coleus and Nephthytis stems. Each stem section of the Chinese Evergreen will provide a new plant. The Sanseviera leaf is merely cut into two-inch sections and each section eventually becomes a new plant.

AIR LAYERING

Propagation by air layering allows roots to form on shoots while they are still attached to the parent plant. Thus a fairly large shoot can be rooted and a good sized plant obtained. This method is most valuable in renewing a plant that has grown too large or has become unattractive because it has lost its lower leaves. After growing for several years, plants such as the common rubber plant and various Dracaenas and Dieffenbachias need to be air-layered to keep them short and attractive.

The actual operation is very simple. Select the length of shoot required and cut a notch in the stem where the roots are to be formed. The notch can be kept open by inserting a wooden match stick. If the stem is large enough, several notches can be made. Dust the wound lightly with a rooting hormone, wrap a handful of wet sphagnum moss around the stem and tie it securely. Keep the moss moist and rooting can be expected within six to eight weeks. Loss of water from the moss can be reduced by wrapping it with a piece of plastic.

DIVISION

As plants mature, some will form young plants at the base: Saintpaulias grow in multiple crowns; Episcias and many ferns produce runners with young plantlets at the ends; and some orchids will form young bulbs at the sides of the parent one. All of these can be propagated by division.

Turn the plant out of its pot and examine it to see where the new plants are established. Use a knife to cut through the soil ball so that each new plant can be separated with some roots attached to it. Pot in a container of suitable size and do not expose the newly divided plants to full sunlight for about ten days.

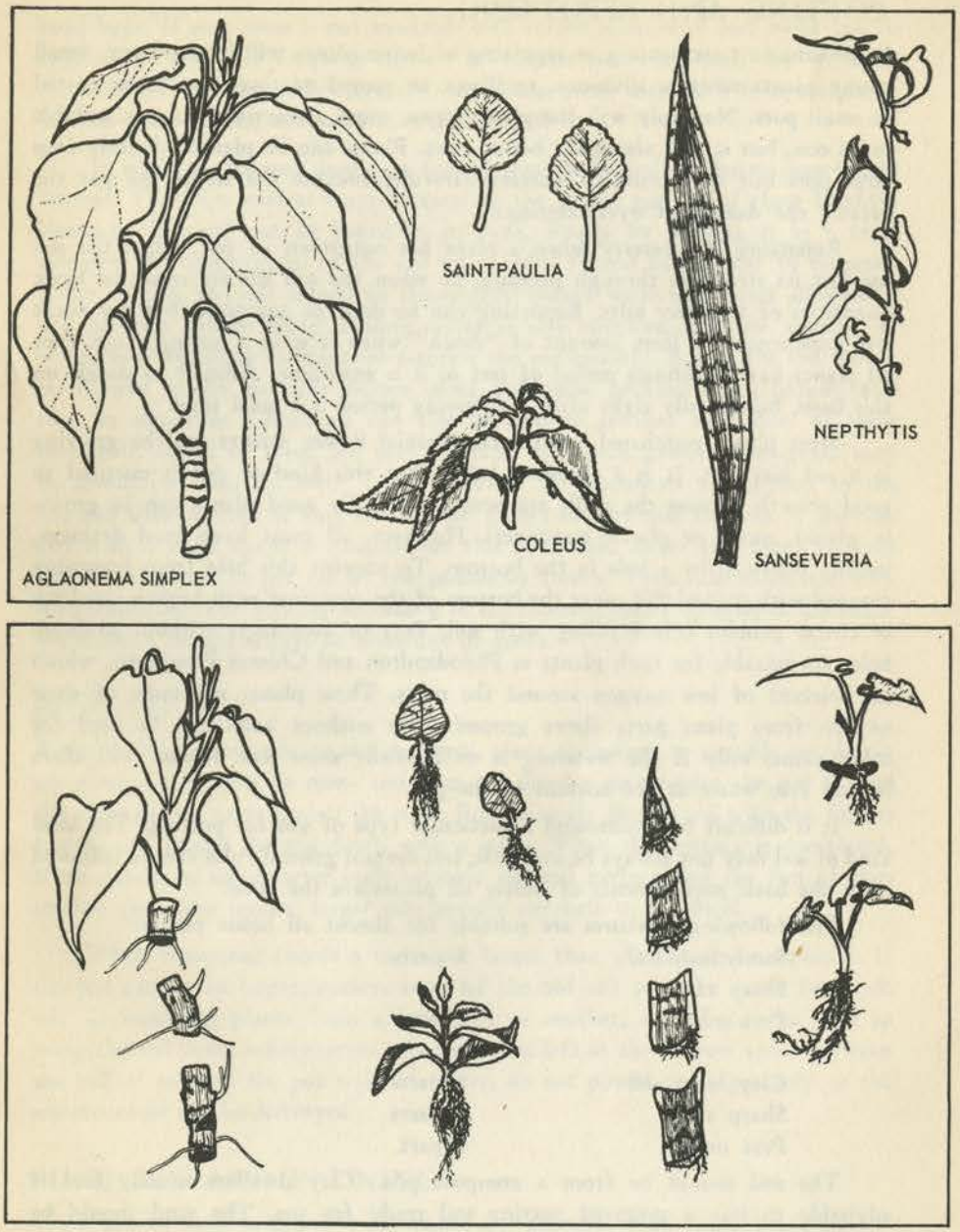

Fig. 6. Propagation of house plants.

POTTING AND REPOTTING

From time to time potting or repotting of house plants will be necessary. Small young plants whether divisions, seedlings, or rooted cuttings should be potted in small pots. Not only will the plant appear more attractive in a pot suitable to its size, but it will also get a better start. Plants can be planted directly into large pots but they must be watered carefully because the larger the pot the greater the danger of overwatering.

Repotting is necessary when a plant has outgrown its pot, when the soil has lost its structure through packing, or when the soil has accumulated toxic quantities of fertilizer salts. Repotting can be done at any time, but the plant will experience the least amount of "shock" when it is in a resting stage. Not all plants have a definite period of rest so it is sometimes difficult to decide on this basis, but usually right after a flowering period is a good time.

Most plants purchased from a commercial flower grower will be growing in a red clay pot. It is a common belief that this kind of pot is essential to good growth because the walls are porous. Actually good plants can be grown in glazed, metal or plastic containers. However, all must have good drainage, usually provided by a hole in the bottom. To prevent this hole from becoming clogged with packed soil cover the bottom of the container with broken crockery or coarse pebbles before filling with soil. Pots or containers without drainage holes are suitable for such plants as Philodendron and Chinese Evergreen, which are tolerant of low oxygen around the roots. These plants get some of their oxygen from plant parts above ground. Pots without holes can be used for other plants only if the watering is so carefully done that seldom will there be any free water at the bottom of the pot.

It is difficult to recommend a particular type of soil for potting. The ideal kind of soil may not always be available, but certain general rules can be followed since the basic requirements of nearly all plants are the same.

The following mixtures are suitable for almost all house plants:

Sandy loam soil	3 parts
Sharp sand	1 part
Peat moss	1 part
	or
Clay loam soil	2 parts
Sharp sand	2 parts
Peat moss	1 part

The soil should be from a compost pile. City dwellers usually find it advisable to buy a prepared potting soil ready for use. The sand should be sharp, that is coarse and free of fine silt. Peat moss is readily available in different

sized bags. If peat moss is not available well-rotted manure or leaf mold can be substituted. Both are frequent carriers of diseases and when used the soil mixtures should be thoroughly sterilized. Sometimes fresh manure will injure plants because of the excess ammonia that is given off.

In addition, the soil should be free of weed seeds and soil-borne insects and diseases. There are various ways of treating the soil to get rid of these harmful elements. The soil can be baked in an oven, simply by putting it in a tray, bringing the temperature of the soil up to 200° F. and baking for 30 minutes. After baking, the soil should be thoroughly soaked with water and allowed to dry partially before using. Boiling water is also effective, but the amount of water used should be sufficient to saturate the soil quickly. Again, the soil should be allowed to dry partially before using, otherwise packing and puddling will ruin its structure. Chemicals can also be used to sterilize soil. Most of these chemicals, liquid or dust, are just a means by which gaseous fumigants may be introduced into the soil. To be effective the chemicals are applied to the soil and then covered so that the released gases can permeate the soil. A garbage can with a tight cover is suitable for this operation. After treatment the soil should be spread to get rid of the poisonous fumes. These chemicals are very dangerous; use them strictly according to the manufacturers' directions. Chemical sterilization should always be done out of doors.

HOW TO POT

When potting young plants and seedlings, plant as shallow as possible for deeply set plants are subject to root- and stem-rot diseases. In firming the soil around the roots do not press *against* the stem. Press directly downward with the fingers but do not pound the soil down with a stick. When the potting is completed, there should be one-quarter inch between the soil surface and the rim of pots smaller than four inches; larger pots require one-half to one inch.

When repotting, choose a container larger than the pot to be replaced. If the pot cannot be larger, remove some of the old soil to make room for fresh soil. In repotting plants from a large pot to another, a stick can be used to tamp the soil down otherwise air spaces may be left in the narrow space between the ball of soil and the pot wall. However, do not pound too vigorously or the soil structure will be destroyed.

PINCHING AND PRUNING

Much can be done to improve the shape and appearance of many house plants. The growing point of a stem may be removed by pinching. This does more

than terminate its growth at that point; usually it causes the plant to branch out with several stems. Pinching should be done according to a definite plan, and before a plant is permitted to grow too high. Plants such as the common rubber plant, geraniums, and coleus need to be pinched so that they will become bushier. While very succulent stems can be pinched off with the fingers, the stem tips are removed more satisfactorily with a sharp knife. When making the cut, choose a point just above a node or leaf joint. This will permit the leaf to develop as a continuation of the plant with no bare stem showing.

Some older woody plants may require a more severe cutting back of the stem. Older geranium plants, hydrangeas, azaleas, and poinsettias may need to be pruned in order to start new growth. Pruning shears are needed to prune the branches back to just above a node.

WATERING

"How often and how much should I water my plants?" is a question frequently asked. It is an important one because improper watering kills more plants than any other plant-growing practice. No fixed rule can be given, for each plant must be considered individually. However, all that is required is an understanding of some of the factors involved and the application of a little common sense.

As stated previously roots absorb water from the soil and a great deal of this water is lost from the leaves by transpiration. Consideration of the main factors involved in the loss of water will give some indication of how much must be replaced. It is obvious that a large plant needs more water because there is a greater leaf area. In addition, low humidity, high temperature, and bright light all increase the rate of transpiration or water loss. Plants under these conditions need to be watered more often, while a small plant growing in a cool, humid location needs little watering.

Overwatering is just as harmful as underwatering. Overwatering tends to reduce the air content of the soil and without sufficient air the roots are unable to function properly. On the other hand, underwatering causes the plant to wilt and severe wilting may cause permanent damage.

The idea is to water only when necessary. Experienced plantsmen use one or all three of the following signs to determine the need for water.

1. Tapping the pot. A hollow sound means that the ball of roots and soils has dried sufficiently to shrink away from the wall of the pot. A dull thud indicates that the soil is still moist.

2. Estimating the weight. A plant in need of water is comparatively light in weight. If it is heavy, the soil is still moist enough. Lift a plant just after it is watered and you will know what it should weigh.

3. Judging by the color of the soil. Most soils when wet are darker than when dry. This is not always reliable; if only the surface is dry, this does not mean that the plant is ready for more water.

How *much* water to give is also important. The soil should be thoroughly wet, then all excess water that drains through the pot should be removed. Do not water by giving little drips frequently.

There are three main ways of watering a plant. The most common one is to thoroughly wet the soil by pouring water on the surface. Another method is to set the pots on saucers or trays of water and allow the soil to absorb the water through capillary action. In either case the surplus water should be removed. For those who like to grow plants without too much attention, the third or wick method is recommended. Several commercial wick-pots are on the market, or home-made ones will serve. All that is required is a pot with a drainage hole, a short piece of glass wool wick, and a tray with a shelf in it.

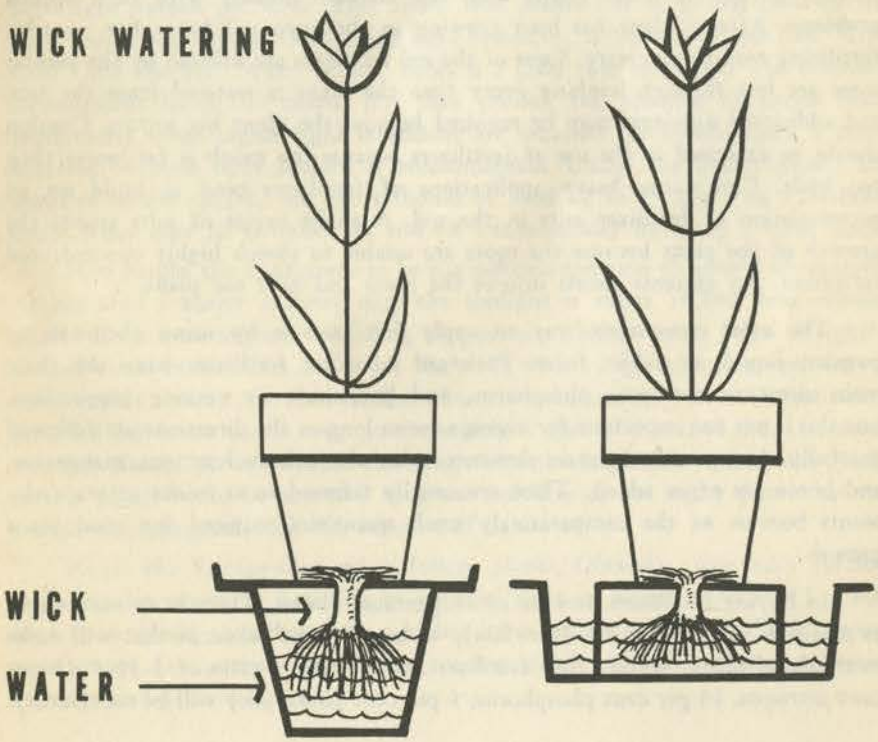

Fig. 7. Automatic or wick-watering.

An inverted shallow saucer with a hole drilled through the center also serves as a support. Both ends of the wick should be tufted to increase the areas of contact. The soil is in direct contact with the wick and by a capillary action water moves into the soil. This method avoids under or overwatering. Once a month the plant should be watered from the top to wash down salts that have a tendency to concentrate at the soil surface.

Certain kinds of water are harmful to plants, for example, hard water adversely affects those plants that grow naturally in an acid medium. Again, water softeners, particularly the kinds that replace calcium with sodium, also cause trouble. After prolonged use, water softened in this way causes sodium to concentrate in the soil. Therefore, if your tap water is hard, or is commercially softened, use rain water or melted snow whenever possible.

FERTILIZING

Most fertile soils contain all the necessary nutrients for good plant growth. On rare occasions, house plants may show a lack of some minor element, but the average grower of house plants need not concern himself with these special problems. After a plant has been growing in the same soil for a few months, fertilizing may be necessary. Some of the soil nutrients are utilized by the plants; some are lost through leaching every time the plant is watered from the top, and additional nutrients may be required because the plant has grown. Caution should be exercised in the use of fertilizers because too much is far worse than too little. Continuous heavy applications of fertilizers tend to build up an accumulation of fertilizer salts in the soil. A slight excess of salts stunts the growth of the plant because the roots are unable to absorb highly concentrated fertilizers. An extreme excess injures the roots and kills the plant.

The most convenient way to apply fertilizers is by using chemicals in powder, liquid, or tablet form. Packaged complete fertilizers have the three main elements, nitrogen, phosphorus, and potassium, in varying proportions, but this is not too important for average use so long as the directions are followed carefully. Along with the main elements, other elements such as iron, manganese, and boron are often added. These are usually referred to as minor or trace elements because of the comparatively small quantities required for good plant growth.

In buying fertilizers, beware of exaggerated claims. There is no such thing as magic in fertilizers nor is there likely to be a "secret" element that will make your plants bloom better. Any fertilizer approaching a ratio of 5-10-5 (5 per cent nitrogen, 10 per cent phosphorus, 5 per cent potassium) will be satisfactory.

If no directions are given, a good guide is one-quarter teaspoon of fertilizer to a 5-inch pot; a larger pot will need slightly more. Do not repeat more often than once every two or three weeks. For quick response, the liquid or soluble crystal types of fertilizers are recommended. It should be pointed out, however, that an excess of liquid or soluble fertilizer is more harmful than the common powder form because it is readily available, while the latter tends to dissolve more slowly.

USING ARTIFICIAL LIGHT

Artificial light must be considered under two headings. "Supplementary light" and "Sole source of light". When intended merely as a supplement, the kind of light, the brightness, and the temperature effects are not important because natural light is the principal source of illumination. But if the plants are to be grown solely under artificial light, the kind of light, the brightness, and the length of time it is used become very important.

Plants have been grown under many kinds of light, but the most suitable source for home use is the fluorescent tube. It is a relatively cool light with a high light output per watt. This means that plants can be grown close to the light source and receive a fairly high light intensity. A balance of one-half "daylight" and one-half "warm white" tubes is a good rule to follow. The ordinary incandescent lamps are useful but they present the problem of excess heat, particularly when higher light intensities are required. In special cases, a combination of both light sources is recommended. Unless the plants grown are sensitive to day-length, the lights should be used 12 to 15 hours in a 24-hour cycle. They may be switched on and off automatically by using a time clock.

How bright the light needs to be is a difficult question to answer accurately. At noon on a sunny summer day, the sunlight is about 10,000 foot candles (f.c.). If we were to pack the ceiling of a room with fluorescent tubes as tightly as they could be installed, and paint the walls with a high reflecting surface, we could expect about 2,500 foot candles when the tubes are new. In the installations intended for home use, a very good one might give 600 to 800 f.c. but most will run about 200 to 500. At this range of light brightness or intensity, only certain plants could be expected to grow and flower, but many plants can be started or propagated with this amount of light.

Plants like Saintpaulias, many foliage plants, Gloxinias, and other forcing bulbs can be grown to flowering in artificial light no higher than 500 f.c. But even these would grow better at a higher light intensity. The low light is very satisfactory for germinating seeds, rooting cuttings, and starting tuberous begonias and Gloxinias.

SUPPLEMENTARY LIGHTING

A fluorescent tube concealed in a valance, lamps with a planter at the base, and modern spotlights are examples of supplementary lighting. Judicious use of spotlighting is effective in focusing attention on a plant and can often help create a new atmosphere in the room itself.

SOLE SOURCE OF LIGHT

Plants may be grown solely under artificial light in a decorative plant case or in a functional box. A decorative case with sliding glass doors might be located in the living room. A simple box is all that is needed in the basement. An enclosed area is recommended because it aids in the control of temperature and humidity and improves the efficiency of the light.

Basic plans and details for a simple box are discussed below. Depending on personal tastes, many improvements and features can be added.

The box can be made of plywood. The dimensions as shown in the illustration are 3 ft. high, 3 ft. wide, and 4½ ft. long. One side hinged at the bottom, serves as the ventilating control and is convenient for handling the plants. A piece of strap iron with a saw-tooth edge fastened at one end permits the side to be opened at any angle.

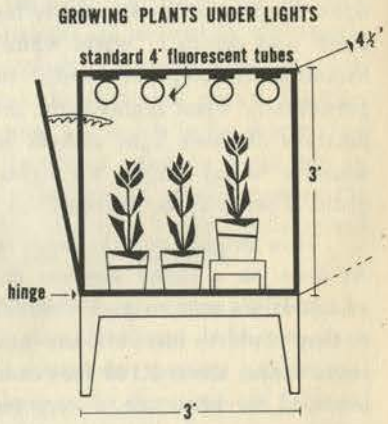

Fig. 8. A plant growth cabinet.

Four single 4-foot fluorescent tubes or two industrial fixtures, each with two tubes, are mounted at the top of the box. The lights can be hung from the top and made adjustable with pulleys but the simplest arrangement is to have the lights fixed and bring the plants up to the light by setting them on boxes or shelves. The interior of the box should be given a coat of glossy white paint to improve the reflection of the light. The decorative case need be only one-half of the width and, of course, two fluorescent tubes would then be sufficient. The exterior can be finished in various plywoods to match the furniture of the room.

If the air temperature of the basement is 50 to 60° F., opening the cover 3 to 4 inches when the lights are on will give a temperature of 72 to 75° F. When the lights go off, the temperature will fall to about 60° F. This range of temperature is suitable for a wide variety of plants. If the temperature of the basement is warmer, more ventilation is required, but in cool basements a few incandescent bulbs may be needed to obtain the desired temperatures.

If the box is filled with plants and seed boxes, the humidity will be high enough from the transpiration and evaporation. Where there are only a few plants, damp peat moss under the pots will be beneficial.

Chapter III

Diagnosing Plant Troubles

Plants may be affected by numerous disorders from time to time but much can be done to control or prevent these troubles. Prevention of plant troubles is generally easier than trying to control them. One of the best preventives is to buy and accept as gifts only clean healthy plants. Examine all new plants carefully before putting them among healthy ones. The undersides of the leaves, the young growing leaves and buds, and the flowers are the most vulnerable parts of a plant and these merit special attention.

Generally, plant troubles are caused by physiological disorders, pests, or diseases. Physiological disorders result mainly from lack of care or improper environment (water, temperature, and plant food). Pests refer to insects that may attack the roots, leaves or flowers. Diseases may be caused by fungi, bacteria or viruses.

Physiological troubles: The most prevalent physiological disorder in house plants is caused by excess watering. In an earlier section it was shown that over watering in itself is not harmful but it creates a condition in which the air is displaced by water, thus preventing the plant roots from obtaining sufficient air. When soils are waterlogged the roots do not function properly and the plants appear wilted as if more water is needed. This is exactly the remedy often given and, of course, it just makes the plants worse. In severe cases, the leaves turn yellow and drop. Examination of the root system when this happens usually reveals brown decaying roots. The remedy is less frequent watering or improved drainage. Insufficient watering also causes wilting but unless it is severe the plant usually recovers without injurious effects. Frequent wilting causes the edges of the leaves to curl under and eventually turn brown.

Occasionally plants appear droopy with discolored leaves. In a short while they appear watersoaked, flaccid, and eventually turn brown. These are typical symptoms of plants exposed to freezing temperatures. Opening a window for a few minutes is enough to cause freezing injury if the temperature outside is below zero. Low temperatures short of freezing are also harmful. This is particularly true of many tropical plants. For example, temperatures below 60°F will cause the leaf edges of Saintpaulias to curl under. Stunted plants that increase in size very slowly are other examples of low temperature injuries.

Pale green plants with elongated stems and thin leaves are the result of inadequate light. In mild cases of light deficiency, reduction or even cessation of flowering is the first symptom.

Sometimes leaves are curled, the leaf blades puckered in a most abnormal manner, and flower buds drop or open abnormally. These symptoms indicate the presence of natural or synthetic gases. Incomplete combustion due to faulty adjustment of heating equipment or a leak in a gas installation are often the cause.

DISEASES*

Mildews

The most common diseases of this type on house plants are those referred to as powdery mildews. The disease appears as a white powdery growth of the causal fungus on the leaf surface, generally on the upper surface. High humidity and sudden drops in temperature promote the development of mildews. To prevent the disease avoid excessive humidity and space the plants so as to provide good air circulation. If mildew does develop the plants should be treated with a very finely divided dusting sulphur.

Blights and Leaf Spots

These diseases are probably the most common ones encountered and they are caused by various fungi and bacteria. Sometimes it is difficult to distinguish between a leaf spot disease and a blight. Generally speaking when a disease of the aerial parts of a plant is not limited to a definite area it is spoken of as a blight. The term leaf spot is used when the disease is limited to a definite area. However, when leaf spots grow together to form relatively large irregular or indefinite areas the condition is often spoken of as a blight.

As soon as the disease appears, pick off and destroy the affected leaves. Avoid excessive humidity and also wetting the leaves when they will not dry quickly. Separate the plants to provide good air circulation and ventilation.

Stem and Root Rots

Occasionally wilting of a plant is not caused by lack of water or by one of the other physiological disorders described at the beginning of the chapter. In such cases this condition is usually due to the decay of the roots or of the stem below or above the surface of the soil. The decay of the roots is usually caused by fungi or bacteria that occur in the soil. The decay in the roots may spread into the stem or decay of the lower portion of the stem caused by a soil-borne organism may occur separately. Occasionally a decay of the stem well above the soil level is caused by some other fungus or bacterium. The leaves and flowers above the decayed area wilt.

To control diseases caused by soil-borne organisms avoid over-watering and use soil in which the plant in question has not previously been grown. The most effective way of controlling these diseases is by the use of sterilized soil. Small quantities may be sterilized by placing the moist soil in an oven maintained at a temperature of 400°F. for 30 minutes. Soil treated in this manner must be moist to prevent burning of the organic matter. It should not be used until a few days after it has been sterilized.

* Prepared by H. S. Thompson, Botany and Plant Pathology Division.

INSECT PESTS*

The proper management of house plants will do much to prevent injury from insect pests. Keeping the humidity as high as possible makes conditions less favorable for red spider mites and scale insects. New plants and cuttings should be carefully inspected; if they are infested with insects they should be discarded, or kept away from other plants until the insects have been eliminated.

Washing plants periodically, preferably with soap solution, one or two ounces of a soft soap per gallon of rain water, also helps to keep them free from insects. Apply the soap solution with a syringe, soft brush or sponge, or by dipping, then rinse the plants off with clear water.

Contact Sprays or Insecticides

A number of insecticides, for example, nicotine, malathion, pyrethrum and derris (rotenone) extracts, and oil emulsions, are available for controlling insects on plants. In using these materials follow the manufacturers' directions carefully. Malathion, available as a dust, spray powder, or emulsion, gives good control of most insects and mites on house plants. Malathion may injure some tender plants such as Boston and maidenhair ferns, crassula and petunia.

Commercial summer oil sprays ready for dilution may be purchased, or kerosene emulsion may be prepared as follows: To 5 oz. of hot water add 1 oz. of a soft soap, preferably linseed oil soap, and stir until dissolved; then while still stirring pour in slowly 10 oz. of kerosene. Churn the mixture thoroughly or beat with an egg beater to give a creamy emulsion. For use, dilute this mixture at the rate of 3 oz. per gallon of water and add ¼ oz. (2 teaspoonfuls) of nicotine sulphate. The oil sprays are particularly effective against mealybugs, scale insects and red spider mites, but must be used carefully and not too frequently to avoid injury to the foliage of some plants, especially ferns. It is a good plan to wash the plants with clear water about two hours after using an oil spray. Furthermore, after using any insecticide do not place the plants in direct sunlight for several hours.

Caution: Most insecticides are highly poisonous and must be used carefully. Avoid spilling and breathing the spray or dust. When dipping plants, wear rubber gloves.

Common Pests

Plant Lice or Aphids: These are small, green, reddish brown, or black soft-bodied insects with fairly long legs. They are usually wingless. They cluster on the tender tips of the plant and on the undersides of the leaves, where they suck the sap and cause curling of the infested parts. In addition, they discharge

* Prepared by G. G. Dustan, Entomology Laboratory, Vineland Station, Ont.

a sticky material called honeydew. The simplest control is to spray or dip the plants with any of the contact insecticides named above, except oil, following the directions on the container. Satisfactory mixtures are one teaspoonful of nicotine sulphate to one gallon of water to which has been added an ounce of soap previously dissolved in a little hot water, or one teaspoonful of malathion emulsion in one gallon of water.

Mealybugs: Mealybugs are common on rose, fuchsia, geranium, palm, oleander, coleus and some other plants. They are relatively large, sluggish insects of oval shape and can readily be identified by the white waxy covering on the body. The young crawl about for a time after hatching, then settle down, often in clusters, and start sucking the sap. The waxy covering makes them difficult to kill and persistence is necessary to obtain good control. The following procedure is recommended:

Pick off any very heavily infested leaves and burn them. Loosen the large clusters of insects with a toothpick or sharpened match; then wash off as many as possible with a strong stream of water. Next, spray or dip the plant with (a) malathion emulsion, one teaspoonful per gallon of water, (b) nicotine-soap solution, one and one-quarter teaspoonfuls of nicotine sulphate and one ounce of soap per gallon of water, or (c) a pyrethrum-derris spray, and repeat the application at weekly intervals until not one mealybug can be found. Oil sprays with the addition of nicotine sulphate are more effective than nicotine sulphate and soap, but are more likely to injure the plants and should be washed off within two hours.

Scale Insects: These are scale-like, stationary insects usually brown in color and round, oval or oyster-like in shape. They commonly attack fern, palm, croton, ivy, oleander, cactus and rubber plant.

Scale insects are even more difficult to control than mealybugs because of their tough waxy armor. The young can be killed before they have protected themselves with the scale covering, but it is often necessary to spray from three to five times at weekly intervals to kill all the newly hatched forms. Malathion, the oil-nicotine spray, or nicotine-soap, as recommended for mealybugs, may be used.

Many old scales can be removed from palm, rubber and other plants with tough leaves by scrubbing with a soft brush soaked in the nicotine-soap mixture, or by pricking them off with a needle.

Whitefly: The adults of this pest are small, snow-white insects which fly about when disturbed. They lay their eggs on the undersides of the leaves and these hatch into small, oval, gray insects which insert their beaks into the tissue

and seldom move from one spot. They secrete a sticky honeydew in which a black fungus grows, giving the plants a sooty appearance.

The pyrethrum-derris spray, malathion, and nicotine-soap mixture as recommended for aphids give control if applications are repeated three or four times at weekly intervals. The spray usually does not kill many of the adults; therefore, before treating, remove the plant to a room away from other plants, and, before bringing it back, shake off any remaining adults.

Two-spotted Spider Mite: This serious pest of house plants is sometimes called the common red spider. These mites are barely visible to the naked eye and vary in color from yellow to green or red. They lay small, pearl-like eggs. They sometimes occur in large numbers on the undersides of the leaves, especially where the plants are grown in a dry atmosphere, and cause the foliage to turn yellow and mottled. They make a fine web, under which they feed, and heavily infested plants may have conspicuous masses of webbing over and between infested leaves.

Heavily infested house plants should be destroyed, as control is difficult after the leaves are covered with webbing. Frequent syringing of the undersides of the leaves with a strong stream of water usually controls light infestations. To control heavier infestations, spray with malathion or one of the derris (rotenone) sprays two or three times at intervals of about four days, or give one or two thorough applications of the oil spray. Nicotine sulphate does not kill them.

Other Mites: Two other species of mites, the flat mite and the pallid or cyclamen mite, sometimes infest cyclamen, African violet and ivy. Both mites are very tiny and difficult to detect without the aid of a microscope. The flat mite feeds chiefly on the undersides of the leaves and causes mottling similar to injury by the two-spotted spider mite. Control measures for the flat mite are the same as for the two-spotted spider mite. Lightly dusting all parts of the plant with sulphur dust also controls the flat mite, but not the cyclamen mite.

The cyclamen mite confines its feeding almost entirely to the soft, tender growth of opening leaves and buds, and to flower parts, causing deformed, curled leaves, and streaked blossom petals. Heavily infested plants should be destroyed. Regular spraying with a derris spray every two or three weeks kills exposed mites and usually prevents serious injury. To eliminate an infestation, immerse the plant, pot and all, in water at 110°F. for 15 minutes. The temperature has to be exact to be effective and to avoid plant injury. The larger the volume of water the easier it is to maintain the proper temperature.

Soil Pests: Small white maggots are sometimes abundant in the soil of house plants. These are the young of small black flies called fungus gnats, which fly around the plants or rest on the leaves but cause no injury. The maggots seldom attack the roots of the plants, but if their presence is annoying they can be reduced in numbers by thoroughly soaking the soil with (a) malathion, one teaspoonful per gallon of water, (b) nicotine sulphate, one teaspoonful per gallon of water, or (c) strong soap solution made by dissolving one-quarter pound of soap in one gallon of water. Use about a cupful to a 6-inch pot, or place the pot for about an hour in a pail containing just enough of the liquid to cover the top of the soil.

Small white grubs of the black vine weevil occasionally attack and feed on the roots of the potted plants, especially primula, begonia, cyclamen, and ferns. If a plant seems unthrifty and remains stunted, the soil about the roots should be examined and replaced with fresh soil if grubs are found.

Earthworms sometimes disturb the root systems of potted plants by their tunnelings. Dusting the soil with hydrated lime and then watering it in usually kills the worms.

Identification of Insects: When in doubt as to what pest is injuring the plant, send specimens of the injured parts, slightly moistened and wrapped in wax paper in a box, to the Entomology Laboratory, Canada Department of Agriculture, Science Service Building, Ottawa. Enclose a note giving the name and address of the sender and the name of the plant. Mail with "Canada Department of Agriculture" in the address may be sent postage-free.

Chapter IV

Popular Flowering Plants

ABUTILON (FLOWERING MAPLE)

Abutilon is a woody shrub with attractive bell-shaped flowers that may in some varieties have colored foliage. The leaves resemble those of a maple tree, hence the popular name, flowering maple.

It grows rapidly at temperatures of 55 to 65°F., in full sunlight, and is more suitable as a conservatory or sunroom plant than a general house plant. Propagate by taking cuttings in January or February. These root well in sand or in any of the media mentioned in the section on "Propagation".

To induce branching, pinch the young plants when they are 6 to 12 inches tall. Do not overfertilize because this tends to promote soft leafy growth and fewer flowers.

AFRICAN VIOLET—See Saintpaulia

AGAPANTHUS (Lily of the Nile)

Agapanthus produces clusters of exotic lavender, blue, or white flowers on erect stems 2 to 3 feet long. Because of its size and cultural requirements, it is not considered a good house plant.

Agapanthus grows well in full sun or in partial shade. It should be planted in a large container and for good flowering the roots should be left undisturbed. During the flowering period (usually summer), it should be given a good supply of water and light. In winter when the plant is dormant, a cool bright basement is an ideal location. In the spring the plant can be forced into bloom in bright light at a temperature of 65 to 75°F., and when growing actively, two or three applications of liquid fertilizer are beneficial. Propagate by division.

ANTHURIUM

The name "Anthurium" means "tail flower" in Greek. It gets its name from the peculiar shape of the flowers; a tail-like structure (spadix) projects from a spathe. The spathe is the showy part of the flower.

The most important Anthuriums are *A. Andreanum* and *A. scherzerianum*. Both are valued for their beautiful spathes in shades of pink, salmon, and fiery red. The long-lasting spathes are also grown for cut flowers. Some Anthuriums are grown for their handsome foliage but these are not so well known.

These plants are usually grown in pots of osmunda fiber and as the plant elongates it is covered with osmunda and sphagnum moss to keep the aerial roots moist and to supply nutrients. When new leaves are developing an application of fertilizer is beneficial.

The plants require a minimum temperature of 65°F., high humidity, and medium light intensity. They survive under average home conditions but benefit from frequent syringing with water.

Anthuriums are propagated by air-layering or stem cuttings.

AZALEA

Most of the Azaleas sold by Canadian florists are *Indica* types but others are increasing in popularity. The Azalea is one of the most popular Christmas flowering plants. The florist usually imports his stock from Belgium and it arrives ready for forcing.

Azaleas require an acid medium and are usually grown in peat or a mixture of peat and soil. Careful watering is required because the high water-holding capacity of peat makes it difficult to determine when the plant needs watering. Color and weight of the soil are the best indicators. The best method of watering is to plunge the pot into a bucket of water and leave it until air bubbles cease to come up.

When purchased, this plant is usually in full bloom. Keep the plant as cool as possible and check the soil moisture frequently for best results. After the flowers fade and fall, the plants are usually discarded but they can be kept for another year. Simply continue to grow them in a bright, cool location and apply fertilizer every three weeks. When danger of frost is past, plunge the pot in a shady spot in the garden. Continue fertilizing during the summer; then before frost threatens, bring into a cool room. An unheated sunroom is ideal. After three to four weeks there, return to a bright window in the house. Flowering will probably be later than Christmas.

BEGONIA

For house plant purposes, there are four main kinds of begonia: the tuberous rooted, the semi-tuberous rooted, the foliage, and the fibrous rooted.

The tuberous rooted begonias have only a limited use as house plants. However, if there is sufficient light and a cool situation they will grow well and add color and variety to any collection. For details on their culture, see Chapter VII.

The semi-tuberous rooted group (*B. socotrana*) include Lady Mac, Melior, Marjorie Gibbs and other more recently developed varieties. They were formerly common as Christmas plants but their popularity has waned because of their cool temperature requirements.

These begonias are usually propagated from leaf cuttings. During the summer they should be grown in a semi-shaded location. In November and December they can be exposed to full light but, if possible, should have a temperature between 55 and 65°F. Most varieties in this group are short-day plants, hence the winter flowering habit.

The foliage varieties include a wide variety of species and hybrids (see also Chapter V, Foliage Plants). They are usually grown for their attractive

foliage, although some have fairly good flowers too. The foliage varieties require less light and are fairly tolerant of a wide range of temperature.

For propagation the leaves are usually placed flat on the rooting medium and held down by pegs or small pebbles. The main veins are cut at one-inch intervals. Roots and young plants will form at the cuts. When large enough to handle, the young plants are planted in small pots.

The fibrous rooted begonias are best known as wax begonias. They are usually grown from seed but stem cuttings produce plants in less time. Cool temperatures and bright light are essential but if they are not shaded from the bright summer sun the leaves will burn. They are not sensitive to daylight and will produce flowers continuously.

BELEPERONE GUTTATA (Shrimp Plant)

This plant has attractive green leaves and flowers enclosed in shrimp-colored bracts. The bracts suggest its common name. It grows best in a warm temperature and bright light. Under low light conditions, the plants have a tendency to become "leggy". When this happens they may be cut back severely in the spring. The severed branches may be cut into 2- to 3-inch lengths and rooted in sand.

Fig. 9. Bromeliads. Achmea hybrid (Foster's Favorite), Nidularium identii and Achmea gamosepala.

BROMELIAD

This is a spectacular family of tropical and subtropical plants. They are characterized by a vase-like cup formed in the center of the leaves. Some bromeliads have plain foliage and a showy inflorescence which could last for months; others are distinguished by showy leaves often marked with bizarre designs.

The root system of most bromeliads serves primarily as a means of attachment to tree trunks or other hosts. As long as the plants can collect food and water through the cup-like center they can grow even without roots and, for this reason, they can stand abuse. Sometimes the cup is used as a vase for cut flowers. Very interesting arrangements can be designed with this natural container.

Some of the better known bromeliads are *Achmea fasciata, A. fulgens, Achmea* hybrid (Foster's Favorite), *Ananas sativus variegatus* (the variegated pineapple), and *Vriesia splendens* Major.

Although better known in Europe this group of plants is destined for great popularity in Canada.

CALLA (Zantedeschia Aethiopica)

The calla most familiar to florists is known by such names as calla lily or arum lily. It is characterized by large white upright-facing spathes and large green triangular leaves.

This plant is propagated from offsets generally found near the main tubers. It normally blooms during the winter and spring months and grows best under cool conditions (50°F.) but can tolerate a higher temperature. When flowering, it needs full light and liberal watering. After flowering, it should be given several applications of fertilizer two weeks apart. It can be kept growing throughout the summer or forced into dormancy by gradually withholding water until the foliage dies down. Dormant plants may be stored for two to three months, during which time the tuber should be watered once every week or so to keep it from drying out completely.

In the fall the dormant plants should be repotted. Remove all dead leaves and shake the tuber free of adhering soil. Then plant in a good potting soil to a depth which exposes the tip only. Water the soil thoroughly immediately after planting but do not water liberally until active growth has resumed.

The yellow calla, *Zantedeschia Elliottiana,* should be given a positive dormant period and the tuber stored for 4 to 6 weeks at 50°F. for good flowering. In general Z. *Elliottiana* is not so free flowering as the white calla. It is a good house plant only if there is a cool bright location available. In addition, its use is limited in most homes because the plant is fairly large.

CALCEOLARIA

There are two main kinds of calceolarias; the hybrid or herbaceous types, and the integrifolia or shrubby types. The former is more common in Canada. All calceolarias are characterized by pouch-like flowers which range from yellow to brown and red. They are sometimes referred to as lady's slipper but this name also applies to several other plants.

The herbaceous kinds are usually grown from seed and it takes about nine months to produce a flowering plant. Cool temperatures (50 to 55°F.) and bright light are prime requirements. Although it grows better in a rich soil, excess fertilizer can cause the leaves to turn yellow.

The shrubby varieties are usually propagated by cuttings. They are not common house plants. In cool European countries, this type of calceolaria is a popular garden subject.

CAMPANULA ISOPHYLLA (Italian Bell Flower)

This campanula is a good house plant if cool temperatures are available. It is sometimes called Star of Bethlehem but this name is more commonly used in reference to *Ornithogalum Arabicum.*

Although it can be grown from seed, the usual method of propagation is by division or cuttings. In a cool, well-lighted room masses of blue or white flowers make this an attractive house plant. Older plants have slender stems that drape gracefully over the side of the pots; for this reason it is sometimes used as a hanging plant.

This is one of the commonest house plants in the Netherlands where the cool climate is ideal for its culture. In Canada, it is best suited to coastal regions favored by cool summers.

CAMELLIA

Although there are many types of *Camellia,* the *japonicas* are the most familiar. They are shrubs which may grow very large but begin to flower when the plants are fairly small.

Camellias are definitely *cool* plants. During the flowering season they thrive at 40 to 45°F. After the blooming period is over (usually in the spring), the temperature may be higher and this is a good time to fertilize the plants. For the summer months, they should be moved outside to a semi-shaded location.

Because of the very low temperatures required, a partially heated sunroom would be suitable. Whenever weather permits, even in the winter, the plants should have good ventilation because fresh air is most important.

CHRYSANTHEMUM

The rise in popularity of Chrysanthemums as house plants has been remarkable in the past few years. This came about when potted mums were tailored for home use. Commercial growers have found a ready market for pot chrysanthemums that are short, compact, and covered with flowers.

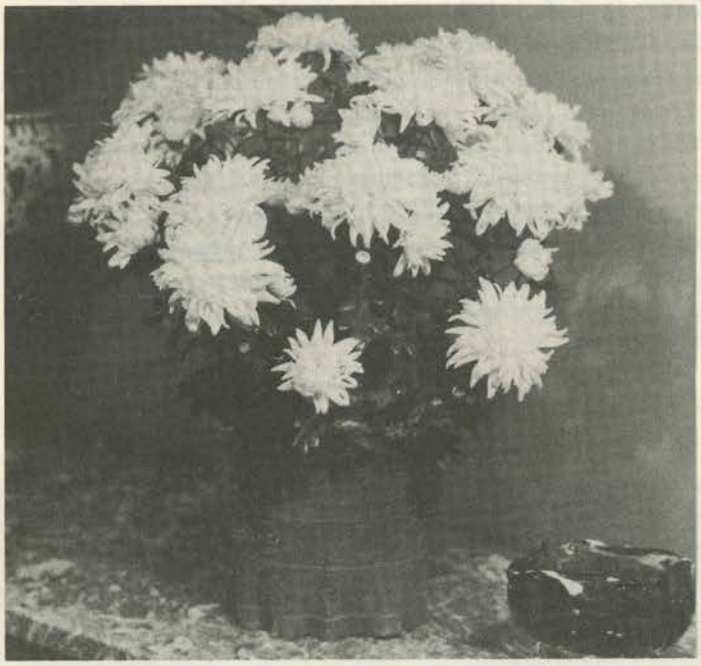

Fig. 10. The modern pot mum is both attractive and long lasting.

Both greenhouse and garden varieties are used in the culture of potted mums. The latter can be planted out in the garden after the flowering period is over and they will produce flowers again outdoors that fall. The greenhouse varieties should be discarded after flowering. If a conservatory is available, they could be kept as stock plants for new cuttings but if cut back and grown in the same container, they will not flower satisfactorily.

CINERARIA

Cinerarias can be grown by cuttings or divisions but the common method is to raise them from seeds and treat them as annuals. The plants that florists sell in the spring are started in the fall. Few flowering plants can match cinerarias for the wide range of colors and free-blooming qualities. The cool temperature

requirements make them poor house plants but in a cool bright sunroom or similar location where the night temperature can be kept below 55°F., cinerarias produce beautiful flowers over a long period. Frequent watering is needed.

CLIVIA (Kafir Lily)

The Clivias are bulbous plants with evergreen, strap-shaped leaves. The flowers come in clusters of red or orange-red at the top of tall stems.

Clivias are propagated by division. Immediately after flowering is a good time to divide large plants. Pot deeply in a good sized pot because they are kept in the same container for several years. A sandy loam soil is best and the pots must be well drained. A handful of gravel or broken crockery at the bottom of the pot is needed to ensure free drainage.

During the summer and winter, grow the plants in a cool location. In early spring when new growth appears, the temperature can be warmer (60 to 65°F.) and water given more frequently. This is also a good time to add fertilizers to the soil.

CYCLAMEN (Persicum)

This is the common florist's cyclamen. Few house plants can match the spectacular beauty of a well-grown specimen. Although once a plant of major importance, its popularity is declining because the average Canadian home is too warm for the cyclamen to survive.

A little care will prolong the life of cyclamen considerably. It thrives under cool conditions; 50 to 55°F. at night and 60 to 65°F. during the day are ideal temperatures. Bright light without prolonged exposure to direct sunlight, and constant moisture at the roots are other requirements. Even putting the plant in a cool hallway or basement at night would be beneficial.

The cyclamen is usually grown from seed. Because of its slow growth, 10 to 18 months are needed to produce plants of saleable size. By setting the plants in a cool, shady part of the garden during the summer they can be carried over for another year. This is usually possible only when a cool greenhouse or conservatory is available.

CYCLAMEN (Neapolitanum)

This cyclamen is a dainty cousin of the previous plant. It is about one-third the size of the common cyclamen and has the same general cultural requirements. For those who want to grow something different, a little care will pay off in dainty blooms not unlike orchids.

EUPHORBIA SPLENDENS (Crown of Thorns)

Although not particularly beautiful, this plant is grown by many people. It is distinguished by sharp spines covering woody branches bearing only a few leaves. The reddish flowers are more abundant in winter but may appear throughout the year.

It is usually propagated by rooting 3- to 4-inch lengths of stems. Several rooted cuttings may be potted in a 5-inch pot. It grows better in a sandy soil and thrives on high temperatures and full sunshine but it is sensitive to excess watering.

EUPHORBIA PULCHERRIMA (Poinsettia)

The poinsettia is one of the most popular Christmas plants in Canada, as a result of improved varieties and better cultural methods. The showy bracts are usually scarlet, but there are some cream and pink varieties. These bracts are not really flower parts but they usually develop color when the plant is in flower. The flowers are inconspicuous structures at the center of the bracts.

Fig. 11. A well-grown poinsettia plant.

To maintain the striking beauty of this plant at its best during the holiday season three basic rules should be followed. Place the plant in a bright sunny location; away from drafts or hot air registers to ensure steady temperatures; and water as soon as the soil appears dry. With a day temperature of 70°F. and a night temperature of 60 to 65°F., poinsettias can be kept in prime condition for 4 to 6 weeks.

The usual method of propagation is by cuttings but because of its exacting requirements the job is best left to the commercial grower. It is possible to have them in flower for a second year and those who wish to try this must meet several requirements. As soon as the bracts and leaves begin to lose color, put the plant in the basement to dry off. In April or May, cut back to 6 to 10 inches, shake off the old soil and replant in a sandy loam mixture, then start the plant into growth again in a bright location. If a short plant is desired, pinch the shoots back in mid-August. The tops can be rooted in sand and then potted in soil. Fertilizing every two to three weeks with a complete fertilizer is necessary during the growing period. Finally, the poinsettia is a short-day plant. Exposure to artificial light lengthens the natural short day-length but this can be avoided by putting plants in a dark closet at dusk or growing them in a room where no artificial light is used.

FUCHSIA (Lady's Ear Drops)

A well-grown specimen of fuchsia is very beautiful, but it is another of those plants that are difficult to grow in the average Canadian home. Outside of greenhouses and conservatories, really good plants are seldom seen.

The young plants grow most rapidly at a minimum temperature of 60°F. in full sunlight. For the flowering period a minimum of 55°F., shade, long days (summer months), and high humidity are necessary for optimum development. However, fuchsias can be flowered in the ordinary home during the winter months also but they are seldom good plants.

The plants are usually propagated by terminal cuttings. Cuttings rooted in September will produce medium sized plants by the following May.

GARDENIA VEITCHII

This is not a satisfactory house plant. Often the flower buds drop a few days after the plant is placed in the home. It can be retained as a foliage plant but flowering should not be expected.

High temperature, low light intensity, and dry atmosphere are the main factors responsible for flower bud drop.

HOYA CARNOSA (Wax Plant)

This old-time house plant is becoming popular again because of its ability to withstand adverse conditions. In modern homes, a climbing plant of this kind has many uses if some support is given. The plant has thick leathery leaves and round clusters of pink star-shaped flowers. Although it will grow under a wide range of conditions, it thrives best in full sunlight, a temperature of 65 to 70°F., high moisture and at a medium level of fertility.

It is easily propagated by terminal cuttings.

HYDRANGEA MACROPHYLLA

Potted hydrangeas are among the most popular plants for Easter and Mother's Day. Hydrangeas are perennial woody plants. They are usually propagated during the spring and forced into bloom the following year.

With care hydrangeas can be kept in bloom for 4 to 6 weeks even though fully opened at time of purchase. Being a woody plant, the hydrangea requires copious watering. The best way is to set the plant in a pail half filled with water and leave it till air bubbles cease to rise from the soil. Place the plant in a bright location during the day and at night keep it in a cool basement or vestibule.

Fig. 12. Hydrangea hortensis, an important holiday plant.

Hydrangeas can be carried over to bloom again the following year if they can be kept in a shady spot during the summer months. As soon as the blooms fade; prune the branches back, leaving two to three sets of healthy leaves. Keep the plant growing and continue to water and fertilize. By the middle to the end of May plunge the pot outdoors. If a garden is not available, plunge the pot into another larger pot or box and pack with peat moss. Apply a complete fertilizer every two weeks and iron sulphate (1 oz. to 2 gal. water) on alternate weeks. In early September move the plants to a cool dark storage place (45 to 50°F.). During storage, all the leaves drop if the plants are properly treated. Do not allow the plants to dry out. Soon after the New Year, bring the plants up to a sunny location and new growth will appear. When the leaves are full size, commence fertilizing again. To obtain blue flowers, aluminum sulphate must be added to the soil every two weeks after growth has started. It is applied in solution at the rate of 3 ounces per gallon of water.

IMPATIENS (Patience Plant)

The Impatiens species commonly used as house plants are native to Zanzibar and belong to the Balsam family. They are good house plants because they will flower almost continuously with only low light intensity. They can also be planted in window boxes and beds out-of-doors if the location is shady. Some kinds are dwarf and spreading while others are upright forms. There are variegated varieties with flower colors of white, pink and scarlet to purple.

Reproduction is by seeds or cuttings. Seeds will produce a variety of forms. When a good plant is obtained, it can be increased by cuttings. Rooting is very easy if the temperature of the medium is 65°F. No special soil is required but older plants will need regular application of fertilizers to keep the leaves green. Pinching young plants will produce compact specimens.

KALANCHOE

Several species of Kalanchoe can be used as house plants. The most common one is perhaps *Kalanchoe blossfeldiana,* variety Tom Thumb. The prolific flowers and compact growth habit of this plant make it very desirable. In addition, its wide tolerance to temperature fluctuations is a good feature. Other species are also grown but perhaps the hybrids resulting from interspecific crosses will prove to be valuable additions to the list of good house plants.

Kalanchoes are short-day plants (see Chapter I) with a natural flowering period in January. However, by manipulating day-length they can be flowered at any period of the year.

These plants can be propagated by leaf or stem cuttings or by seeds. The seeds can be sown from March to July for good plants by January. The seeds are very fine and should not be covered heavily.

Kalanchoes are very sensitive to DDT and many other insecticides. Fortunately not many insects attack this plant. If insects are present, use insecticides containing rotenone or malathion as these will cause the least damage to the leaves. Rotting-off at the base of the plant is caused by soil-borne organisms. To control this, use sterilized soil and water less frequently.

NERIUM OLEANDER

This plant is more commonly known as Oleander. It is a well-known shrubby plant but is no longer grown extensively because of its rapid growth and size. Since it does not usually flower until it is two years old, few modern homes can accommodate such a large plant.

It can be wintered over in a cool sunroom or basement and moved outside in the spring. When in bloom the plant is very handsome with flowers of pink or white. After flowering, grow the plant in full light and fertilize every two weeks. Gradually reduce watering to ripen the plant for the winter. Since it is an evergreen, the oleander should not be dried or placed in complete darkness even during the semi-dormant period.

New plants can be started by taking cuttings 6 to 8 inches long. Rooting will be hastened if the bottom ends are treated with a rooting hormone. Sand or a mixture of peat and sand are satisfactory media.

PASSIFLORA (Passion-flower)

These plants include a large group of evergreen climbers. They are not suitable as house plants. They will do best in a warm conservatory (65 to 85°F.) where they are permitted to climb a solid wall.

The flowers are interesting and some of the fruits are edible. When the plants get too large, they can be pruned severely with success.

The Passifloras are easily propagated by seeds or by cuttings.

PELARGONIUM (Geranium and Pelargonium)

Pelargoniums include the common Geranium (*P. hortorum*), the Martha Washington Geranium (*P. domesticum*), and many others.

The common Geraniums are too well known to require lengthy description. They grow best as young plants and cuttings should be made each fall from plants that are grown outside in beds. Few homes have enough light to develop good specimens during the winter. Tall, leggy plants with few blooms result when the light is insufficient.

The Martha Washington Pelargonium usually blooms in the spring. It does not bloom in summer because a temperature below 55°F. is required for flower bud formation. These plants produce blooms of striking beauty; some varieties having blotchy markings on white, pink, or mauve backgrounds. In general, they are more difficult to grow than other Geraniums.

Propagate by cuttings in the early fall to obtain flowering plants the following spring.

SAINTPAULIA (African Violet)

The Saintpaulia or African Violet is not a true violet but it is one of the most common house plants. Baron Walter von St. Paul is credited with having introduced the Saintpaulia to Europe from the hilly regions of eastern tropical Africa. It became well known as a horticultural plant two years after the first plant bloomed in Europe in 1893 but never reached the height of popularity it enjoys in America. The Saintpaulia needs the warm temperature usually found in our homes; Europeans normally maintain much cooler environments.

Fig. 13. Saintpaulia or African Violet.

It is easy to see why this African introduction has become so popular. It thrives in warm temperatures. Few house plants can equal the flowering period of the Saintpaulia in the average home. Then, too, its ease of propagation encourages the indoor gardeners' instinct to "do-it-yourself".

Propagation—Most Saintpaulias are propagated by leaf cuttings but division of the crown, and seed sowing are also practised. The leaves can be rooted in water or in any good propagating medium (see Chapter II on Propagation). If water is used, changing the water daily or blowing air into the water through a straw will provide the needed aeration. If firm matured leaves that are free of insects or damaged areas are selected, rooting will take place in 4 to 6 weeks. The leaves can then be planted in small pots being careful *not to plant too deep.* When a rosette or cluster of leaves is formed the mother leaf can be cut off. The latter can be re-used if it is in sound condition.

Culture—The best soil mixture is a sandy loam with considerable organic matter. For more details on soils and fertilizers refer to previous chapters.

When growing Saintpaulias, remember that they originally came from the steaming jungles of East Africa. There they thrived under the canopy of jungle trees which afforded filtered sunlight, high humidity, and even moisture. Thus the location in the home should be one where there is bright diffused light, but not direct sunlight. If a photographic light meter is available, the light intensity can be measured in terms of foot candles. An intensity of 800 to 1,200 foot candles is optimum. Brighter light than 1,500 f.c. will cause the leaves to turn yellow. Under low light intensity the plants cease flowering.

Fortunately the Saintpaulia is very adaptable to varying humidity levels. It will grow better under humid conditions but will also grow satisfactorily in the normal atmosphere of most homes.

How to water Saintpaulias is a question on which many experts are divided. Should they be watered from the top or bottom? Actually, it does not matter. What is important is to understand the plants' reaction. When watering from the top, only tepid water should be used. Water that is too cold will cause irregular spots, rings or streaks to develop on the leaves because low temperature destroys the green coloring matter in the Saintpaulia leaves. If the plants are watered from the bottom normally, it is a good idea to water from the top occasionally to wash the fertilizer salts back into the soil. The salts are usually seen as yellowish deposits on the soil surface and pot rims.

The optimum temperature is 65 to 68°F. at night, with an increase of about 10°F. during the day. If the temperature of the air surrounding the plants is below 60°F., curling under of the leaves results. When a thermometer in the middle of the room reads 65°, the temperature at the window may be

much lower. When plants are growing on a window sill, drawing drapes across the window shuts off heat and creates a cool enclosed area. This can be avoided by moving the plants away from the window at night or during severe weather. At the other extreme, temperatures over 80° for long periods will result in smaller and fewer flowers. During hot summer months there is little that can be done to avoid this condition.

Troubles—Mildew and crown rot are common diseases of Saintpaulia. Mites are especially troublesome because control is difficult. Mite injury on Saintpaulia is recognized by the puckering and excessive hairiness of young leaves. Also thrips will cause the flowers to drop soon after they are open. For controls see Chapter III, "Diagnosing Plant Troubles".

Varieties—It is impossible to give a complete list of the varieties available. Many have been named that differ little, if any, from the original varieties. The original *Ionantha* has a light blue flower and still compares favorably with some of the new introductions. The "Girl" varieties have frilled serrated leaves and flowers of many colors. In general, they are not so prolific nor such continuous bloomers as other varieties. The "Supremes" have large leaves and large flowers. Although the leaves are brittle they are worthy additions to any collection. The Dupont varieties have large flowers and clear colors. There are also double varieties that are very interesting. Despite misleading names, there is as yet no true red color in Saintpaulia. Yellow also is still lacking but may well be possible in the future.

For the beginner, the following is a small list of varieties that have performed well in the past:

Blue	*Reddish-Purple*	*Pink*	*Double*	*White*
Mentor Boy	Redland	Pink Beauty	Neptune Supreme	White Madonna
Ionantha	Redhead	Pink Delight	Orchid Bouquet	White Lady
Brilliant Supreme	Carmen		Dark Beauty	
Dupont Blue				
Sailor Girl				

SOLANUM PSEUDO CAPSICUM (Jerusalem Cherry)

The bright orange-scarlet berries made this a favorite Christmas plant in former years and it is still popular in some parts of the country. Unfortunately, it is a plant that needs to be grown at a very cool temperature in the house. When the temperature is above 65 to 70°F., the plant drops its leaves rapidly.

It is usually grown from seed sown in the spring. During the summer it may be set outside until frost threatens in the fall. A cool sun porch is a good place for it until severe weather arrives.

Chapter V

Foliage Plants

Decorative foliage plants have passed through a revolutionary change in recent years. Nowadays foliage plants are selected for their ability to grow under the adverse conditions of the average home. Sometimes, beauty and color appear to be by-passed in these selections, but most of the plants commonly used today fit in with the contemporary trend in homes and furnishings.

Being mainly of tropical origin, foliage plants grow best under conditions of warmth, high humidity and filtered sunlight. The average home in Canada would have no trouble in providing the necessary heat or the filtered sunlight but humidity is a difficult problem to overcome. Happily, most of the selected plants are able to withstand dry atmospheres and minimum care.

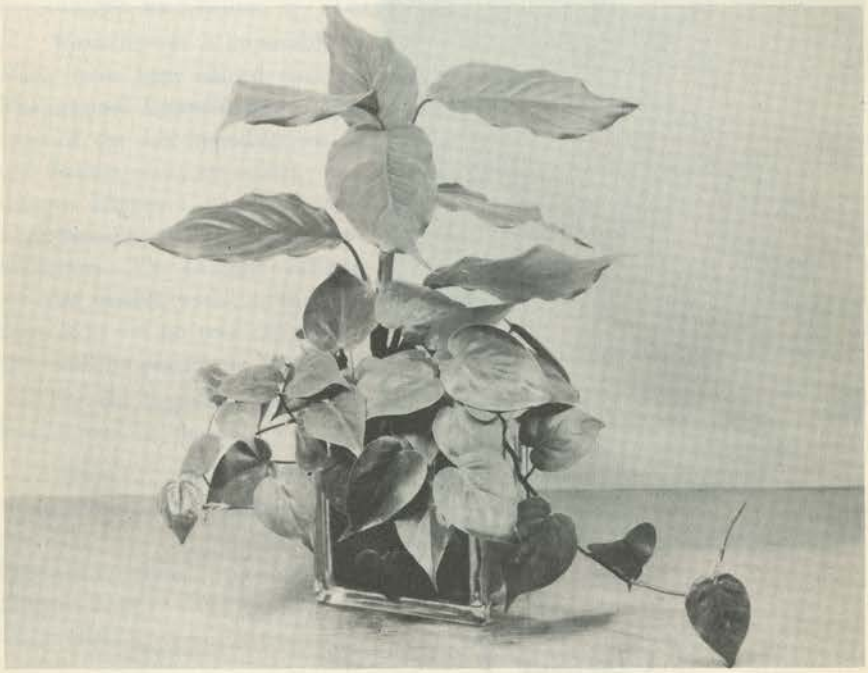

Fig. 14. A single plant of Aglaonema simplex combines very well with Philodendron cordatum vines.

AGLAONEMA

The Aglaonemas are handsome, erect, medium-sized house plants of which *Aglaonema simplex* or Chinese Evergreen is the best known. They are extremely tolerant of dry living room conditions and low light intensity. They will grow over a wide range of temperature above 50° F. Chinese Evergreen is probably the original plant to be popularized as being able to grow in water alone. Wall

planters and novelty china containers lend themselves admirably to this kind of water culture but it should be stressed that the water needs to be kept fresh by frequent changes. *A. commutatum,* from the Philippines is sometimes called the variegated Chinese Evergreen but it is a different plant. The foliage is rounded, deep olive green with silver markings. *A. pictum* is a pretty species from Sumatra, and is characterized by its dwarf habit and bluish leaves. *A. schismatoglottis* is not yet well known to the florist but it is robust, showy and durable. This plant should become more useful in future.

The Aglaonema produces a small flower (spathe) not unlike a miniature calla. Some of the group, particularly *commutatum* and *schismatoglottis* also produce clusters of shiny red berries that add considerably to the appearance of the plants.

Aglaonemas are propagated by tip and stem cuttings. The tops can be air-layered if the plants become too tall.

ARALIA SIEBOLDI

The Aralias are a large family of plants but only *A. sieboldi* is commonly used as a house plant. It is an ideal plant for growing in a container because of its slow compact growth. It can adapt itself to temperatures ranging from 50 to 80° F. as well as from shade to sunlight.

ARAUCARIA EXCELSA

This plant is also known as the Norfolk Island pine. Because of its resemblance to a miniature tree, it is frequently used as a table-size Christmas tree. The plant is durable and grows quite slowly. Although it will grow in a warm temperature, it will do better at 50 to 60° F.

ASPIDISTRA LURIDA

This is an old favorite and well deserves its nickname of cast iron plant. It has few equals in being able to survive under adverse conditions. Lately it has not been used extensively. One reason may be its susceptibility to red spider mites. These can ruin a plant in a very short time if they are not detected and controlled immediately. A loss of green coloring coupled with yellow pin points is an indication of their presence.

AUCUBA JAPONICA

Aucuba japonica is one of the toughest house plants. It will survive where few other plants will live. It is a particularly fine plant for cool locations but will tolerate warm temperatures too. It is a tall upright shrub that grows slowly. *Aucuba japonica variegata* is exceptionally attractive because of the irregular golden yellow markings on the leaves.

BEGONIA

The begonias grown for foliage require more care and understanding than most of the other plants described in this section. *Begonia metallica,* with large olive green leaves and red undersides, *B. Rex* with its many color combinations, and newer types such as Helen Tempel will probably prove satisfactory if given enough light and humidity. They are also warm-growing plants.

These plants can all be propagated from leaf cuttings. Generally speaking, young plants are more attractive and if possible a succession of these should be available to replace older specimens.

CALADIUM—See under "Flowering Bulbs".

CALATHEA AND MARANTA

There are disagreements as to which species are Calathea and which are Maranta but this need not concern the indoor gardener because the plants as a group require the same conditions, a warm, humid greenhouse or enclosed case. The only one suitable is *Maranta* (Calathea) *Kerchoveana* with flat oval foliage and chocolate blotches on both sides of the midrib. Because it folds up its leaves at night, it is also known as the Prayer Plant.

COLEUS BLUMEI

The Coleus is one of the easiest and fastest growing house plants. It requires a minimum temperature of 60° F., bright sunshine, and plenty of moisture. During winter, unless it is placed in a sunny window, the color of the leaves is dull and the plant becomes leggy and unattractive.

Coleus can be propagated from seeds but a great many varieties and colors will appear. The best varieties are propagated by cuttings. During the spring and summer months they will root in 2 to 3 weeks.

CISSUS

The various Cissus plants are mostly trailing plants. *C. rhombifolia,* the popular Grape Ivy will do well in a warm bright room. *Cissus Antarctica* or the Kangaroo Ivy from Australia now enjoys a lively demand and is gradually replacing *rhombifolia. Antarctica* has leathery leaves on wiry red stems and is generally a better house plant.

CORDYLINE TERMINALIS

This plant is sometimes called Red Draceana but it is really Cordyline. It has bronze foliage that turns to blazing crimson before Christmas. After Christmas, the foliage becomes spotted and drops. This limits its usefulness as a year-round house plant.

CRASSULA ARBORESCENS

This is another old standby and is better known as the Jade plant. The jade green fleshy leaves on sturdy branches are very hardy and will tolerate most home conditions. It is easily propagated by rooting small branches.

CROTON

This group of plants has the most colorful foliage imaginable. There are many varieties and the colors range from brilliant reds, yellows, to green and black blotches. The leaves may be broad and flat, or narrow and needle-like. They do, however, require bright light and high humidity along with a warm temperature. The latter is not critical if the light and humidity conditions are satisfied.

DIEFFENBACHIA

The Dieffenbachias are tall, erect plants with rich green, oval leaves with splashes of greenish-white blotches. They are sometimes called "Dumb Cane" because touching a cut stem of this plant with the tongue can render a person temporarily speechless.

Dieffenbachia picta is the common form but there are many improved varieties available today. One of the best is *D. Rudolph Roehrs* with solid chartreuse leaves and dark green veins and edges. *D. Bausei* has leaves with a light background spotted with dark green and white.

All Dieffenbachias need a warm temperature and diffused light. Under extremely dry and dark conditions, the lower leaves turn yellow and drop. They are also sensitive to overwatering and care must be taken to ensure good drainage for the soil.

When Dieffenbachias get too tall and leggy the top can be cut off and rooted in sand or any other rooting medium. Air-layering is an excellent means of starting a new plant.

DRACEANA

Draceanas have been used as house plants for many years but it is only recently that interest in this group of plants has been revived. Draceanas come in great variety of size and form. Many of the smaller ones are suited for dish garden work while some of the larger ones makes excellent specimen plants.

In general Draceanas are more tolerant than Dieffenbachias because they will stand more moisture and a wider range of light intensity. If some of the variegated varieties do not seem to have distinct color contrasts, try giving them more light.

Among the dwarf types are *D. Sanderiana,* an erect form with green leaves edged with white bands and *D. godseffiana,* a graceful shrubby plant with glossy green leaves dusted with gold. *D. fragans* is one of the larger forms and is one of our older house plants. *D. massangeana* has broad, grass-green leaves with a gold stripe down the midrib. *D. warneckii* is a beautiful plant with a bushy habit and green and white pin-striped foliage.

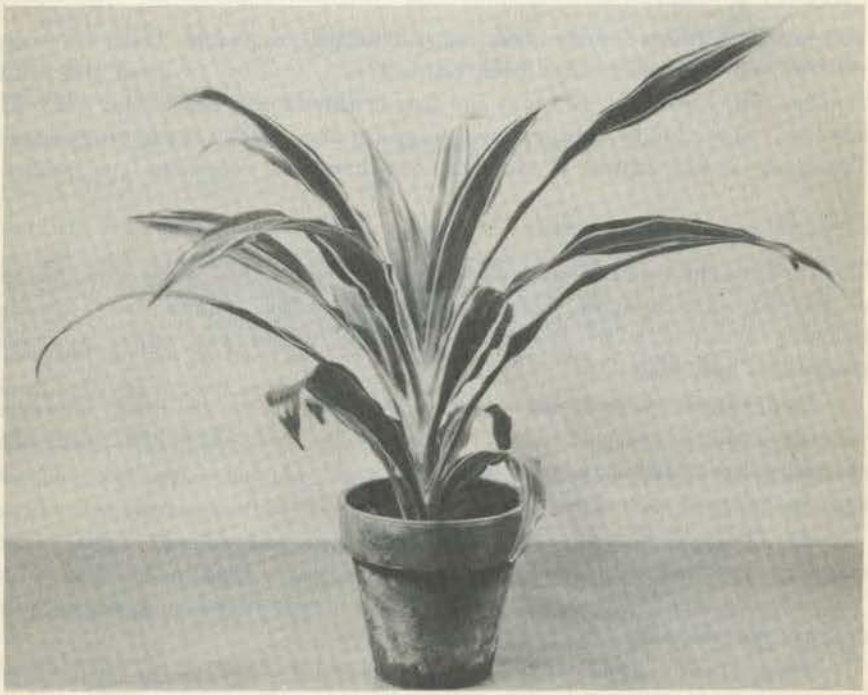

Fig. 15. Draceana Warneckii. Draceanas are attractive house plants which can stand considerable neglect.

To replace an old over-sized plant, air-layering or stem tip cuttings may be practised. The usual commercial method of propagation is by cutting the stem into pieces of two to three inches in length and rooting them as shown in Chapter II.

EPISCIA

The Episcias are characterized by exotic foliage with metallic hues that sparkle like jewels. The foliage is the chief attraction of most Episcias but some also have brightly colored flowers.

The natural habit of growth of these plants is trailing but they can be trained to grow upright if adequate support is provided. Older plants produce runners with tiny young plants at the ends.

Episcias are related to the Saintpaulias and are almost as easy to grow. High humidity, temperatures above 65° F. at all times, and diffused sunlight are the chief cultural requirements.

Episcia coccinea (or *E. fulgida*) is the one commonly offered to the public as "Flame Violet". The coppery hued and dazzling brilliant green foliage is iridescent when the plant is growing well. Tubular scarlet flowers are borne one to a stem and appear frequently throughout the year.

E. cupreata has wrinkled leaves and is more hairy than *E. coccinea.* This Episcia is probably the best known one and is often seen as a ground cover in many conservatories.

Single leaves of Episcia can be propagated in the same way as described for Saintpaulia. The young plants described earlier can be severed from the parent plant and potted up separately.

FATSHEDERA LIZEI

This is an upright growing shrub, originated as a hybrid between *Fatsia japonica and Hedera helix.* Its 5-lobed leaf resembles a large ivy leaf. This plant requires a cool bright location for good development but like the common English ivy it is very tolerant of variable environments.

FICUS

The best known Ficus is the old-fashioned rubber plant. This is still grown extensively as a house plant but there have been many improvements. *F. doescheri* is a showy yellow variegated form which has found favor in many homes. *F. pandurata* has large, leathery glossy foliage shaped like a fiddle and because of its slender upright type of growth it is particularly suited to corners of rooms. It has several popular names among which are fig leaf and fiddle leaf rubber plant.

Ficus needs a warm temperature to grow rapidly but can tolerate temperatures as low as 55° F. It is tolerant of almost any home condition but care must be taken to avoid severe drying of the soil. When this occurs the lower leaves will drop. Sometimes overwatering soils that are poorly drained will have the same effect.

Because they all grow to a large size in a comparatively short time, new plants must be started every few years. Air-layering the tops is the quickest and most dependable method. *F. elastica* the common rubber plant can be pinched when it is 2 to 3 feet high to produce a branched specimen.

FITTONIA

The Fittonias are sometimes called "Nerve Plants" because of prominent vein patterns. The attractive network of white (or red) veins over flat green oval leaves makes this a very attractive creeper. Because of their rigid requirements of humidity and moisture, they are best suited to terrariums or conservatories.

F. argyroneura is the best known one while its red-veined counterpart, *F. verschaffeltii* is gaining popularity.

HEDERA HELIX

These plants are best known as English Ivies. There are a number of new and tested varieties that are ideal house plants. One of the best is Maple Queen, a small-leaved, self-branching type that grows relatively slowly. Curlilocks is a new self-branching type that has reddish growing tips. Variegation in ivies lends an added attraction and there are many varieties to choose from.

Although ivies can be grown in water alone, they should not be watered too frequently if grown in soil. They are very susceptible to root rots if overwatered. This is particularly true if they are grown in novelty containers without drainage holes. Apart from this, they tolerate almost any home condition and will survive even in drafty entrance locations.

The ivies are readily propagated by rooting sections of stems in water or any rooting medium.

MONSTERA DELICIOSA

(see *Philodendron pertusum*)

NEPHROLEPIS EXALTATA BOSTONIENSIS (Boston Fern)

Ferns today have somewhat limited uses as house plants. Their spreading habit is not desirable in the modern compact home. Then too they are not so "houseworthy" as many of the more modern foliage plants.

The Boston fern needs bright indirect sunlight, warm temperatures, and as high humidity as possible for luxuriant growth. It needs steady moisture at the roots also. Mealybugs and soft brown scale are particularly troublesome on ferns. The controls are outlined in Chapter III.

PALMS

Most of the palms used for indoor decorations are too large for the average home. *Kentia Fosteriana,* the Paradise palm is the best known one and is commonly used by florists. A recent introduction, *Neanthe bella,* is a dainty miniature palm that grows very slowly. In addition it is tolerant of low light, dryness, and a very wide temperature range.

All palms should have constant moisture at the roots. In order to be sure that the soil is moist throughout the container, it is best to submerge it in water until air bubbles cease to rise to the surface. A position of filtered light along with a moderate temperature will suit most kinds of palms.

PANDANUS VEITCHI (Screw Pine)

Pandanus is used mainly as a specimen plant. *P. Veitchii* has a white striped leaf and is the one commonly sold by commercial florists. It is a fairly good house plant and will tolerate neglect to a certain extent.

New plants are propagated by separating suckers from the parent plant. To promote rapid growth the young plants should be started in an enclosed cage with high temperature and humidity.

PEPEROMIA

The Peperomias are small growing plants that are well adapted as single plants or combined with other types to form miniature plantings. Best known is *P. obusifolia,* the "pepper-face" with its fleshy waxy leaves. *P. obtusifolia variegeta* is dominantly cream or golden yellow. One of the prettiest is *P. Sandersii* (commonly known as the watermelon plant) because of its silver pattern on gray green leaves.

All Peperomias will stand up better if kept on the dry side. Excess watering will lead to root rots. They will also tolerate extreme home environments.

PHILODENDRON

The tropical family of Aroids provides many of the best house plants and far in the lead is the Philodendron group. Most Philodendrons are climbers or vines; hence their name which translated from the Greek means "climber of trees". Immature forms and recent introductions are erect but the former will "vine" as soon as they grow older. Very attractive plants can also be developed by training these plants to grow on bark or poles made of sphagnum moss.

Most of the Philodendron species originated in South and Central America but hybrids are beginning to come from all over the world. Their native habitat suggests that they require warmth, humidity, and a relatively low light intensity. But as a group they are remarkably adaptable to a wide range of conditions.

The range of sizes and leaf patterns is tremendous from a dainty little vine to gigantic specimens towering to the peak of a conservatory. In addition to the many leaf designs, some Philodendron leaves have colored undersides which add to their beauty. The more important Philodendrons are discussed here under the broad headings of "vine" and "erect" species.

Vine—The best known vine-type of Philodendron is the heart-shaped *cordatum*, or more properly *P. oxycardium*. But this plant is being sold by the millions and the name *cordatum* is so well established that it is unlikely that the correct name will ever be popular. Although it is generally grown as a small vine in the house, it can attain huge proportions under optimum conditions. Although often seen in dark corners, they do not make much growth under such conditions. Bright filtered sunlight combined with warmth will increase the size of the leaves and thickness of the stems. This plant is readily propagated by rooting sections of the vine in water in any rooting medium.

P. Hastatum, *P. Mandianum*, and *P. Gloriosum* have leaves shaped like an arrow-head. Because of their large size they need poles or other artistic supports, such as driftwood, to remain erect after two to three years.

Fig. 16. Philodendron hastatum and P. pertusum are two of the better large-leaf types.

Of the large-leaf types *P. pertusum* is perhaps the most widely used. Its leaves are distinguished by their round, perforated and cut-leaf design. There is some controversy as to the difference between this plant and *Monstera deliciosa*. The best evidence available would indicate the *Monstera deliciosa* is really the older stage of *P. pertusum*. In the juvenile stage, the lower leaves of *P. pertusum* are solid but succeeding leaves develop partial indentations until the plant is

mature. *P. squamiferum, imbe,* and *dubium* are also used to some extent as house plants.

Erect—The erect forms are more recently introduced Philodendrons and are less known. However, these self-leading Philodendrons will be important house plants because they increase in width more than in height. *P. Wendlandi* is a beautiful house plant. It is rugged enough to compare favorably with the best of the vine Philodendrons and yet will not outgrow its location. As new leaves develop the plant becomes fuller and more attractive.

P. orlando and *P. cannaefolium* are two other recent introductions that bid fair to win important places on house plant lists.

PODOCARPUS MACROPHYLLIS

This plant originated in Japan and is a useful subject for cool locations. Its narrow black-green leaves resemble yew foliage. Small plants are useful in planters and boxes. Larger specimens can be shaped and grown in tubs.

SANSEVIERIA

The Sansevierias are often called "Snake Plants" because of the pattern on the leaves. They are practically foolproof, being tolerant of sun or shade, irregular watering, and temperature fluctuations. They are subject to few diseases and their tough leaves discourage insects.

Because they are so durable, they are often used for decorating

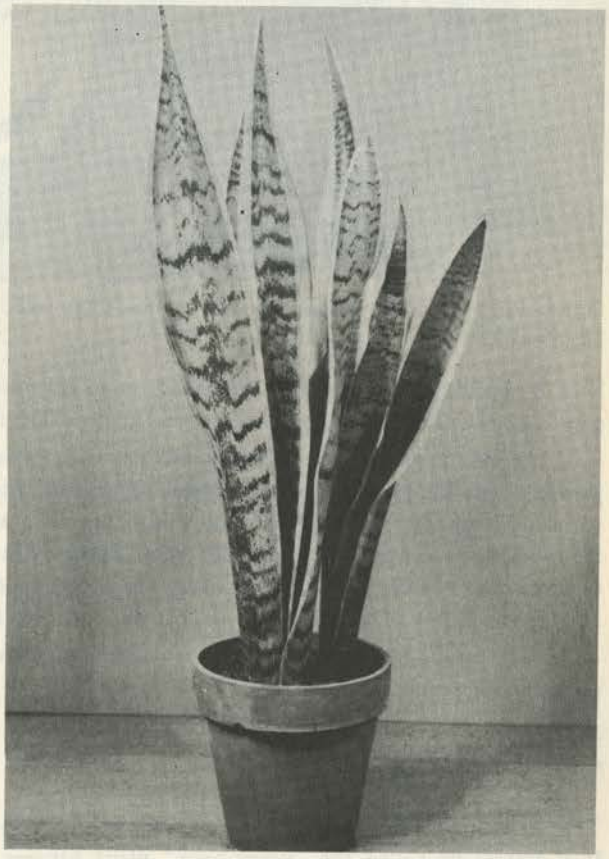

Fig. 17. Sansevieria laurenti is probably the most durable house plant available.

public places. For home use, their stiff, erect form can be greatly complemented by grouping other plants with them.

Although they are used primarily for their foliage, older plants produce flowers ranging from white to pale green in color. The scented tubular flowers are short-lived but attractive.

S. *zeylanica is* the common variety with green marbled leaves. S. *laurenti* is a sport with golden edges and is gradually replacing the original variety. S. *Hahnii* is a short compact variety with various shades of green.

Sansevierias are easily propagated by division of clumps or by leaf cuttings. Three-inch sections of leaves will root and produce buds that grow rapidly under warm humid conditions. To perpetuate S. *laurenti,* division of the rhizomes is necessary because leaf cuttings produce plants that revert back to the original green variety.

SYNGONIUM (NEPHYTHYTIS)

These are useful foliage plants. The young plants are excellent for planters and dish gardens. As the plants grow older they climb, so that supports are necessary. They grow best under warm humid conditions.

SCINDAPSUS (POTHOS)

This is a vine that resembles *Philodendron oxycardium* or *cordatum.* It is a native of the South Seas and is sometimes called "Devil's Ivy".

The best types are those highly marked with yellow or cream streaks and blotches. Marble Queen, *Pothos wilcoxi,* and Silver Moon are among the better varieties. They need filtered light to retain the white markings. Above all keep these plants in a warm location; 70° F. or better. Even brief exposures to low temperatures (below 65° F.) will cause the leaves to develop spots that eventually break down physiologically. Excess water is also harmful.

They can be propagated like Philodendrons with the exception of the higher temperature requirements.

TOLMIEA MENZIESI

This is an interesting plant that produces young plants on the mature leaves. It is sometimes called the "Piggy-back" plant because of this curious habit. It will grow best in a sunny window.

Fig. 18. Pothos var. Marble Queen and Episcia coccinea are beautiful vines but require special attention.

TRADESCANTIA

The old-fashioned "Wandering Jew", *Tradescantia fluminensis* has green and white foliage. *T. Zebrina* has purple and silver stripes. Both are easily propagated vines that make attractive house plants. *Tradescantia discolor (Rhoea discolor)* is an entirely different kind of plant. It is the familiar "Moses-in-the-bulrushes" plant with maroon and green upright leaves. It has small white flowers tucked in the axils of the leaves.

Chapter VI

Easy-to-grow Flowering Bulbs

During the cold winter months there is no substitute for fresh spring flowers to add a dash of color and cheer in the house. Flowers grown right at home are usually more appreciated. No do-it-yourself activity is more rewarding than planting bulbs and watching them push through the soil and develop from leaf to flower.

Bulbs are usually classed as hardy or tender. This is important because the two groups are handled differently. The hardy types or Dutch bulbs generally require a cool rooting period before they can be made to bloom. The tender kinds are of tropical and subtropical origin and generally require a warmer temperature.

To grow tender bulbs, a greenhouse or conservatory is useful though by no means essential. It is surprising what can be grown merely in good bright windows, or in the basement with artificial light. With little effort and expense, one of several installations can be built. The main essential, of course, is some kind of a light source. Hanging ordinary 60-watt incandescent bulbs 3 feet apart or three fluorescent tubes above a 3-foot table is satisfactory for most of the hardy bulbs if the temperature of the basement is about 60° F.

The basement installation can be improved if the table is pushed against a wall that is painted white or even whitewashed. Curtains of aluminum foil or boards painted white can be used to cover the other sides. The reflection is useful to increase the light intensity.

The light box described in Chapter II is even better. It can be used not only for forcing bulbs but for starting seeds for the outdoor garden. Fig. 8 shows this kind of box. It contains an industrial four-tube fixture. All bulbs do not require so much light but the extra light does no harm. If incandescent lights are used, three 100-watt lamps are recommended. It should be stressed that the incandescent lamps give off much more heat and may not be satisfactory in a warm basement.

The temperatures required for the various bulbs are given under "Specific bulbs". To cool the box, merely allow more air to circulate by opening the cover wider. If the basement is very cool, the lid needs to be opened just a crack. If this is not sufficient to maintain temperature, use only incandescent lamps or add one or two to the fluorescent system.

HARDY BULBS

This group includes tulip, daffodil, hyacinth, narcissus, crocus, and many others. The bulbs are generally available from early September. To obtain special varieties, it may be necessary to buy from a garden center or seed store. In buying bulbs select those that are plump, sound and free from blemishes and spots. The

bulbs need not be top-size, but avoid buying very small sizes. A range of colors and forms is more interesting than a succession of the same variety.

Buy the bulbs as early as possible and store them in a cool place until they are potted. Decide how many bulbs you can handle and buy accordingly. The special rules that follow will aid in determining the quantity to purchase.

Soil—The soil mixtures suitable for forcing hardy bulbs need not be fertile because the bulb contains practically all the food required to produce a good flower. What is required is a soil that is porous. If the basic soil available is a light, sandy loam, it can be used as it is. Where the soil is a heavy clay, mix coarse sand with it — the heavier the soil, the more sand required. Do not add manure to the soil unless it is sterilized. Also avoid using soil that has previously been used for growing bulbs indoors or in the garden. Such soil may contain disease organisms.

Some of the hardy bulbs, hyacinths and narcissi for example, can be grown in water alone. Also, fiber may be used in place of soil. This is a special medium that provides a clean, well-drained anchor for the roots. It is used in pre-packaged items primarily, but is no better than a clean, porous soil.

Fig. 19. Assorted containers add interest to bulb forcing.

Containers—Ordinary red clay pots are most commonly used. The shallower pots are sometimes referred to as bulb pans and are especially good for the shorter flowering bulbs such as hyacinth and crocus. At the same time, the latter lend themselves to unusual and interesting containers. Narcissi can be planted in china bowls with striking effects. Fig. 19 shows some of the other possibilities. Practically any container can be used. The important thing to remember is that containers without drainage holes require special attention in watering. It is easy to over-water in these containers. In pots with drainage holes, it is recommended that a few pieces of broken pot be placed over the hole. The weight or feel of the soil should be used as an indication of when to water.

Planting—Bulbs should be planted as soon as possible. As a general rule, the bulbs should be set just deep enough to cover the tops. Whenever possible a pot should be filled almost to capacity with bulbs. A common error is to plant two or three bulbs in a large pot. A good pot of bulbs should be a balanced mass of flowers and foliage.

Storage—After the bulbs are planted they must undergo a rooting period in a cool environment. If the potted bulbs are to be buried outdoors, the pit or trench should be cooled off in advance by placing leaves or paper over it. Running cold water over the area is also helpful. The site of a pit is preferably under a tree and well drained so that no water can accumulate. The depth of the trench can be 18 to 24 inches. The pots can be placed tightly together and grouped in the order in which they are to be removed. Long stakes should be used to mark the location of the groups. After the pots are in place a layer of sand can be spread over the top. If mice or squirrels are a problem, place a wire screen over the pots. A thick coating of leaves or litter over the pit will ward off the heat of the sun and help to keep the temperature down. In most parts of Canada, a thicker layer of dry leaves or straw secured by branches or wire netting is necessary over the bulbs after cold weather sets in to prevent severe freezing.

By far the most convenient and dependable storage is a vegetable cellar, but any part of the basement can be used provided it can be kept at a temperature between 45 and 50° F., well ventilated and dark. During early fall the temperature can be kept down by opening the windows at night and closing them in the early morning. Hang a thermometer in the room to be sure that the temperature is satisfactory.

Fig. 20. Hardy bulbs may be rooted in a cool basement. They are ready to be forced when the ball of soil is matted with roots.

Bulbs in a cellar need to be watered regularly. Allowing the pots to dry out during the rooting period will cause flower buds to die before opening. Pots intended for later forcing should be stored at a lower temperature — in practice, nearer the window or ventilator.

Forcing—Hardy bulbs are not ready to be forced into bloom until a good root system is developed. If the soil is matted with white roots, it is a clear sign that the bulbs can be forced. This can be checked by turning the pot upside down and tapping the edge against a table or something solid. By supporting the top with extended fingers the whole soil ball will slide out easily if the pots were clean to start with.

Specific Bulbs

Hyacinths—Varieties of hyacinths suitable for forcing are listed below:

Early		*Late*	
L'Innocent	White	Queen of the Whites	White
Bismarck	Blue	King of the Blues	Blue
Ostara	Blue	Queen of the Blues	Blue
Pink Pearl	Pink	Queen of the Pinks	Pink
Yellow Hammer	Yellow	La Victoire	Red

The top-size bulbs can be planted one to a 5-inch pot. The smaller sizes can be planted in groups of three to five depending on the container. Special glass vases holding single hyacinth bulbs in water are available. These make interesting plants and are easy to handle.

Early varieties can be forced from December on. They are ready if there are signs of good root development. Hyacinths for early forcing should be removed from the trench or storage and placed in a warm, dark location until the sprouts are 4 to 5 inches high. The flower buds at this time will look like miniature clusters of bananas. They are then placed in a window sill or under artificial lights. The temperature can be between 60 and 70° F.

For very late forcing (April) the bulbs should not be planted in the fall; they should be spread out on trays and stored in a dry, warm (70° F.) atmosphere until December or later. They are then planted and handled as above, with the exception of the dark treatment immediately after the rooting storage.

Tulips—The varieties of tulips that can be forced comprise a very long list. For early forcing, say, from late January to the end of February, use any Mendel, Single, or Double Early tulip available and pick out the colors to suit your own personal taste. If Triumph tulips in such varieties as Albero, Kantara, or Crater are available, they are also excellent for early forcing.

Some Darwin Tulips such as:

Wm. Pitt	Brilliant scarlet
Zwanenburg	Pure white
Unsurpassable	Lilac
White Sister	White
Bartigon	Rose red
Wm. Copeland	Lavender

and the Cottage tulip, Golden Harvest, are also good for forcing in late February, March, and April.

Like hyacinths, tulips need cool storage for the rooting period. For forcing by early January, use the early varieties. From late January on, the midseason ones will be superior.

When planting tulips put nine to twelve bulbs in a 7-inch bulb pot. With smaller bulbs use a greater number. Those planted around the outside should be placed with the flat side of the bulb against the pot. The early tulips may need a week or two of dark storage (a warm dark closet can be used) at 65 to 70° F. before they are brought into the light, in order to get good stem length. When the sprouts are 5 to 6 inches high, they can then be forced in a bright window or under artificial light. A temperature between 60 and 65° F. (slightly cooler than for hyacinths) should be the aim.

Daffodils and Narcissi—Daffodils are really a type of Narcissus. It is difficult to classify the Narcissi but those that have flowers with a cup that is as long or longer than the perianth are usually referred to as daffodils. Other forms of narcissus have shorter cups.

Recommended Varieties:

King Alfred	daffodil
Helios	incomparabilis
Early Perfection	poetaz

Daffodils and Narcissi should be potted as early as possible. Three to five bulbs may be planted in a 7-inch bulb pan. This number may be increased with smaller bulbs. Plant the bulbs as close together as possible, but do not squeeze them into position. The soil should not be too firm. Gentle pressing of the soil is sufficient. Begin forcing when the bulbs are well rooted and the flower buds are visible. If at the time they are taken out of storage the flower buds have not grown out of the bulbs, start them in a light cool place, 50 to 55° F. When the buds show, force them at 60° F. Do not force at a warmer temperature if sturdy stems are to be expected.

Some Narcissi, particularly Paper White, Soleil d'Or, and the so-called Chinese Sacred Lily, do not require a cool rooting period. These can be planted and started at a warm temperature. This group of narcissi is also very adaptable and can be grown in water only. Pebbles are excellent to hold the bulbs in place.

Crocus, Muscari, and Lily of the Valley—These are small but nevertheless very interesting bulbs that could add greatly to the indoor garden. Plant about ten crocus bulbs to a 5-inch bulb pan. Muscari, or Grape Hyacinth bulbs are similar in size and can be planted like crocus. Both of these require a cool storage period for rooting and a cool (50 to 60° F.) temperature for forcing.

Lily of the Valley is grown from "pips". The pips used for forcing are usually imported from Germany. Cut part of the roots from the pips and plant in sand, peat, or sphagnum. Only the roots should be covered—the tops should be above the soil. Keep in the dark at 70 to 75°F. until flower stems are well started. Then they may be brought into the light by a cool window for flowering. About three to four weeks are required for flowering. For a succession of flowers, plant a few pots every two weeks from September to February. The unplanted pips should be stored at near freezing temperatures for long-term storage. After planting be sure that the sand or moss is kept moist—drying out for even a short period can mean failure to flower.

With the exception of Paper Whites and a few other bulbs in the hardy group, forced bulbs can be planted in the garden to flower the following year. After the blooms fade, cut the flower stems off and continue to grow them in the basement until it is warm enough to plant outside in the spring. When planting in the garden, space the bulbs about 6 to 8 inches apart. Allow the foliage to die down normally for best results.

TENDER BULBS

This group really includes bulbs, corms, and tubers. Because of their origin they need a warm temperature throughout their life cycle. Indeed, they are very sensitive to cold and if such bulbs are purchased in cold winter weather, be sure that they are not damaged by exposure to low temperature en route home; insist on the bulbs being well wrapped or packed. Most of these are available through the fall and winter months.

Soil—Unlike the hardy types, the tender bulbs require a rich soil. A soil mixture containing one part good garden loam, one part peat moss or leaf mold and one part clean sand would be satisfactory for most bulbs in this class. To this mixture add one-quarter cup of superphosphate per bushel of soil. City dwellers who find it difficult to obtain good soil will find pre-packaged material very satisfactory. Compost soil, leaf mold, and other media are available in many stores. In buying packaged soil, look for a reliable name on the label since these mixtures are usually more carefully prepared. After the plants are growing vigorously, a bi-weekly application of a complete liquid fertilizer is recommended. Follow the manufacturer's directions carefully.

Containers—Since the tender bulbs can be grown from one year to another, standard clay pots are best. Use the correct size for balance between plant and container.

Specific Bulbs

Amaryllis—These are really Hippeastrum but they are better known as Amaryllis. The Dutch Hippeastrums are deluxe varieties but recently South African importations have been found to be highly satisfactory. The latter are available in the fall and can be flowered in six to eight weeks after planting.

A 6-inch pot is a good size to use. Amaryllis bulbs should be planted with the top one-third above the soil level. After planting, water and place in a warm location (75 to 80°F.). Until the flower bud shows, light is not necessary. As soon as the bud begins developing, place in a bright location at 65 to 70°F. As the flower stalk lengthens, give the pot a quarter turn daily. This will ensure a straight stalk. It will be noted that leaves often appear after the flower buds open.

When the flowers fade cut the flower stalk off at the base. Fertilizing the plant is of greatest benefit at this time. The leaves grow luxuriantly during

Fig. 21. An outstanding specimen of Dutch Hippeastrum.

the early summer. By August the leaves will turn yellow and die. When this happens cease watering, place the plant in a cool part of the basement and by early December it can be brought up and started again. There is no need to change the pot until the bulb is obviously too large for its container.

Caladium (See frontispiece)—This plant is prized mainly for its bright, attractive foliage. Although it also blooms, the flowers are insignificant. Plant the tuber with the top just above the soil level. Like the Amaryllis, it needs to be started in a warm, moist location. As soon as the leaves begin to unfurl bring into the light but avoid direct sunshine. The tuber can also be saved for another year.

The light box is a good place to grow this plant but the temperature must be higher than that maintained for tulips and other hardy bulbs.

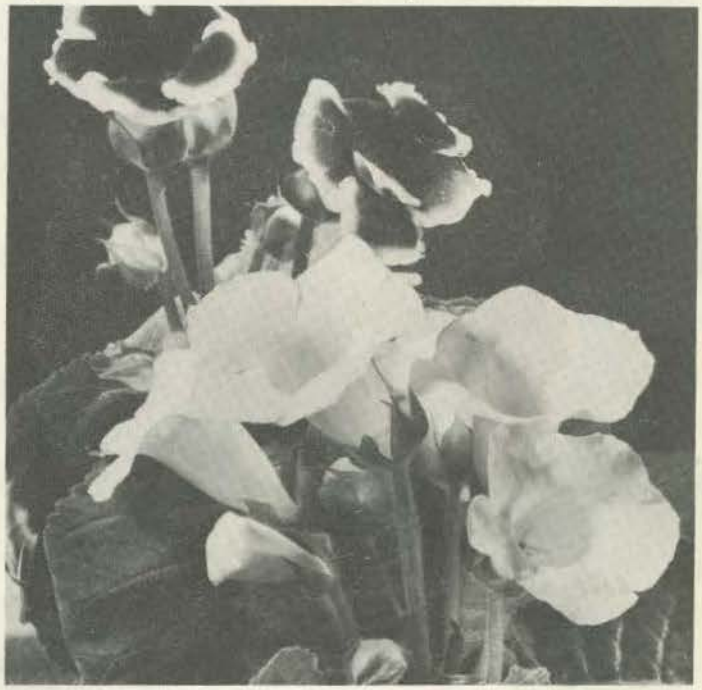

Fig. 22. Most indoor gardeners prize the velvet blooms of gloxinias. Any one who can grow Saintpaulias (African Violets) will be able to grow these successfully.

Gloxinias—These make very good house plants. The brilliant colors and velvet texture of the large flowers combine to put gloxinias in a class by themselves. Their foliage is also attractive and resistant to insect injury. The best varieties are listed on Page 77.

Emperor Wilhelm	blue and white
Emperor Frederick	red and white
Etoile de Feu	scarlet
Violacea	purple
Mont Blanc	white

Plant dormant tubers 1 to 2 inches apart in a shallow box or flat. The best method is to fill a flat with moist peat moss and plant the tubers by twisting them in until the tops are just above the peat. It is important to plant them right side up. Examination of a gloxinia tuber will show that one side has a slight depression—this is the *top*. When watering be careful not to wet the hollow. The flat should be placed in a warm (75°F.) location but light is of no importance at this point.

When the sprouts have leaves 2 inches high, transplant into 5-inch pots using the soil mixture described earlier. Do not bury the tuber but leave the top exposed. From now on the gloxinias need bright light but not direct sunshine, and a temperature of 70 to 75°F. If they are grown in the light box described raise the pots until they are 12 to 15 inches from the fluorescent lights. With incandescent lamps this is too close and would result in the plants being harmed. A liquid fertilizer can be applied every two to three weeks. After flowering grow the plant on until the leaves show yellowing. Then stop watering and store the tubers in a dry location at 60 to 65°F. until the following winter.

Tuberous Begonias—These are too well known to require description in detail. However, if they are to be forced before May special treatment is needed, including supplementary lighting to ensure a day-length of 14 to 15 hours. The light box is ideal if the plants can be placed about a foot away from the fluorescent tubes. They will also need a cool temperature (50 to 60°F.) for short, compact plants.

They are started and grown as gloxinias except for the day-length and temperature differences.

Miscellaneous Bulbs—There are a great number of other bulbs that can be grown in the home. Brief mention will be made of some of them.

Clivia—These have evergreen leaves. Grow cool during the winter and they will flower in the spring.

Eucharis—Sometimes called the Amazon lily. This is a warm-temperature plant (above 65°F.). It is a little difficult to grow in the average home, and flowering is unpredictable.

Fairy Orchid—These are tiny orchids, the formal name of which is *Bletilla Hycinthina*. Plant several in a pot, start warm and keep moist. The flowering period is uncertain but blossoms should appear after two or three months. They need to be examined closely to appreciate the exquisite form of the flowers.

Chapter VII

Cacti and Succulents

This group of plants includes a great variety of forms and sizes. In general they are especially adapted for storing water. The cacti are further distinguished by their spines and often by their striking flowers.

CACTI

General Care—Cacti are very sensitive to excessive watering. They should be watered thoroughly when the soil is dry and then left until the soil turns to a light color before watering again. In a home, this means about once a week. A good soil mixture for most cacti is one-half clean sharp sand and one-half sandy loam. If drainage is a problem, a one-inch layer of charcoal or gravel at the bottom of the pot is helpful. Cacti kept in as small a pot as possible are less likely to be overwatered.

Fig. 23. Cacti. L. to R. Opuntia microdasys, Mammillaria, Echinocereus de Laetii, Malocarpus schumannianus, Mammillaria sp., Pilocereus chryostele, Oreocereus trollii, Astrophytum myriostigma.

To help cacti bloom, keep them in a cool (50°F.) bright location during the winter months. This cool period is essential for flower bud initiation. Large cacti can be plunged (with the pot) in a well-drained part of the garden for the summer; and left there until early fall or until flower buds appear. While outdoors do not water unless the soil is extremely dry.

These plants may be propagated by seeds, cuttings, grafting, or offsets. If propagation is by seeds follow the directions given for fine seeds in Chapter II.

When cuttings are made allow the cut ends to dry before inserting them into the propagating medium. Some varieties have offsets that can be severed from the parent plant and rooted.

Very few insects bother cacti but mealybugs can become troublesome. When they appear, paint the individual bugs lightly with alcohol. An equally effective method is to dab the insects with Volck, an oily insecticide.

Many cacti are suitable for indoor use and some of the most beautiful are in the genus *Astrophytum*. They bloom freely with yellow flowers predominating. *Astrophytum myriostigma* is the well-known "Bishop's Hat". This cactus is spine-free and its five-sided shape suggests its popular name. Members of the genus *Cereus* are generally tall-growing cacti with huge flowers and sometimes large edible fruit. They are easily grown and will thrive under varied environments. A cool, dry location in the winter will promote flowering in the spring and summer. *Cephalocereus senilis*, the "Old Man of Mexico", is slender and round with long, silvery white hair. It is well known because of its odd appearance. *Cereus Peruvianus* is a slow growing variety, and because of its higher tolerance of water it can be used to advantage in planters. *Echinocereus de Laetii* is sometimes called the "Old Man's Little Boy" because of its resemblance to *C. senilis*.

Echinocactus refers to a group of cacti best known as barrel cactus. *E. Grusonii* has a light green body, heavily ribbed and covered with lemon-yellow spines.

Ferocactus is a type of barrel cactus but these usually have hooked spines. Bell-shaped flowers grow from the center of the plant. *F. corriger*, the "Indian Fish Hook" has red hooked spines in the young stages. Another Ferocactus is the well known "Toothpick Cactus", gray green with long heavy, dark colored spines. The Mexicans use the spines for toothpicks.

Mammillaria form the largest and most interesting cactus group. Perhaps the most common name is "Pincushion Cactus". Their ease of culture and adaptability have made them popular as house plants. *M. elongata* grows in golden yellow clusters and is sometimes called "Lady Fingers". *M. Parkinsonii* has a dark green body covered by long white spines. Most mamillarias flower all through the summer with their myriad blooms in red, yellow, white, and pink.

Notocactus are a group of very dainty cacti that do not attain large proportions. The blooms are very showy and the colorful spines are equally attractive. *N. ottonio*, the "Indian Head", produces flowers that are often larger than the plant itself.

Opuntia, or "Prickly Pears", are a large group of cacti with a highly diversified range of forms. Some varieties have wicked spines while others have

none at all. *O. cylindrica,* or "Devil's Cane", is a dark green columnar cactus. The short hooked spines covering a column with round leaves growing at the top inspired the popular name. *O. microdasys,* commonly known as "Bunny Ears", because of the shape of the pods, is another popular type.

Rebutias, or "Crown Cacti", will bloom when quite small and the vivid scarlet blossoms literally cover the plant. *R. senilis* has small white spines with red flowers. It produces several offsets each year and is a fairly dependable bloomer.

Zygocactus truncatus, the well-known Christmas cactus, usually has carmine flowers but newer introductions with white and pink flowers are now available. It grows better in soils having a higher organic content than is required for other cacti. Equal parts of loam, sand, and leaf mold would be very suitable. If placed in a shaded part of a porch or in a cool, bright basement for the summer, it will flower in December.

SUCCULENTS

General Care—Like cacti, the Succulents are distinguishable by fleshy bodies or leaves that are especially adapted for storing water. Soil mixtures formulated for cacti are satisfactory but succulents grow better if more organic matter is added to such mixtures. Succulents make excellent house plants because of their attractiveness and ability to survive extreme conditions. *Aloes* are plants with pointed, fleshy leaves growing from a rosette. However, some are many branched like *Aloe spinosissima* and these are most useful as the tall plant in a small design. *A. Variegata,* with spotted leaves is perhaps one of the better known Aloes.

The *Crassulas* are widely used for dish gardens, but some are also suitable as specimen plants. *C. arboresens* is the common Jade Plant. *C. hemispherica* or "Arab's Turban", is an interesting plant with its round leaves forming an intricate design.

The *Echeverias* are noted for their beautiful leaf forms and attractive flowers. The common "Hen-and-Chickens" are either *E. glauca* or *E. secunda* and are too well known to require elaboration.

The *Haworthia* is another good house plant because of its showy leaves and ease of culture. *H. fasciata* is the Zebra plant. It has dark green leaves with narrow white bands across the back.

The *Lithops,* or "Stone Faces", are easily mistaken for smooth-faced pebbles. They grow best in full sun and with very little moisture.

The *Sedums* grow best in a light sandy soil and full sun. There are many kinds of Sedum and all are fairly good house plants.

Chapter VIII

Orchids

Orchids have long been admired as the ultimate in corsages, but in recent years they have been used more and more as house plants. Many orchids grow well in the average home; in fact some have more stamina than many of the more commonly grown house plants. It is important to understand their particular requirements and then try to satisfy them. To achieve this a small greenhouse, or even a glass enclosed case, is of great assistance but not absolutely essential. However, the average home can be adapted to many species of orchids. *General Culture*—First it should be emphasized that orchids are divided into three main temperature classes: (1) warm (70°F. nights and 75 to 80°F. days), (2) Temperate (60°F. nights and 70°F. days), (3) Cool (50 to 60°F. nights and 55 to 65°F. days). Some orchids are adaptable to more than one temperature range.

Most of the orchids grown as house plants originally came from high altitudes so that fresh air is vital to them. In introducing fresh air, care must be taken not to cause widely fluctuating temperatures nor should the air movement be so rapid as to cause drying. Definite rules are difficult to lay

Fig. 24. Orchids. L. to R. Cypripedium, Brasso-cattleya and Dendrobium.

down, but several air changes per hour would be a good objective. Another general rule is that the "temperate" and "cool" classes need more air changes than the "warm" ones.

Contrary to popular opinion, orchids need bright light, particularly if they are to produce flowers. On the other hand, do not expose them to strong sunlight for prolonged periods. This can be avoided by diffusing the sunlight with blinds or other means of shading.

In their native habitats, many orchids grow in locations where there is high humidity. Providing optimum humidity in the average home is often difficult. In a greenhouse or enclosed case it can be accomplished by damping the floors. In the home the plants may be set over trays or shallow containers filled with water, but the pots should not come in contact with the free water. Setting them on coarse gravel is one solution but perhaps the neatest solution is to put a porous brick in the tray and set the pot on top of it. The plant then benefits from the evaporating moisture but will not be standing in water.

It is perhaps more difficult to water orchids than any other plants, but only because their medium is different. The principles involved are similar; that is, when the plant needs watering it should be done thoroughly and left alone until the next time. Some study and care will be required to ascertain just when watering is needed because of the coarse texture of the media used. Then, too, the condition of the plant must be taken into consideration; some have definite resting periods during which very little water should be given but they should not be allowed to dry out completely.

In natural habitats the resting periods coincide with the seasons. Torrential rains are sometimes followed by dry periods. Orchids from such districts are usually adapted to extreme conditions because of their pseudo bulbs which act as reservoirs for food and moisture. The false bulbs of Cattleyas, Oncidiums, and Dendrobiums conserve food and water as do true bulbs. Unfortunately, the resting periods of many hybrids are not so well defined but they nevertheless benefit by undergoing a dormant period. During the dormant period the plants should not only have less water, but also more light and air, combined with a cooler temperature. They should be kept in this environment until signs of new growth are seen.

The best time to repot orchids is just as new roots are beginning to develop. At this time potting will cause the minimum amount of injury to the fleshy roots. Generally, spring and early summer is the best period for this operation. Orchids need to be repotted when the bulbs grow over the rims of the pots. This occurs about every two years for mature plants and every year for seedlings. Before repotting, cut away the dead and rotted roots and shoots.

Osmunda fiber is the basis of most orchid media. It is obtained from the roots of a particular kind of fern and it is chosen because of its lasting qualities and coarse fiber. The following are suggested mixtures:

(1) For Cattleyas, Dendrobiums, and other coarse rooted orchids—Three parts osmunda, one part sphagnum.

(2) For seedlings—three parts osmunda, one part sphagnum, and one part leaf mold.
The osmunda and sphagnum should be chopped fine.

(3) For Cypripediums—two parts osmunda, two parts sphagnum, and one part leaf mold.

(4) For Cymbidiums—two parts osmunda, one part sphagnum, and two parts leaf mold.

There is some controversy over whether orchids require fertilizing but the best evidence available would indicate that it is beneficial. The important thing to remember is that orchids grow very slowly and therefore require very little fertilizer. The best rules to follow would be to (1) apply fertilizers in the liquid form only, (2) use only very weak solutions, (3) apply when the plants are growing actively.

Choosing orchids—Orchids should be chosen primarily to suit the environment you can provide. Always buy from a reliable dealer because you must take his word for such vital information as origin of plants and parentage, if it is a hybrid, whether it has flowered before, and its natural flowering season. The origin is important because imported plants take a while to recover. It is readily appreciated that hybrids from controlled crosses would be more valuable than unnamed seedlings. If a plant has flowered before, it is likely a mature plant; if it hasn't, it may not flower for some years to come. The flowering season is important because with this information you can select plants that bloom when you want them most. Above all, do not be misled by bargains that are sometimes offered in newspapers and magazines.

POPULAR ORCHIDS

Cattleyas—The traditional orchid corsage is usually made with Cattleyas or Cattleya hybrids. This group contains some of the largest and finest blooms. Cattleyas and their hybrids range from the warm to the temperate division; that is, they require 60 to 70°F. nights and 70 to 80°F. days. Various species are used to secure continuity of bloom and variety of color. The hybrids, however, flower at all seasons and are rapidly replacing all the species for commercial use.

Cattleya leaves are usually single, although some species bear two or three at the top of the pseudo bulb. The flower buds are enclosed in a sheath and arise from the base of leaves. One or more flowers are produced at a time. The predominant flower colors are purple and various shades of purple, but the pure whites are perhaps more valuable commercially.

The ideal period to rest Cattleyas is soon after the flowers are over. *Cymbidiums* are suitable as house plants if a cool situation can be provided. They tolerate temperature fluctuations well and are fairly easy to grow. The flowers of Cymbidiums are borne on sprays. The many beautiful colors of the sprays and the graceful evergreen foliage make these plants of special value to those interested in orchids. In recent years the commercial value of these smaller orchids has increased greatly.

Ideal conditions for Cymbidiums would be 50 to 60°F. nights and 60 to 65°F. days with bright diffused light. Early winter is the natural flowering season of many Cymbidiums. They remain in bloom for as long as two months. After flowering the plants should be rested; at no time, however, should they be allowed to dry out completely.

Cypripediums are sometimes called "Lady's Slippers". The flowers are characterized by a sac-like lip with the predominant color white, yellow, green, brown, or purple. The cultural requirements for Cypripediums are much the same as those described for Cymbidiums but the "Cyps" have softer leaves and do not withstand extreme temperatures as well. In addition, the "Cyps" do not have a pseudo bulb so that watering must be more regular. The various species combine to spread the flowering season the year around.

Dendrobium is another spray orchid; that is, the flowers are borne in long racemes. In this group there are species that are deciduous and evergreen. The deciduous species are native to climates with definite wet and dry seasons. The former need a warm temperature during the growing season, but may be rested in a temperature of 50 to 55°F. The other species require a warm temperature throughout the year. Most Dendrobiums are winter flowering.

The *Miltonias* are dainty pansy-like orchids. They require temperate conditions and will not tolerate extremes. The flowers are produced in early summer. In winter the plants can be rested in a temperature of 60°F. at night. Watering should be reduced at this time and humidity restricted. These orchids are difficult to handle if the summer temperature cannot be controlled.

Vandas have monopodial growth, that is, they have "one foot" in contrast to sympodial plants like Cattleyas. The stems produce strap-shaped leaves with a leathery texture. The flowers are borne on long racemes from the axils of the leaves. The warmth-loving species, *V. luzonica, sanderiana, insignis,* etc., require less light, temperatures that do not fall below 70°F., and a fully saturated atmosphere. Other Vandas such as *coerulea, Kimballiana, Amesiana,* etc., are the more common kinds and will grow at 60°F. nights and 70°F. days. They may be rested in a temperature of 45 to 50°F. They will respond to high light intensity during their growing period.

The *Oncidiums* are gay, yellow spray orchids that do well when given a cool to temperate environment.

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