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JANUARY COVER ILLUSTRATION

Piedmont Azalea (*Rhododendron canescens*) grown in the Callaway Gardens,
Pine Mountain, Georgia. — Photo courtesy Callaway Gardens.



U.S. DEPARTMENT OF AGRICULTURE

Fig. 1. Plan C garden four feet long and one foot deep. This long, narrow garden is most useful in dimly lighted corridors. This version of the indoor garden also may be used as a room divider.

Indoor Gardens for Decorative Plants

By HENRY M. CATHEY, HERSCHEL H. KLUETER, AND WILLIAM A. BAILEY¹

You can grow and display many kinds of decorative plants in your home by using an indoor garden. An indoor garden essentially is a planter equipped with high-intensity fluorescent lights.

The idea is not new. For years, house plant growers—African violet enthusiasts in particular—have worked to develop ways of growing plants satisfactorily where there is little or no daylight.

By acclimating the plants to a dimly lighted environment and by providing supplementary lighting with fluorescent lamps, growers have been able to maintain plants indoors for long periods. But they have been hampered by lack of a light source that is suitable for plant display—a source that is high in intensity, that is not too hot for the plants, and that does not detract from the appearance of the surroundings.

With the development of high intensity lamps that have square, tubular, and round shapes, many lighting handicaps have been overcome. Plants thrive when grown in an indoor garden illuminated by these high intensity fluorescent lamps—plants that barely existed indoors before the lights were developed.

To grow plants satisfactorily in an indoor garden—

- Water the plants thoroughly, but only often enough to prevent wilting.
- Fertilize the plants every 2 to 4 weeks while they are actively growing.
- Illuminate the plants with fluorescent lights 12 to 16 hours daily.

THE GARDEN

Plans for three versions of the garden are shown. A cabinetmaker should be

able to construct an indoor garden by following these general plans.

Plan A is for a garden with a planter box 2 feet square. This is a focal-point garden—used as the principal decorative accessory in a room. (Figs. 7, 8, 9)

Plan B is for a tall, narrow garden—6 feet tall and 1 foot square. It is designed for displaying plants in hanging baskets. (Figs. 10, 11)

Plan C is for a garden 4 feet long and 1 foot deep. This long, narrow garden is most useful in a dimly lighted corridor. It will brighten as well as decorate the corridor. This version of the indoor garden also may be used as a room divider. (Figs. 13, 14)

Planter Box

The planter box can be made of fir plywood painted to match the walls in the room where it will be used, or it can be made of veneered plywood stained or oiled to match the furniture with which it will be displayed. Many kinds of wood and wood finishes are available that are suitable for planters.

Inside the planter is a watertight liner. This liner is best made of sheet tin painted with asphalt to retard rusting. For a temporary liner, heavy-gauge polyethylene may be stapled inside the planter.

The planter is mounted on a platform, equipped with casters, that fits under the riser. (Fig. 2) The entire unit may be moved easily; floors and carpets around it may be cleaned; plants in the garden may be reached easily for care and replacement; and the contents of the room—garden as well as furniture—may be rearranged easily.

Waterproof hanging baskets are available for use with the tall, narrow garden

¹Agricultural Research Service, USDA, Beltsville, Md.

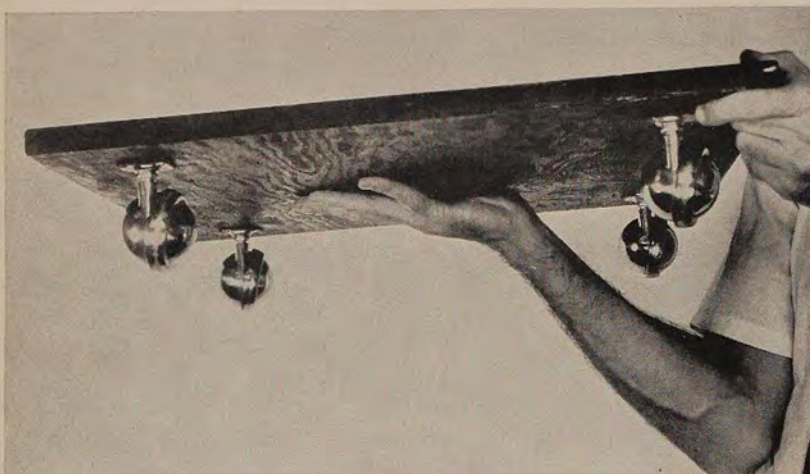


Fig. 2. Platform, equipped with casters.

Fig. 3. Ballast, connector, and timer.

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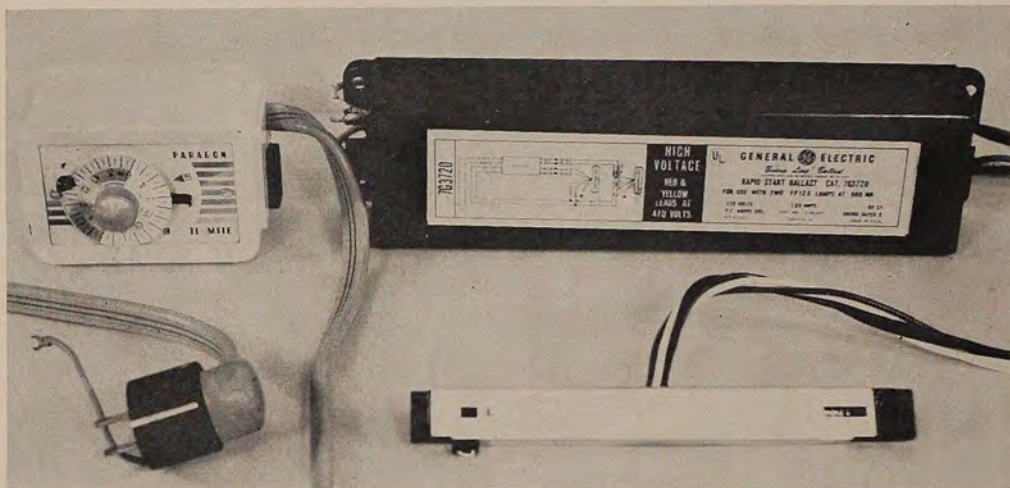
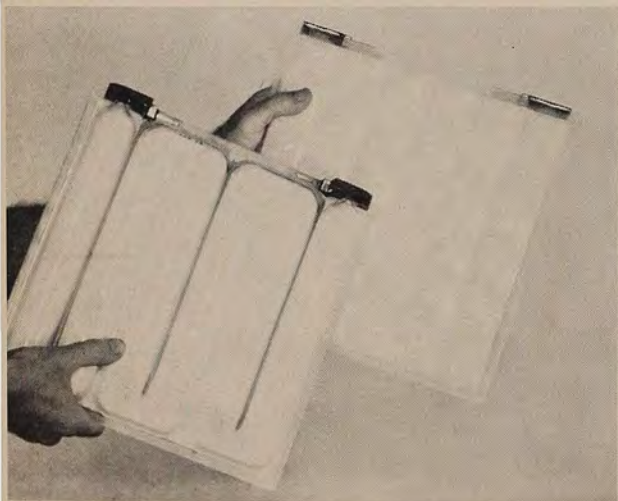


Fig. 4. Panel lamp.



shown in Plan B. (Figs. 10, 11) These baskets have a drainage disk in them that permits excess water to be drained off.

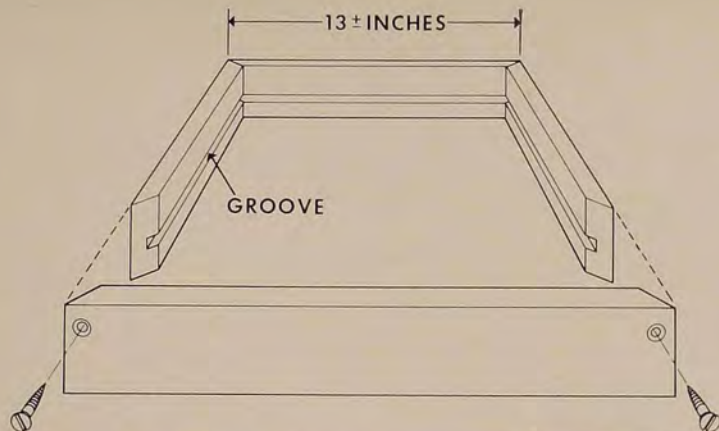
Lighting System

The lighting system for the gardens using panel fluorescent lights consists of separate lamps, ballast, fixture, and timer. (Fig. 3)

The panel fluorescent lamps are deluxe cool white. The lamps also are available in tints other than cool white. (Fig. 4) They require special connectors, which should be ordered at the same time the lamps are ordered.

Rapid start ballast is required for these lamps. One ballast will operate two panel fluorescent lamps.

When you order lamps, ask the dealer if mounting fixtures are available for



PHOTOS—U.S. DEPARTMENT OF AGRICULTURE

Fig. 6. Fixture for panel fluorescent lamps.

them. If not, you will have to make your own or have them made. The fixture consists of a wood frame about 13 inches square. (Figs. 5, 6) Three of the sides of the frame have grooves cut in the inside faces. The panel fluorescent lamp is slid into these grooves and the fourth side of the frame then is screwed in place, holding the lamp secure in the frame.

The lamps are held in position over the planter by slotted metal channels 4 feet long. These channels are wall standards for adjustable bracket shelves. They are available at most large hardware stores. The lamps, in their wooden fixtures, rest waffle side toward the plants on 12-inch brackets that are set in the slots at the top of the standards. The upturned ends should be cut from the brackets to form a flat top on the brackets.

Since the ballast is separate from the light fixtures, it can be placed on the rear of the planter box. Not only is it out of sight, but in this location the heat that it generates will not harm the plants in the garden.

A timer can also be mounted at the rear of the planter. This timer, which is available at electrical supply houses, assures that the lighting system comes on and goes off at the proper time every day.

The timer, ballast, and lamps are connected as shown in the wiring diagram. (Fig. 16) Wires from the ballast to the lamps are covered with plastic tubing and are hidden in the hollow

Fig. 5. Frames must be custom fitted to each lamp.

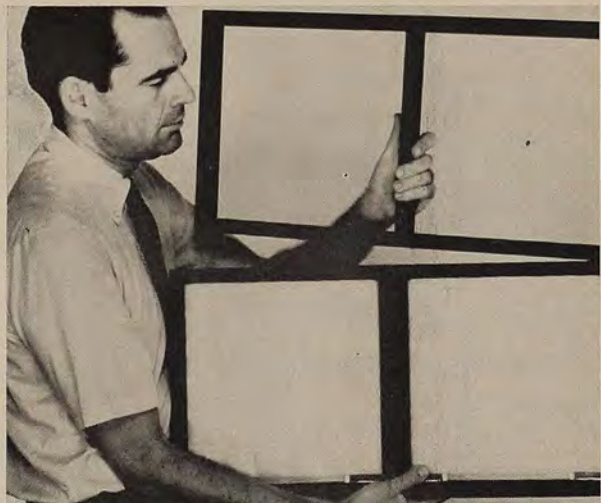


Fig. 7. Focal-point garden using panel fluorescent lamps (Plan A). With lamps attached to the rear standards, as shown here, lighting intensity is high enough for good growth of flowering plants.





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Fig. 8. Plan A type garden planted with *Ficus* (rubber plant), *Dieffenbachia* and azaleas.

back of the standard that supports the lamps.

High-output lamps designated as VHO, SHO, and Powergroove are available as complete lighting systems—tubes, fixture, reflector, and ballast. The fixture can be connected to the timer at the rear of the planter. High-output lamp fixtures can be used on the corridor model of the garden. (Plan C)

SELECTING A LOCATION

The best place to put an indoor garden is where the temperature during the day is about 75° F. and the temperature during the night is about 65° F.

Avoid locations near heating ducts, exhaust fans, or doorways to the outside. Hot air from heating ducts heats and dries the plants. Cold air and drafts from exhaust fans and outside doors may chill the plants.

It is also a good idea to avoid placing planters in heavy traffic areas in the home. Not only is the planter often in

the way where traffic is heavy, but plants in the garden are likely to be damaged by passing traffic.

Wherever it is used, an indoor garden will light the ceiling and walls as well as the plants. This extra light may be welcome; it may serve as the primary source of illumination for the room. But it may be unwelcome—glare, rather than brightness. To reduce glare, put fiber-glass diffusers on the back of the panel lamps—on the side away from the plants. *Do not put diffusers between the lights and the plants.*

STOCKING THE GARDEN

The degree of satisfaction that your garden brings you depends, more than anything else, on your selection of plants for it—plants that are both attractive and adaptable to growing indoors. Your skill in arranging the plants that you select can add to your enjoyment of the garden.

Plants should not be placed directly in the indoor garden; they should be potted and the pots set in the garden. This method of handling the plants allows you to rearrange your garden periodically.

You can use seasonal plants in your garden—poinsettia at Christmas, azalea or tulips at Valentine's day, lily at Easter, hydrangea for Mother's day, potted annuals during summer, or potted chrysanthemums in fall. Your garden should never remain static; it will soon become unattractive.

Selecting the Plants

Select plants according to the amount of light you are prepared to supply.

Foliage plants need only be lighted from the top. So if you want to use only fixtures that are parallel to the planter and mounted over it, select foliage plants.

Flowering plants must be lighted from the top and back of the indoor garden. If you are willing to mount lighting fixtures on the standards so the lamps shine forward onto the plants, you may include some flowering plants in the garden.

Here are the minimum and preferred number of foot-candles you should use to light selected plants when they are illuminated 16 hours daily. (A foot-candle is the light of one candle falling on a surface one foot away from the candle. Get a representative from your electric power company or a qualified electrician to measure the foot-candles for you.)

Plants that require low light:

Minimum: 50 foot-candles

Preferred: 100 to 500 foot-candles

Aglaonema (Chinese evergreen)

Aspidistra (Iron plant)

Dieffenbachia (Dumb cane)

Dracaena

Nephtytis (*Syngonium*)

Pandanus veitchii (Screwpine)

Philodendron oxycardium

Philodendron pertusum (*Monstera*)

Sansevieria (Snakeplant)

Plants that require medium light:

Minimum: 500 foot-candles

Preferred: 1000 foot-candles

Aglaonema robelinii (Chinese evergreen)

Anthurium hybrids

Begonia metallica

Begonia rex

Bromeliads

Cissus (Grape ivy)

Ficus (Rubber plant)

Kentia fosteriana (*Kentia* palm)

Peperomia

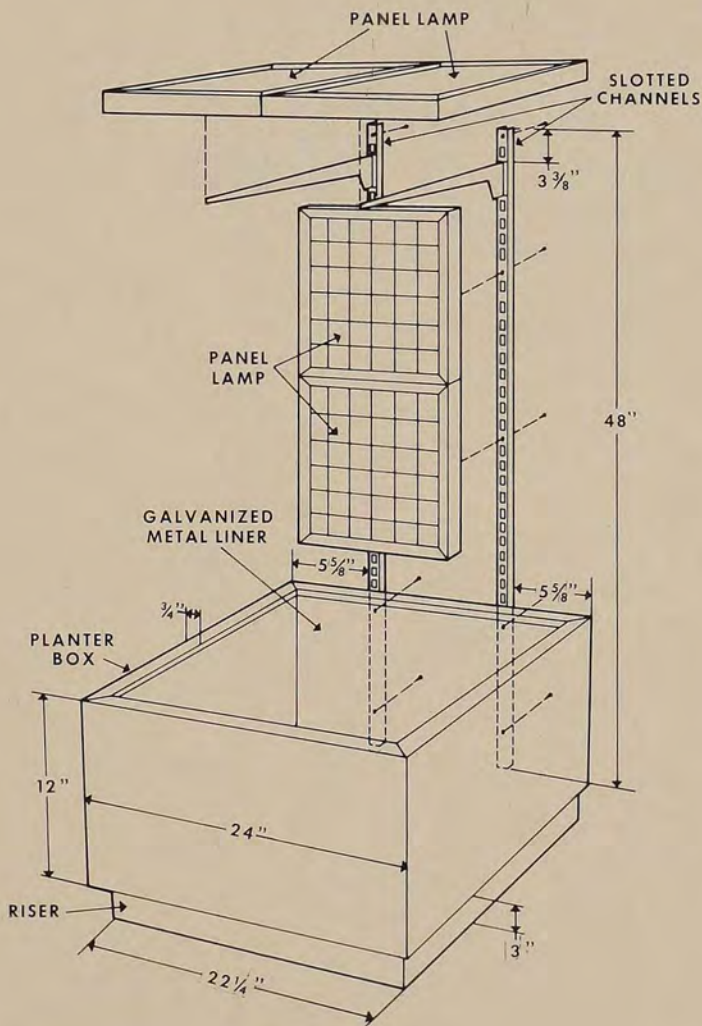


Fig. 9. Plan A—Focal-point garden 2 feet square.

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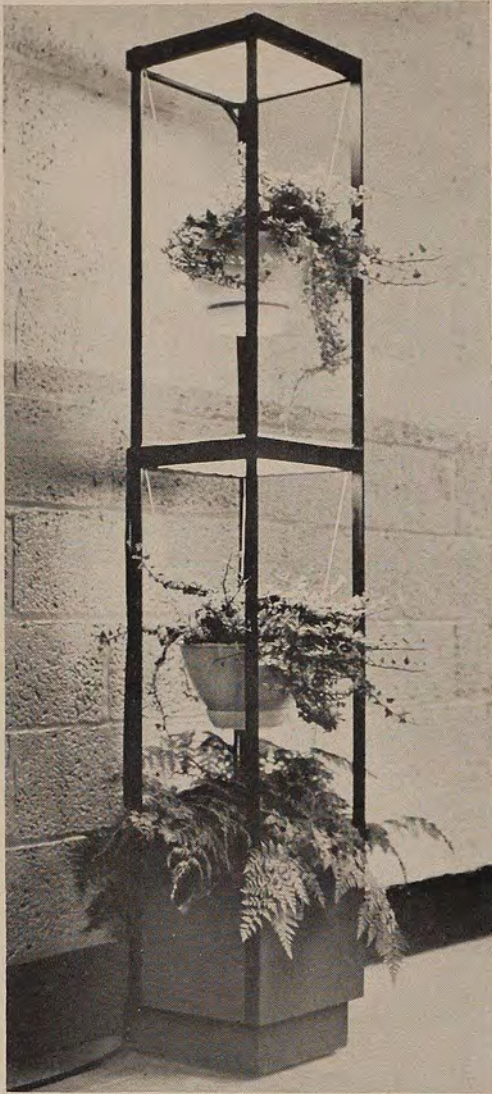
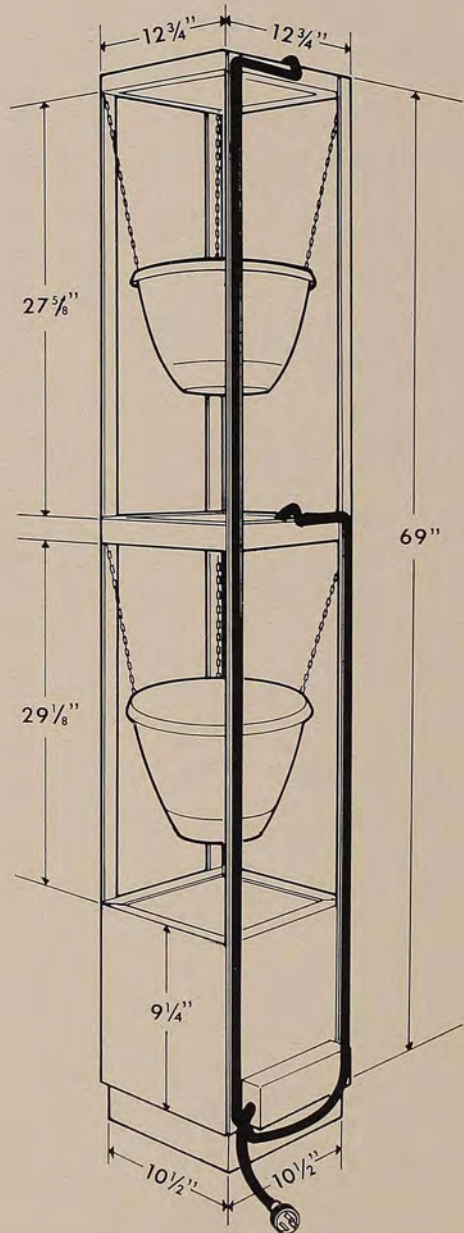


Fig. 10. Indoor garden for displaying plants in hanging baskets (Plan B). The baskets are waterproof and have a drainage disk in the bottom.

PHOTOS—U.S. DEPARTMENT OF AGRICULTURE

Fig. 11. Plan B—Indoor garden for hanging baskets.



Philodendrons, other than *P. oxycarpum*
Pilea cadierei (Aluminum plant)
Schefflera
Scindapsus aureus

Plants that require high light:

Minimum: 1000 foot-candles
 Preferred: Above 1000 foot-candles

Aloe variegata
 Begonias, other than *B. metallica*
 and *B. rex*
Codiaeum
Coleus
Crassula
Episcia
 × *Fatshedera lizei*
Hedera (Ivy)
Hoya carnosa
Impatiens
Kalanchoë tomentosa

Pelargonium species

Petunia × *hybrida* (Cascade type)

Saintpaulia species (African violets)

Salvia splendens (Scarlet sage)

Sinningia species (*Gloxinia*)

Tagetes species (Marigold)

Many kinds of plants may be used in the house. Here are some plants that grow well under varying conditions indoors—

- Plants that are useful under many conditions: *Aglaonema*, *Aspidistra*, *Cissus rhombifolia*, *Crassula* (Jade Plant), *Dieffenbachia*, *Ficus*, *Nephtytis*, *Philodendron*, *Sansevieria*, *Schefflera*, and *Scindapsus*.

- Plants that are useful in extremely dry conditions: Bromeliads, cacti, *Peperomia*, *Sansevieria*, *Scindapsus*, *Zebrina*.

- Plants for large containers: *Dieffenbachia*, *Dracaena*, *Fatshedera*, *Ficus elastica*, *Ficus lyrata* (*pandurata*), palms, *Pandanus*, *Philodendron*, and *Schefflera*.

- Plants for low temperatures (50° to 60° F. at night): Bromeliads, cineraria, citrus, cyclamen, English ivy, German ivy, Jerusalem cherry, kalanchoë, and primrose.

- Plants for medium temperatures (60° to 65° F. at night): Christmas cactus, chrysanthemum, gardenia, grape ivy, palms, pilea, peperomia, ti plant (*Cordyline terminalis*), tuberous begonia, and wax begonia.

- Plants for high temperatures (65° to 70° F. at night): African violet, *Aglaonema*, Croton, *Dracaena*, *Ficus*, *Gloxinia*, *Nephtytis*, *Philodendron*, *Scindapsus*, *Schefflera*, cacti and succulents, *Caladium*.

Some plants will not do well indoors. These plants are sunlovers, and though the lights in the indoor garden are bright, they still are pale and weak when compared to the sun. Among the sunlovers are zinnia, aster, cockscomb, morning-glory, nasturtium, snapdragon, and verbena.

Potting the Plants

All plants that go into the indoor garden should be in clay pots. Bagged potting soil is satisfactory to use for

potting the plants. It is available in most garden shops, many hardware stores, and large grocery stores.

You can mix your own potting soil from equal parts of (a) garden soil, (b) sand or perlite, and (c) peat moss. Add one tablespoon of rock phosphate and one tablespoon of limestone to each gallon of soil mixture. Before using the soil, mix it thoroughly, adding water until the soil mixture is crumbly moist.

Setting the Plants

Support large potted plants by setting them on other clay pots that are upended in the bottom of the planter box. Fill in around the upended pots with coarse gravel to a depth of 3 or 4 inches. Then fill the remainder of the box around the potted plants with unmilled sphagnum moss, pea-size gravel, or marble chips. Small potted plants can be plunged directly into the sphagnum or pea gravel.

Although the panel fluorescent lamps used in the garden are not as hot as incandescent lamps, they generate enough heat to harm plants that come in contact with them. Therefore, keep all plants at least 4 inches away from the panel lamps.

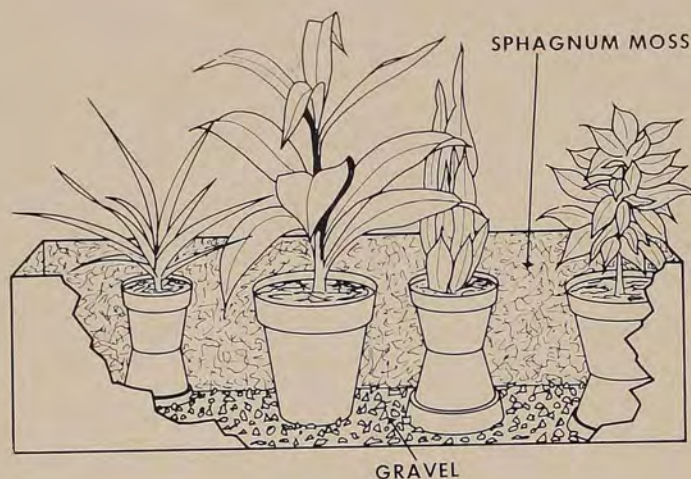
CARE OF THE GARDEN

After you have selected plants that grow well indoors, your success in growing them depends primarily on the care you give them. You should water the plants thoroughly but infrequently, fertilize them periodically and illuminate them adequately and regularly.

Watering

Of all steps in the care of an indoor garden, watering is most important. If they do not get enough water, plants dry out and die. If they get too much water, plants drown or rot. The proper procedure is to water thoroughly, but only often enough to prevent wilting.

As soon as you put plants in the garden, begin adjusting them to their new indoor environment. Water the soil ball, clay pot, and surrounding sphagnum moss to saturation. But do not flood it.



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Fig. 12. *Pots in the planter box are raised to a uniform level. Space between them is filled with unmilled sphagnum moss.*

Allow the whole garden to dry until the plants are near wilting. You can detect wilting early by watching the leaves; they change from green to gray-green and begin to droop.

When the plants begin to wilt, water thoroughly again.

While plants are adjusting to the indoors, some of the oldest leaves may yellow. If so, remove them. Wash the leaves with warm soapy water and stake the plants. They should now be ready for a long life in the indoor garden.

You can be sure of watering exactly the right amount if you use a plastic funnel. Use it this way—

- Inset the neck of the funnel into the soil in the pot.
- Fill the funnel with water. When it empties, fill it again.
- When water no longer drains from the funnel, stick your finger in the neck so the water will not run out; then remove the funnel.

Only the amount of water that the soil can hold will leave the funnel—never too much. Plants watered in this way usually will not need water again for several weeks. Flowering plants require more frequent watering than do foliage plants.

Wet moss on the surface of the planter tends to raise the relative humidity of the air around the plants as moisture evaporates from it. This high humidity is beneficial to the plants.

Do not bother syringing the plants to

raise the humidity. Syringing seldom is effective; the humidity remains high only for a few minutes. And there is danger of spilling water on furnishings in the room.

When you are watering, do not get water on the lamps, fixtures, and planter.

Fertilizing

Every 2 to 4 weeks, treat the plants in your garden with a solution of water-soluble fertilizer used at the strength recommended on the label. Fertilize only when plants are actively growing.

Do not use dry fertilizers for plants in an indoor garden. They do not dissolve completely, and through buildup, may eventually kill the roots.

Even when you use soluble fertilizers, you may notice an accumulation of fertilizer on the surface of the soil; it will be a white crusty deposit. This deposit should be removed, along with a little of the surface soil, and replaced with new soil.

Lighting

Plants need light for 12 to 16 hours a day. Use a timer to control the length of illumination. Do not depend on your memory to turn on the lights at the proper time.

The timer can be set to turn the lights on and off at any time. For 16 hours of light, you can set it to turn on at 6 a.m. and off at 10 p.m.

While You're Away—

Many house plants die while the owner is away from home on a vacation or business trip. If you cannot get someone to care for your plants, cover the planter with polyethylene sheet and reduce the lighting from 16 hours a day to 8 hours.

If you have time before leaving, you can train the plants to get along with a little water. If not, just give them a good drink, using the funnel method, before you leave.

Plants usually can get along satisfactorily by themselves for about 2 weeks. If you must be away for more than 2 weeks, you can expect to lose some of your plants, particularly flowering plants.

Other Care

About once a week, turn each of the pots in the planter. This encourages symmetrical development of the plants and keeps the plants from rooting into the sphagnum moss through the drain hole of the pot.

If plants get old or sick or oversize, take them out of the planter and replace them with new, healthy, moderate-size plants.

You may find that you are having

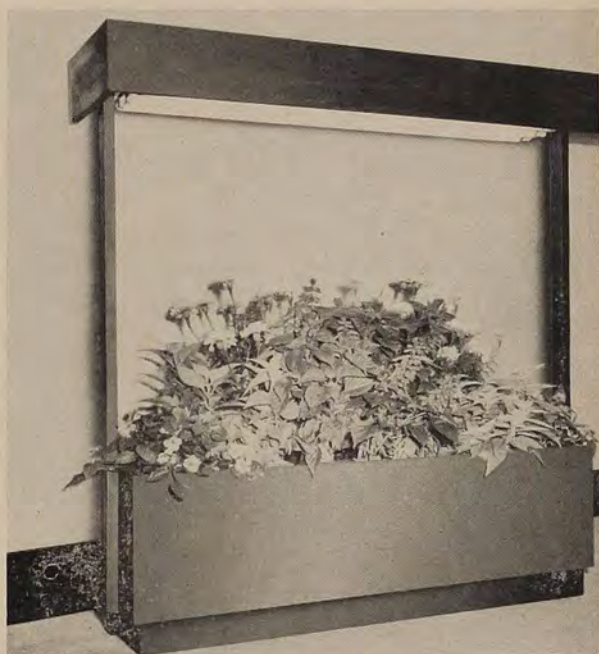
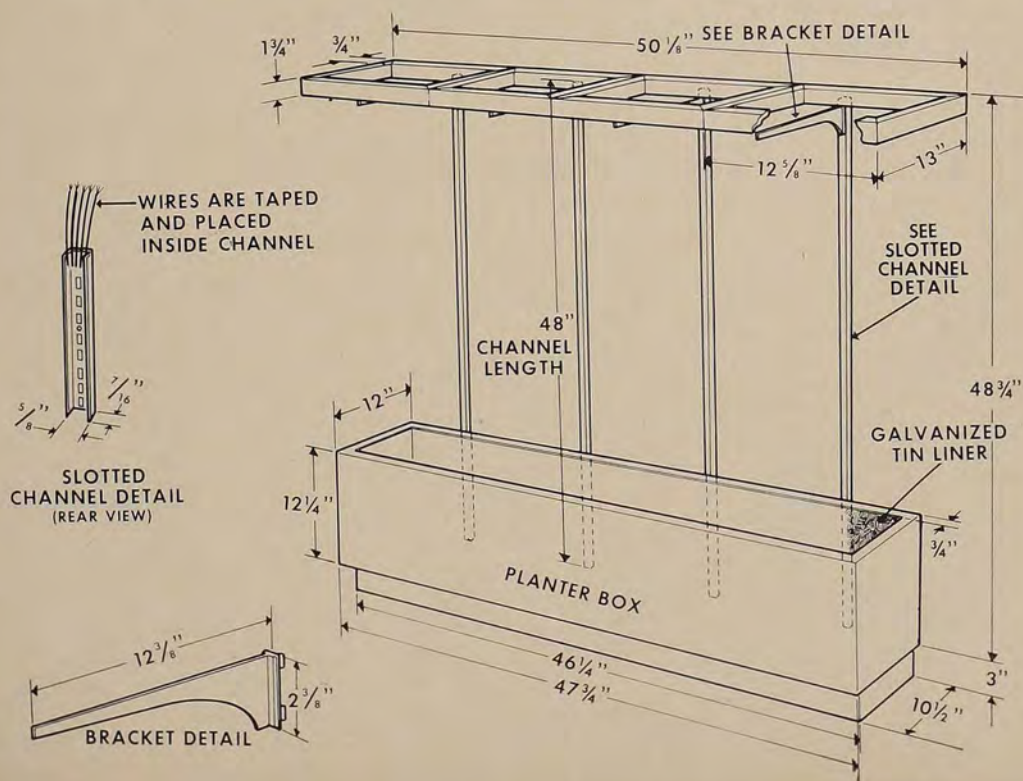


Fig. 13. Plan C garden planted with marigolds, impatiens, and coleus.

PHOTOS—U.S. DEPARTMENT OF AGRICULTURE

Fig. 14. Plan C—Indoor garden for corridor or foyer.





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Fig. 15. Plan A garden with Schefflera Dieffenbachia and marigolds.

insect problems in your indoor garden. If so, follow the instructions in Home and Garden Bulletin 67, "Insects and Related Pests of House Plants," which is available from the U.S. Department of Agriculture, Washington, D.C. 20250. Include your ZIP Code in your return address.

OTHER USES

In addition to using your indoor garden for growing conventional house

plants, you can use it for displaying plant collections such as mosses, ivies, orchids, or bonsai. If you use the garden for orchids, surround it with a clear plastic-sheet material to hold in moisture and keep the humidity high.

Or you may want to display potted plants from the florist—plants that you intend to discard after their flowers pass. Because many of their needs are met by the garden, these potted plants last considerably longer there than they would on a table or window sill. Actually, the plants may continue to grow in the garden.

If you intend to use your garden exclusively for display of florist's plants, you might have a metal pan made to fit over the opening in the planter. The pan should be 3 or 4 inches deep, painted to match the planter.

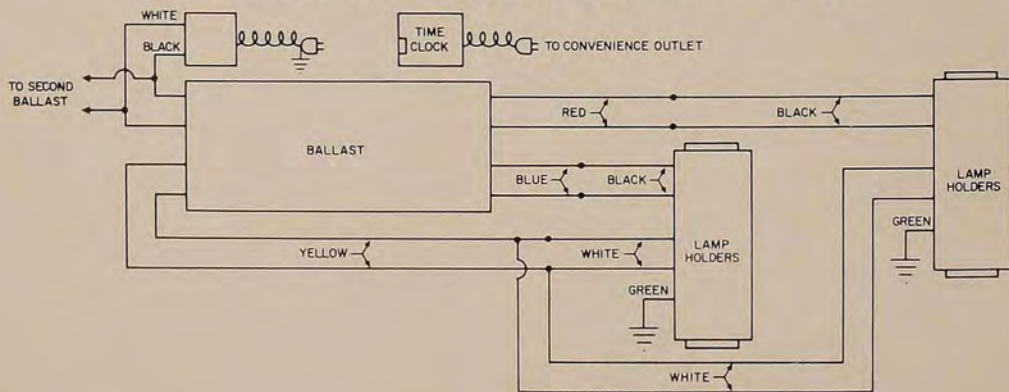
Fill the pan with pea gravel or marble chips and set the plants on the gravel-filled pan. When you water the plants, let some of the water drain into the pan; evaporation from the gravel or marble chips will increase the humidity of the air around the plants.

MORE INFORMATION

For more information on kinds of house plants and their care, see Home and Garden Bulletin 82, "Selecting and Growing House Plants," available from the U.S. Department of Agriculture, Washington, D.C. 20250. Include your ZIP Code in your return address.

You may obtain books from your local library that can supply you with information about growing plants indoors.

Fig. 16. Diring diagram for panel fluorescent lamps.



Native and Some Introduced Azaleas for Southern Gardens—

Kinds and Culture

BY F. C. GALLE¹

The native azalea species of southeastern United States have been called, by many plant authorities, the most beautiful of all our indigenous shrubs. They have received high praise from British and European gardeners, possibly much more than in our own country. Many misbeliefs, together with a confusion of names, surround these azaleas. Often times they are called "Bush Honeysuckle" or "Wild Honeysuckle" when, botanically, they belong to the genus *Rhododendron*, of the Ericaceae, a family of acid-loving plants. In the past there has been some concern about the separation of *Rhododendrons* and *Azaleas*. Some botanists and most horticulturists feel that the deciduous *rhododendrons* should be separated as *Azalea* and the evergreen species kept with *Rhododendron*. Irrespective of their botanical classification, the plants are very choice and American gardeners are fortunate in having them as wild plants in this country. Particularly, are we favored here in the deep South in being able to grow an even larger number of species than in other regions to the north.

Species of native Southern azaleas range in color from white to yellow, orange, scarlet and crimson varying in many vivid shades and hues. Some plants can be found with or without conspicuous color blotches in the throat of the flower. Under proper care most species produce an abundance of bloom and can equal or surpass in brilliant color many of the hybrid and horticultural varieties of azaleas. Native azaleas are also hardier and require less care than many of the hybrids and intro-

duced species. Native azaleas are best used in informal gardens with some shade provided. They are also excellently fitted for wooded, or naturalistic gardens.

With the proper selection of species, one can have azaleas in flower from late March and early April until July and August. They can be combined with many of the other evergreen azaleas and with other evergreen plants. They are particularly attractive where they are used in mass planting rather than as specimen plants having a good green background to show off the exquisite flowers. Azaleas are adapted for light shade and particularly should have shade during the hottest part of the day. Morning sun and later afternoon shade is recommended.

Native azaleas, taxonomically, are difficult to classify by many botanical authorities. There is a great deal of similarity between various species and natural hybridization also occurs between species resulting in the appearance of many non-typical forms. However, within these hybrid forms can be found many unusual color variations which have become collector's items. In the past, many have tried to segregate some of these color forms and classify them as new species, which unfortunately adds to the general taxonomic confusion. Irrespective of this, we shall give a brief description of the various species of azaleas that are known to do well in the South and to discuss their range and use. I shall try to give the descriptions in the order of flowering and the flowering dates will be in reference to flowering in Callaway Gardens in west central Georgia. There is always some variation within the seasons as to the flowering period.

¹ Director of Horticulture, Callaway Gardens, Pine Mt. Ga.



CALLAWAY GARDENS

***Rhododendron austrinum*, Florida Azalea. Rain lily in foreground.**

During some seasons there is a definite overlapping or massing of more than one species in flower. At other times the flowering of the species may be spread over a longer period of time. The following sequence is based upon period of flowering.

R. austrinum, Florida Azalea, is one of the first to show color in the spring, flowering in late March and early April with fragrant yellow flowers, borne before the leaves have fully developed. The plant will attain a height of over 12 feet and is native to north and western Florida, southwest Georgia, southern Alabama, and southeast Mississippi. In spite of the fact that it is called Florida Azalea, the plant has, in fact, been found in a larger territory outside Florida than within the state. Aside from its flower color, the general characteristics of this species are very similar to those of the Piedmont Azalea. The flowers may be more glandular and quite woolly, the tubes of the flowers may be a pink to strawberry red. It is believed that the

forms having the reddish tubes may often be natural hybrids between *R. austrinum* and *R. canescens*.

R. canescens, Piedmont Azalea, plants with white to light or deeper pink fragrant flowers. Flowering occurs in late March and early April. Native from north Florida to Texas, Alabama, Tennessee, Georgia to North Carolina. It is the most abundant of all the native species of the South and occurs in nearly all the southern states. A large shrub, often ten to fifteen feet in height, it offers exquisite pink shades, in massive areas of airy, open flowers. It is commonly found in many habitats, along streams and dry ridges.

Rhododendron speciosum, Oconee Azalea, with its orange to orange-red flowers is one of the most attractive azaleas for the South. It is sometimes erroneously called the Flame Azalea. It has been suggested by some authorities that John Bartram, the famous Philadelphia botanist, and his son, William, may have been describing the Oconee Azalea. Needless to say, his description could be used also for *R. calendulaceum*. In his famous travels, he wrote that "this is the most gay and brilliant flowering shrub yet known." He further called it the "most celebrated species" and described

***Rhododendron canescens*, Piedmont Azalea.**





U.S. NATIONAL ARBORETUM

Natural stand of Rhododendron nudiflorum at the National Arboretum, Washington, D. C.

the flowers in general to be the "color of the finest red lead, orange and bright gold, as well as yellow and cream color." This is a non-glandular species having no pinhead glands on the flower tubes, as contrasted with the Flame Azalea, and it flowers three to four weeks earlier than the Flame Azalea. The plants are native in open woods and wooded slopes from Western Georgia, in a narrow band through the central part of the state, to South Carolina. It varies from low mounding shrubs to plants of six feet and over in height. While the flowers normally are produced early to mid-April when flowering of the Piedmont Azalea has finished, some seasons considerable overlap of flowering occurs and natural hybridization is possible. As a result, individual plants may be found with large pink to salmon clusters and some with small red flowers which will have the pinhead glands, such as are found on the Piedmont Azaleas and with some of the leaf characteristics, as well. The hybrid

forms are quite interesting and the entire group of Oconee Azaleas are most handsome. This species is rapidly becoming scarce because of the heavy population expansion in its native habitat and protective measures are needed for its further preservation.

Rhododendron nudiflorum, Pinxterbloom Azalea, is only found in the northernmost areas of the South, in North Carolina and Tennessee, but extends up into Ohio and northward into Massachusetts. Sometimes a dwarf and stoloniferous plant forming large colonies, it is often found as a medium to tall shrub. A fragrant white to pale pink to deep violet-red flower is produced by this hardy plant, and it can be used in many areas of the South for mass planting. The plant flowers in early to mid-April, is commonly found in dry, open woods and is a parent of many garden hybrids used in the North. *Rhododendron nudiflorum* is rather difficult to separate from another northern species, the Roseshell Azalea,

R. roseum, native to the mountains of Virginia (and even Arkansas and Missouri) northeastward into New England. It differs in having less pubescent, or hairy, leaves and also the flower tube is without the pinheads as commonly found on the Roseshell Azalea.

R. vaseyi, Pinkshell Azalea, occurs in the mountains of western North Carolina. It is a tall, upright, mid-season flowering plant. The flowers, borne usually in mid-April, are rose-pink with a green throat and with orange-red dots on the face of the upper petal. The flowers are most attractive and have a delicate appearance. Also, a white, flowered form, recently introduced in the trade, is called 'White Find'. I do not know the extent of its range and its adaptability to the South. We do know that in Central Georgia it is doing very well, both the clear pink types and the white-flowered form. It certainly should be tried in many other areas of the South, for it is a handsome plant. The flowers lack the distinct tube which is typical of most of the native azaleas,

***Rhododendron vaseyi*, Pinkshell Azalea.**

PHOTOS—CALLAWAY GARDENS



***Rhododendron alabamense*, Alabama Azalea.**

being more bell-shaped and appearing to have separate petals. By some botanists, it is not treated as an azalea, but placed in a separate genus.

Rhododendron canadensis, Rhodora. Native to the northern states and not too satisfactory in the South. The flowers of Rhodora are rose to purplish color. White-flowered forms are known.

Rhododendron alabamense, Alabama Azalea, is a fairly rare, or scarce, plant of dry open woodland hills of north central Alabama and in isolated areas in west central Georgia. The typical species is a low plant, three to six feet in height, stoloniferous in its habit of growth. The plant flowers in mid- to late April, white with a distinct yellow blotch, with an attractive lemon fragrance. The plant hybridizes readily with *R. canescens*, the Piedmont Rhododendron, producing pink and white intergrades that often flower earlier than the typical species and are usually taller growing. These hybrids are widespread in Georgia, Alabama, Mississippi, and Tennessee. These are often grouped with *R. alabamense* and are equally attractive plants and fill

the gap between the flowering of the two species.

Rhododendron atlanticum, Coastal Azalea, is native only to North and South Carolina in the South, but is found in the coastal regions of Maryland, Pennsylvania, and Delaware. It is a low growing species, strongly stoloniferous in its habit of growth; the flowers are pure white or white-flushed with red, sometimes with a distinct yellow blotch and a very attractive fragrance. The plant is extremely hardy and should be tried more in the South. Many of the forms have leaves that are quite glaucous, whitish on the underside. The plant has been known to hybridize with many other native azalea species, including *R. canescens* and *R. nudiflorum*.

Rhododendron viscosum, Swamp Azalea, is native in Alabama, Georgia, Tennessee, and north to Maine. A low, dense, stoloniferous plant is typical, but occasionally, forms may be found that are quite tall and upright. The flowers are distinct, slender tubes, white to creamy-white, with a strong spicy fragrance. The corolla tubes are very glandular and quite sticky to the touch. The species is useful in the home landscape. Its fragrant flowers are borne in mid-May to early June. At high elevations, the plant is often found as a low,

mounding shrub and yet, along moist streams, it can become quite tall. It is often found in pink forms, which are thought possibly to be hybrids with *R. arborescens* and other species.

R. calendulaceum, Flame Azalea, has already been mentioned along with Oconee Azalea as being one of the most attractive of native azaleas, whose southern limits are in the Georgia Piedmont areas. It is found further north, extending into Pennsylvania and Ohio. It is an upright, tall, late-



***Rhododendron viscosum*, Swamp Azalea.**

PHOTOS—CALLAWAY GARDENS

***Rhododendron calendulaceum*, Flame Azalea.**

***Rhododendron atlanticum*, Coastal Azalea.**





U.S. NATIONAL ARBORETUM

Natural habitat of Rhododendron calendulaceum on south side of Roan Mountain, North Carolina.

flowering shrub. The flowers are generally somewhat larger than other native Azaleas. It is a tetraploid, having twice as many chromosomes as the other species. It flowers in Callaway Gardens in late May or early June. The orange to orange-red flower phases are usually from high elevations. The flowers are quite variable from light orange to distinct yellow. The plant was introduced to England in the early 19th century and was one of the parents of the Ghent Hybrids. There are also several named varieties of the Flame Azalea commonly grown by nurserymen. Its adaptability as a landscape plant throughout the South is unknown, but it is certainly worthy of trial. When grown well, it is a handsome, attractive plant. The flowers are non-fragrant and are generally glandular on the tubes, as contrasted with the non-fragrant Oconee Azalea, which is non-glandular.

Rhododendron arborescens, Sweet Azalea, is the best of the native white azaleas. It is generally found along streams and on moist mountain tops in Alabama, Georgia, Kentucky, Tennessee, and northward into Pennsylvania and New York. It is generally a tall, upright-growing plant, reaching six to eight feet in height. The flowers are pure white, occasionally with a pink or reddish flush and often with a distinct yellow blotch on the upper petal. The red style of the

flower usually is quite conspicuous against the snow-white petals. The fragrance is very much like heliotrope. The plant is very hardy and very reliable in most areas. The species is quite variable, however, and there are poor forms with flowers not very showy. Typically, Sweet Azalea flowers in late May and early June. There is a late-flowering form of the plant found in the South, which flowers in July and occasionally into August. The plant may occasionally be

***Rhododendron arborescens*, Sweet Azalea.**

CALLAWAY GARDENS



confused with the Swamp Azalea, however, the stems are quite smooth and non-hairy, as contrasted with the Swamp Azalea, which has very pubescent stems. It has been mentioned that the Sweet Azalea intergrades with *R. viscosum*, producing attractive pink-flowered forms, and there have been occasionally yellow-flowered forms from Sweet Azalea.

Rhododendron oblongifolium, Texas Azalea, is a less-known species, which may need restudying. It occurs in open woodland hills along streams in Southwestern Arkansas to East Texas and Oklahoma. It is very similar to *Rhododendron viscosum*, the Swamp Azalea, and could be classified as a form of Swamp Azalea, rather than a separate species. From our observations of the species at the Callaway Gardens, we find it similar to *R. viscosum*.

Rhododendron bakeri, Baker Azalea, and its synonym, the Cumberland Azalea, *R. cumberlandense*, was first found in north Georgia and named in honor of Dr. William F. Baker, Professor Emeritus of Emory University. The plants are found in open woods, generally at high elevations of the Cumberland Plateau, in Kentucky, Tennessee, to the mountains of north Georgia and Alabama. The plant varies from two to five feet in height, sometimes even higher. The flowers are very similar in color range to the Flame Azalea, but flowering

generally two to four weeks after the Flame Azalea, so that the extension of flowering is noted. Generally, in our area, it flowers in late June to early July. A color phase called 'Camp's Red' is known from the summit of Big Black Mountain in Kentucky. The late Dr. Wendell Camp was among the first to recognize the distinctiveness of the red azalea of the Cumberland Plateau and the name 'Camp's Red' now is used to designate a selected form in his honor. *R. bakeri* is thought to produce hybrids with *R. arborescens* and other species, adding to the interesting color forms that are found within the native azaleas. This plant has been little used in the South, but is certainly one that is worthy of further trial to produce the orange and orange-red color range later in the season.

Rhododendron furbishii is a demoted species from North Georgia now generally regarded as a hybrid between *R. bakeri* and *R. arborescens* rather than a distinct species. The flowers are pink with a yellow blotch.

R. serrulatum, the Hammock-Sweet Azalea, is a native of the wooded swamps of the Southern Coastal Plains, from east central Georgia to central Florida, west to Mississippi and Louisiana. It is a very tall plant producing white to creamy white flowers in late July and early August. Its flowers have a



Rhododendron serrulatum, Hammock-Sweet Azalea.



PHOTO—CALLAWAY GARDENS

***Rhododendron prunifolium*, Plumleaf Azalea.**

long slender tube, much like *R. viscosum*, and are also quite glandular and sticky. Apart from the lateness, the flowers have a notable clove scent, which is quite delightful.

Rhododendron prunifolium, Plumleaf Azalea, is found in restricted areas in southwestern Georgia and along the eastern border of Alabama. It is a tall shrub, often reaching fifteen to twenty feet in height, flowering after the leaves are fully developed. The color of the flowers vary from orange to deep-red. It is in flower at the Callaway Gardens in July and there is spasmodic bloom on certain plants as late as August and occasionally into early September. This is a very delightful plant with its brilliantly colored flowers standing out in contrast to the dark green foliage. Many of the flower buds are known to be candy-striped, giving an unusual appearance, a condition which has also been noted on other species. The plant is without fragrance and must definitely be used, as with the other late flowering azaleas, in shady areas to avoid hot sun on the flowers.

This is, briefly, an abbreviated description of the native deciduous azaleas in the South. However, to complete the picture, it should be mentioned that

there are a few other deciduous azaleas that are commonly available in the South.

EXOTIC DECIDUOUS AZALEAS IN THE SOUTH

Ghent Azaleas. These plants are very cold hardy and of those tried so far, the only satisfactory ones with us are the cultivars 'Narcissiflora', a double azalea, with light yellow flowers, fading to white, and 'Daviesi', a single pale yellow to white.

Mollis Azaleas. These are often seen in Northern gardens, but they have not been satisfactory with us in the South. They are very short-lived, except for the cultivar 'Hugo Koster'. We have tried many of the new and recent introductions of Exbury and Knaphill Azalea and found them to be quite disappointing. These plants are striking in flower and certainly tempting to try because of the large, attractive flowers produced by these varieties. However, their unwillingness to grow and respond under our warm summer conditions are the main hazard.

We hope that in future new hybrids may be produced between these larger flowered types and our native azaleas to produce large flowered types adapted to

southern conditions. This is one of the many programs under way here at the Callaway Gardens, and we have some interesting hybrid seedlings intermediate in flower size between the parents, with the adaptability to grow in our southern conditions. Further testing by us and by other hybridizers in the South is certainly necessary.

R. mucronulatum, Korean Rhododendron, has the appearance of a deciduous azalea and is commonly used in Northern areas but seldom in the South. Selection has produced some very early spring flowering plants with large pink or lavender flowers but they often tend to flower too early in the spring in the South and are subject to killing back by late spring freezes. However, in the northern areas of the South, it is certainly worthy of trial. It generally flowers at the same time as *Forsythia* and offers a good combination. There is an interesting cultivar called 'Cornell Pink' with a distinct pink flower.

CULTURE

The culture of native azaleas is not difficult. In fact, they are among the easier shrubs to grow, if one has good plants to begin the venture. This means that it is necessary to buy from established and reputable nurseries and not from the ordinary plant collector or peddler. Unless the plants are nursery grown, poor survival can generally be expected. In the past, the general trend has been for collectors to dig plants bare-root or with very small balls and sell them on the open markets of our larger cities and these, unless given special treatment, such as cutting back and "babying" for one or two years, are often dead within the first season. Unfortunately, there are relatively few nurseries who are making these plants available at the present time. However, there is more interest being developed, and it is hoped that, within the near future, many more sources will become available.

It has been previously mentioned that native azaleas should be planted in some shade. Particularly is this important for the later flowering species. There is also

a need for good soil drainage. Spacing of plants may vary. Generally, we recommend spacing five to six feet apart. However, a close spacing will give you a more immediate effect and is important for mass planting.

Azaleas prefer acid soils of pH 4.5 to 5.5. The soil should be loose and with considerable humus content. Additional organic matter should be added to the heavier soils and even to the sandy soils, such as leaf mold, rotted sawdust, compost, or peat moss. In some areas of the South, our soils have a pH higher than 6 and this can be acidified with the addition of sulfur. The general recommendation is a pound of sulfur to 300 sq. feet. This will lower the pH one-half point. For example, if, after having a soil test, your soil is pH 6, it can be lowered to 5.5. If it is a clay soil, it would take a pound and a half of material to lower pH one-half point. Less sulfur is required for sandy soils to reduce pH, and it is often recommended to add, with the sulfur, half a pound of ferrous sulphate.

After being planted, the plants should be watered immediately and then weekly throughout the season the first year, unless rains are frequent. The general season for planting is in late fall, early winter, or early spring. The planting holes should be 1½ to 2 times the diameter of the earth ball. The hole need not be deep, since most azalea root balls are less than a foot in depth. Azaleas are shallow rooted plants, but considerable organic matter should be mixed with the planting soil. In heavy clay soils, it may be necessary to remove the clay, adding more sand and organic matter and to plant the azaleas slightly higher than the surrounding beds. Watering then is very definitely of major importance. Mulching is also important. In the South we are fortunate in having many types of mulching materials—leaf mold, pine straw, coarse peat moss, pine bark, peanut hulls, and others. It is important to mulch azalea plants the year around and it should be replenished as needed, especially during the summer, to reduce evaporation and conserve soil moisture during this season.

Since azaleas are shallow rooted plants, it is not advisable to cultivate around them. Weeds should be hand pulled rather than hoed out.

Very little additional care is required in maintaining azaleas once established. Occasionally, pruning may be necessary to remove old or weak branches. Old established azalea plants may be cut back quite hard after flowering to encourage new growth and flower buds for the next year. Pruning cuts down on height, if desired, to work the plant into the general landscape scene, or plants can be left to grow tall and lanky, such as many species will do, to serve as a background for lower growing plants, which can be used with them.

Many fertilizers are available for use with native azaleas. There are commercial azalea and camellia fertilizers, or cottonseed meal is another frequently used material. We have been using a 10-5-7 fertilizer and one of the newer fertilizer mixtures containing Ureaformaldehyde nitrogen in a formulation of 12-6-6. We find that an early application of fertilizer, in our area in late March or early April, just prior to the early flowering of *R. canescens*, is normally right. If rains are not forthcoming, it may be necessary to water the fertilizer in and then a second application of fertilizer can be applied in late June or early July.

A common fault of native azaleas is iron chlorosis, although it is not as common with the natives as it may be with some of the cultivated azaleas. But, the same indications of yellow leaves with deep green prominent veins is a characteristic symptom. Iron chlorosis can generally be corrected, by application of iron sulfate or ferrous sulfate, 1 oz. to a gallon of water to which a spreader-sticker material has been added, applied as a spray to the foliage and also applied to the soil as a liquid drench. If this does not correct the situation, then magnesium sulfate, or epsom salt, can be applied at the same rate. Also available for iron chlorosis, are many forms of the iron chelates. There are many products under differ-

ent trade names available, which can be added either as a spray or soil treatment and they usually produce excellent results. It is advisable to follow specific recommendations for the specific material that you may purchase.

Pests and Diseases. Native azaleas are generally very free of insect and disease problems. Occasionally, it has been noted that spider mites may be common on some species. This is a small, minute insect that can be found on the underside of the leaves, sucking the plant juices. The leaves become a greyish green. The use of Aramite or Kelthane is commonly recommended for good control. Lacewing, the common pest of the ornamental azalea, is sometimes found on a few native azaleas, but it is generally not as serious. They are found on the underside of the leaf, causing a blackened residue, and the leaves will be a light green to straw green in color and the plants will not be vigorous. Malathion and Lindane can be applied in the late spring, as the first signs of Lacewing are prevalent and repeated for a period of three applications of spray. We have had excellent results with Zectran, a new insecticide, and found that it has systemic properties and only one spray application is necessary. This material is highly recommended for the native azaleas and other azaleas, as well. The common large caterpillar, *Datana major*, is frequently found on some native and other azaleas. It is a very large hairy caterpillar with a black body and long white stripes, with blackish or dark red head. This pest is generally found in the woods on native azaleas, blueberries, and huckleberries. A general insecticide containing DDT or Malathion, will give excellent control. This is a very gregarious insect, generally found only on one or two plants in a garden and not common every year.

Leafgall is probably the most common of the azalea diseases, yet the injury to the plants is quite minor. It is an obnoxious organism, causing large deformed buds or leaves, which become very pale green, later becoming velvety grey. This is similar to leafgall disease

common on camellias and occasionally on other azaleas. More prominent in wet spring seasons than in dry years, the control of leafgall should be started very early if a wet season is forecast. Removal of infected limbs or stems will be helpful to the general appearance of the plant. These should be destroyed. This disease is not carried over within the tissue of the plant from year to year. Early in the spring, as soon as the infection is first noted, the use of Captan, Ferbam, or Zineb is recommended.

Native azaleas are less susceptible to Azalea Petal Blight than are some of the evergreen azaleas. This may be due to the more open arrangement of the flowers of the native species. However, if Petal Blight is noted, causing a definite spotting of the flowers and producing wilting, the same general recommendations should apply as for other azaleas, using a material called Dithane B-14. Another name for this material is Parzate or Zineb. A newer material is Thialiate; also, Captan and Phaltan are now being tested for control of petal blight. To control petal blight, completely cover the azalea flowers as soon as they begin to open with one of the recommended fungicides. Also, under test, is a new material called Actidone RZ. This material is proving to have good effect both as a soil application a month or two before the azaleas come in flower and as a spray on the flowering plants as well. Again, however, it has been noted that the native azaleas are not as susceptible to petal blight as the Asiatic azaleas.

PROPAGATION

Collecting of native azaleas is not a commonly recommended practice, particularly since most of the collected plants are poorly handled so that the survival rate is very low. Also, permission should be obtained from landowners before collecting. Many of us in the South are fortunate to have native azaleas on our own farms and woodland areas, and we may wish to move them to more appropriate areas in the landscape planting. If this is the case,

small plants are best moved. It is advisable to select appropriate plants, tag and mark them while they are in flower a year prior to moving. The plants are best moved in the fall or very early spring. Careful digging should be practiced to obtain as many roots as possible, because wild specimens usually have very poor root systems. The roots are often very widely spread and very sparse. The plants should be severely pruned after digging, cutting back almost to the ground. We recommend six to eight inches above the ground. At Callaway Gardens, we move large quantities from areas now rapidly going into subdivisions, and it is our practice to cut the plants back quite severely, heel them into a rich mixture of soil and organic matter, holding them for a period of one to two years. During this time, the plants are watered frequently throughout the growing season and fertilized heavily after they have started new growth with one of the types of fertilizer previously recommended. We have, on some occasions, moved plants in mid-summer and during the flowering season. However, the plants respond more slowly, and it may be two or more years before they become re-established and begin to set flower buds. However, we do find that cutting back is the most important practice, cutting back the top of the plant to correspond to the very poor root system that is normally found with collected native azaleas.

Propagation of native azaleas will be briefly outlined. Cuttings of native azaleas are generally difficult to root, as compared to the Asiatic azaleas. Some of the species with stoloniferous growth habit are much easier to root than are the upright or non-stoloniferous species. However, extreme variations exist within the species. You may find that a certain clone or plant is easy to propagate by cuttings, whereas another clone of the same species will be extremely difficult to root. There are two major problems in rooting cuttings of native azaleas. The first is getting them to root and the second is inducing new growth after rooting. Mist propagation is pre-

ferred. Cuttings should be made of new growth in the late spring, while growth is still green and just beginning to harden. Under mist propagation, a sand medium is recommended, or a mixture of sand and peat moss. After the cuttings have rooted, additional light should be applied and the cuttings potted to induce new growth before fall. It has been noted that cuttings that root and then fail to put on new growth in the same season will often die over winter. It is important to induce new growth on cuttings the same season they are rooted.

Layering is a more satisfactory method of propagating but also slower and more cumbersome in handling certain clonal varieties of native azaleas. Layering can be done in either spring or summer; branch or mound layering is the recommended method. In this method, a low branch is bent and staked to the ground, pegging it down with a wire fastener. You may wish to dig a trench, adding peat moss or organic matter under the branch. It may be a year or two before the branch has rooted and is strong enough to cut from the parent plant. The stem can be slightly wounded with a long narrow cut, or it can be cut upward, producing a tongue that will be coming down from the tip part of the branch. We find the latter method generally more satisfactory than air layering procedures. Native azaleas may also be root-pruned. By this method, the severed root will often form a new shoot and that may be dug away from the parent plant one to two years later. We have also noted that root cuttings can be made of certain azaleas. Root cuttings are made by cutting pieces of root, generally three inches in length, pencil size in diameter. These are laid horizontally in a mixture of peat moss or ground sphagnum moss. Though they are noted to be very slow to produce new shoots, we can reproduce large numbers this way.

Propagation of native azaleas by seed is one of the best ways for mass produc-

tion. The seedlings are quite variable and will not always have the same brilliant color as a good selected parent, but at least they will have the same color range as commonly found. Seeds are collected from the brown capsules in the fall of the year, just as they are beginning to turn brown before opening. Seed can be stored until the following spring or can be sowed in the greenhouse immediately. Seeds of azaleas are very fine and capsules should be held until fairly dry and then shaken thoroughly or cracked to extract all the very small seeds. One seed capsule normally will contain on the average two hundred or more seeds. Ground sphagnum moss is the best medium for seed sowing. The sphagnum is moistened, pressed firmly into pot or flat and the seeds are broadcast onto this medium. No additional covering is necessary, since watering will carry the seed into the shredded material. Germination usually begins within thirty days at 65° to 70° in the greenhouse and after the second set of two leaves has appeared, the seedlings can be pricked off into separate flats into a mixture of soil and sand and peat moss, planted into peat pots. After the seedlings are two to three inches in height, they should be pinched to induce branching. Normally, seedlings will flower during the fourth or fifth year. Occasionally, we have had some flowering earlier than this and in some cases it requires eight to ten years.

We in the South are most fortunate in being able to grow one of the most attractive of native American shrubs and to have it in abundance still in many of our state parks and gardens. Throughout the South, gardeners are urged to take an interest in the native azaleas, as well as in many of our other attractive native plants, which make splendid ornamentals. We can make good use of these plants, obtaining as many as possible from local nursery sources and encouraging our nurseries to start growing many more such excellent native plants for general landscape use.

Fragrance Gardens for the Blind— Fact or Fiction

BY LORRAINE BURGESS

The creation of fragrance gardens for the blind seems to most people a charming idea, a way to share the pleasures of a garden with those who cannot see.

Fragrant plants are specially arranged and marked with braille labels so that the blind may acquaint themselves with the scent of Jasmine, Heliotrope, and Mignonette. Other plants are chosen for their fragrant foliage, such as Bayberry, Lavender, Peppermint, and Lemon Geranium. Still a third group of plants are included for texture and form plants like Blue Fescue, Bleeding Heart, and Pussy Willow. Such an assembly of plants captivates the fancy of children,

and makes adults feel that they better understand the problems of the blind. But strangely enough this garden concept does not win the universal approval of associations for the blind, or of some blind individuals. They do not wish themselves "set apart as being different or in need." Some blind people prefer to walk in a garden on the arm of a friend without calling attention to themselves or their plight. Blind associations tend to discourage such undertakings for the same reasons.

Nevertheless gardens for the blind continue to grow and increase in number. Some afflicted persons are quite

Norfolk Botanical Gardens' special fragrance garden for the blind is planted in raised beds made from cobblestones, formerly ballast in old sailing ships that once docked in this tidewater country. The small pool in the middle adds splashing water to this "touch, hear, and smell" project. The hand rail is maintained at an even 30-inch height, while the height of the raised beds varies.

PHOTO BY AUTHOR





PHOTOS BY AUTHOR

Braille and English labels along the hand rail offer plant information to both the blind and the sighted. Tree branches are carefully pruned so as not to interfere with passing visitors.

enthusiastic about the creation of a separate place, a "playground for the sense of touch and smell."

Fragrance gardens already exist at the Brooklyn Botanic Garden, New York; Tyler Aroretum in Lima, Pennsylvania; Golden Gate Park in San Francisco; Garden for the Blind on West Roosevelt Road, in Chicago; and the Fort Worth

Botanical Garden in Texas. As evidence that such gardens are acceptable to the blind, they exist at their own summer camps at Bedford, New Hampshire; Egypt, Massachusetts; Spring Valley, New York; and Macon, Georgia. In other countries Toronto, Canada; Hove, England and Vienna, Austria boast such installations.

The Fragrance Garden is adjacent to the Administration Building patio; there Creeping thyme, Sweet Alyssum, *Elaeagnus fruitlandii*, and Day-lilies serve as additional "nose-catchers." Linden trees mark the entry to the garden, and more trees will be planted to provide the contrasts in warmth found in light and shade.



Labels are placed at uneven intervals beside the plants they describe. For Spring Narcissus and Hyacinths compete with poolside Sweet Flag as fragrant blooms.

PHOTO BY AUTHOR



The Fragrance Garden at the Norfolk Botanical Gardens, illustrated herein, was built in the Spring of 1963 through the cooperation of the city of Norfolk and the Tidewater Federation of Garden Clubs. Modest in size, it still possesses all the ingredients to make it an excellent working example. Plants were chosen for interest in all seasons, either for fragrance, color or texture, in flowers or foliage. Included are Witchhazel, Pussywillow, Loquat, and *Daphne odora* for winter bloom; *Pieris*, *Osmanthus fragrans*, *Magnolia virginiana*, *Styrax obassia*, Fringe Tree, *Calycanthus*, Hop crab, and Lily-of-the-Valley for spring. In the summer, such roses as 'Eiffel Tower' and 'Pink Peace' vie with dwarf Rugosa rose, *Clethra*, *Gardenia radicans*, Jasmine, *Viburnum odoratissimum*, All-woodi Pinks, Petunias, Rue, Costmary, and *Hosta*. For fall there is Loquat, Clematis, and Herme Camellia.

Especially for fragrance the garden contains Bayberry, Anise tree (*Illicium*), *Santolina*, Irish Lace Marigold, Lavender, and *Artemisia*.

The garden follows a free-form pattern of raised beds edged with a waist high guide rail. Labels along the rail contain information in braille and in English about the names of the plants and their season of bloom. The sense of sound is exaggerated by the crunch of gravel on the walkways. A sculpture beside the small pool with splashing water is planned in the near future.

Mrs. E. W. Timmons, landscape designer at the Botanical Gardens, helped with the building of the garden. She suggests that it is important that the guide rails be of uniform height even though the height of the beds may vary. She cautions that while blind people have a remarkable sense of touch with their hands, they should be protected

from protruding twigs or branches which might hit their face or eyes.

Braille markers, she suggests can be obtained inexpensively from Volunteers for the Blind, c/o Mrs. J. M. Beck, 332 South 13th St., Philadelphia, Pa. She further advises that the English translations be written on the back of the braille labels, so they can be installed on the rails without the assistance of a

'braille' interpreter.

If, from these observations, one concludes that a Fragrance Garden for the Blind is a worthwhile community project, it should be understood that the blind are not limited to this one brief interlude with plants. It should serve as an enticement to them to search out other gardens and further encounters with the botanical world.



PHOTO BY AUTHOR

Labels are angled for easy viewing and easy touching no matter how they are read. The markers can be moved along the horizontal rail to key positions as new blooms appear.

A Book or Two

(Books available **for loan** to the membership are designated: (Library). Those not so designated are in private collections and are not available for loan. Books available **for sale** to the Membership are designated with the special reduced price and are subject to the usual change of price without notice. Orders must be sent through the American Horticultural Society accompanied by the proper payment. Please allow two to three weeks for delivery. Those not designated for sale to the Membership at reduced prices can be purchased through the Society, however, at the retail prices given. In these instances the full profit is received by the Society to be used for increased services and benefits of the Membership.)

Practical Bonsai for Beginners

Kenji Murata, Japan Publications Trading Co., Rutland, Vermont. 1964. 120 pages, illustrated. Price \$3.95. (Library) Members price \$3.35.

The interest in the cultural horticultural study of Bonsai (raising dwarf trees in pots) is increasing by leaps and bounds,—especially does this seem to appeal to the male persuasion and calls for all their creative imagination, stamina, and “long term returns.” Kenji Murata realizing our desire for immediate results, wisely does not suggest beginning with seeds, but with easily obtained seedlings preferably conifers. We follow him along and find success will be ours in five short years; his photographs of bonsai that age show what can be done. There are also beautiful examples of 300, 200, and 100 year old conifers which have been lovingly tended over the centuries and handed down as precious heirlooms.

No weak-sister hobby this—it calls for guts, stick-to-itiveness and talent. Transplanting and wiring, training and displaying are well illustrated with text providing procedure. Excellent soil preparation information and what we should have as tools for bonsai is well covered. The author tells how to tell front from back of a bonsai you are preparing, when and how to nip those sprouts on conifers as well as flower-bearing trees; care of bonsai after wiring and best placement of your bonsai—never on the ground.

There is an excellent guide to 50 popular species for bonsai, with common English and scientific names, fertilization, wiring, pot soil, watering, sprout-nippings, pruning, transplanting with notes on each one. This is an excellent book for experienced growers as well as beginning strugglers. There soon will be a Baby Sitters Service for Bonsai trees; since they must be watered twice a day in summer, you can't go away and just tuck them in the garden. But real Bonsai fans will gladly baby sit for each other's plants I'm sure.

KAREN FOSS

Flowering Shrubs

Isabel Zucker. D. Van Nostrand Company, 120 Alexander Street, Princeton, N.J. 08540. 1966.

380 pages, illustrated. \$17.50 (Library). Members' Price \$14.87.

This new reference book on flowering shrubs has recently been released. Mrs. Zucker has divided the book into four parts. Part I deals with the use of shrubs, with very extensive lists of shrubs growing over 10 feet, those between 6 and 10 feet, between 3 and 6 feet as well as those under 3 feet at time of maturity. Further lists in Part I cover characteristics as well as preferred growing conditions. There is a bloom time chart and a chapter devoted to the use of shrubs in the house.

Part II is given to how to plant and maintain shrubs and their troubles and hardiness.

In Part III the acquiring of shrubs is covered including propagation. In this section I feel that the Buyer's Guide Chart is so apt to change even before a book reaches the public that probably these 46 pages could have been deleted.

The last Part of the book takes care of small trees to grow with shrubs and the most frequently asked questions about shrubs. The final entry is a good index.

It is interesting that Mrs. Zucker uses the Nickerson Color Fan sold by the American Horticultural Society as her standard for determining color.

The excellent black and white photographs accompanying the short descriptions of the plants which are listed alphabetically were taken by Mrs. Zucker. They are really a great feature of this nicely assembled book which has the handy plant hardiness zone map as end papers. The only criticism I have beside the Buyer's Guide is the occasional misspelling of plant names, such as *Euonymus alata* for *Euonymus alatus*.

FP-K

The Art of Japanese Flower Arrangement

Stella Coe. The John Day Company Inc., 200 Madison Avenue, New York, N. Y. 10016. 1964. 158 pages, illustrated. \$5.95 (Library).

The author is the founder of the London chapter of Ikebana International and a graduate Master of modern Sofu Teshigahara's Sogestu School, Tokyo. Mrs. Stella Coe published this entertaining and enlightening book in England where it was so highly successful it has wisely

been brought to us in this American edition. It wastes no words in its lucid, straight-forward approach to the modern manner of Japanese flower arrangement. There are 51 black-and-white photographs, each with a diagram of Shin-Soe-Hikae (or Heaven-Man-Earth), which should be very helpful to beginners; there are 28 diagrams and a glossary explaining the Japanese words used in the book.

Having lived in Japan for 12 years, Mrs. Coe absorbed the knowledge she now so well dispenses through her interesting book. In the chapter on "Ikebana explained" she invites us into her charmed circle and sets the pace for our happy adventuring with her. We liked particularly the idea of having the diagram for the arrangement on the same page with the arrangement. Suggestions for material to use, restraint too of her abstract and free style arrangements is helpful. This is a welcome addition to our ever-growing collection of flower arrangement books. We have just one small objection, there are no photographs of the first Japanese school, the classical, which is just touched on; but as Mrs. Coe points out this book's objective is to instruct in the modern styles which she does to the Queen's taste.

KAREN FOSS

The Driftwood Book

Mary E. Thompson, 2nd edition. D. Van Nostrand Co. Inc., Princeton, N. J. 1966. 248 pages, illustrated. \$5.95 (Library). Members price \$5.05.

The Driftwood Book by Mary E. Thompson, photography by Leonid Skvirsky includes Index with numbers in italics referring to the 160 exquisite black-and-white illustrations. Quoting from the author herself, "three things pertinent to flower arranging and especially to driftwood arranging,—creative imagination, courage, and freedom of expression." Mrs. Thompson has all these and more, as this new edition of her 1960 book shows.

Having for 25 years collected weathered wood from above the timber line to quiet coves, lakes and ocean shore, I share fully Mrs. Thompson's interest in this intriguing hobby, and to that growing clan of weathered wood collectors, I urge them to read this excellent book for help in making the best use of their "driftwood".

The book is divided into three parts. Part I covers the mechanics, finding, preparing, and mounting; Part II, art of use with flower arrangements which will be a great help to opening your eyes to possibilities in your own "driftwood"; and Part III, modern trends to abstract, with use of today's textural materials of all kinds. Mrs. Thompson's free form arrangements are an inspiration in the use of restraint, imagination, and insight to achieve beauty. It is a real Treasury of Weathered Wood and is recommended for both the neophyte and experienced arranger. (A book so beautiful should come out in full color in its third edition).

KAREN FOSS

Climbing Roses Old and New

Graham Stuart Thomas. St. Martins Press, 175 Fifth Avenue, New York, N.Y. 10010. 1965. 203 pages illustrated. \$8.95 (Library). Members Price \$7.60.

Mr. Graham Thomas of Surrey, England, advisor to the National Trust, has made a valuable addition to his earlier books, "*Old Shrub Roses*" and "*Roses of Today*," in his latest book covering climbing roses. He has grown roses since his childhood, is thoroughly familiar with the rose gardens of his own country and France, and is definitely the most thorough and painstaking person of all those doing research on old roses today. He admits his partiality toward old roses and his chapter on the musk roses and their importance in the ancestry of the more modern varieties proves this.

The beginner will find his detailed descriptions most helpful, as well as the chapters on rose culture. There are also diagrams for supports for climbing roses, and a botanical chart by Gordon Rowley for those interested in classifying roses.

Mr. Thomas' own delicate line drawings and soft-tinted water colors are a delight to the eye and photographs of formal and informal treatment of the climbers adds interest. As is usual in the books of Mr. Thomas, each chapter is followed by a list of illustrations used by earlier writers with his evaluation of each. The extensive bibliography given is a valuable source of information for those who are interested in further study, making this volume a reference work for both the beginner and the more advanced rosarian.

MAUDE GAY BENZINGER

The Magic World of Roses

Matthew A. R. Bassity. Hearthside Press, 381 Park Avenue South, New York, N. Y. 10016. 1966. 224 pages, illustrated. \$6.95. (Library). Members' Price \$5.90.

Few people have had the wealth of experience that has been the background of Matthew Bassity, author of "*The Magic World of Roses*." Formerly Curator of Public Information at Brooklyn Botanical Garden, then as public relations counsel for Jackson and Perkins for fifteen years, and more recently as public relations counsel for All-American Rose Selections, he has had contacts with many experts and access to authentic information not usually available. For example, the greater part of the pictures which probably average at least one to each of the more than 200 pages can be credited to Jackson and Perkins. Mr. Evans of the American Rose Society has given technical advice. McCall Magazine has supplied pictures on the rose in crafts and also Hallmark and Popular Gardening. There are specific directions for rose photography given by experts from the Eastman Kodak Company; pictures of prize-winning arrangements of roses; instructions on how to dry roses;

recipes for pot pourri; the rose in food and medicine; articles on rose history and legend, and information on how to grow roses and how to plant them.

Considerable space is devoted to rose culture for different areas and how to use the Plant Hardiness Zone Map. One chapter is devoted to Rose Awards and Test Gardens, another to American and European rose gardens. Judging and classifying roses are explained and even how to patent a rose. All-in-all this book by Mr. Bassity is a comprehensive encyclopedia on all phases of rose culture and uses.

MAUDE GAY BENZINGER

Flowers in the Winter Garden

M. M. Graff. Doubleday & Co. Inc., New York. 1966. 203 pages, illustrated. \$4.95 (Library). Members Price \$4.20.

This is a delightful book with great appeal to gardeners who love the "little flowering things." These small plants and bulbs may be grown to make an appearance during the gray months. The author has had spring in January in gardens on Long Island and in New Jersey.

Mrs. Graff writes knowledgeably of alpine plants, crocus and a goodly number of other winter bloomers, which with a little planning, will flourish and flower despite falling temperatures.

Photographs, many of them in color, by the author give a nice pictorial review of various bulbs and plants she has used to brighten the winter scene.

Inclusions helpful to serious winter gardeners are an index, a glossary, a bibliography, and a source list of nurseries.

EVELYN J. MOORE

The Aloes of Tropical Africa and Madagascar

Gilbert Westacott Reynolds. Published by the Trustees. The Aloes Book Fund, P.O. Box 234, Mbabane, Swaziland. 1966. xxii + 537 pages, 4 to, illustrated, 106 full page color, 557 text figures. \$14.75. Obtainable from Edwin A. Menninger, Drawer 45, Stuart, Florida, 33494.

The Aloes of Tropical Africa and Madagascar by the world's leading authority on *Aloe* is a monument to the author, and the monograph sets a good model in works of this kind. The present volume is a companion to the author's earlier monograph, *Aloes of South Africa*, published in 1950, and with that job "off my hands, the urge to investigate and monograph the Aloes of all Africa, and Madagascar, began to assert itself—soon irresistibly." Now after more than fifteen years of field work supplemented by study in the important herbaria of Europe, the completed work covers 197 species out of a total of 324 for the genus *Aloe*, many described by the author.

Aloes are succulent plants of the Liliaceae confined largely to Africa, Socotra Island, and southern Arabia, with one species in the Canary

Islands. The taxonomy of *Aloe* is perplexing, largely because botanists of the past worked mainly with dried herbarium specimens, and for this reason the classification of *Aloe* has long been in a state of confusion. The book is not a final treatise on aloes, yet Dr. Reynolds has made a most significant contribution based upon field work. Objections may be raised as to taxonomic conclusions, but the author's field work and documented materials are above reproach. Horticulturists and others will be astounded to learn that between 1951 and 1960, the author traveled more than 40,000 miles over Africa and Madagascar in search of *Aloe* species "at their type localities, and wherever else I could find them." Two maps show the author's itineraries on his many trips to aloe country. The geographic coverage in Africa includes all areas of the continent north of the Limpopo River on the northern border of the Republic of South Africa (including Socotra, Arabia, and the Canary Islands). *Aloe barbadensis* Mill. (*Aloe vera* L.) of the Canary Islands has long been known to medicine and was illustrated first in the *Codex Aniciae Julianaee* of A.D. 512, and the plant is given good coverage by Dr. Reynolds.

The Tropical African species in Part I are divided into 20 groups, but without a dichotomous key the user will have difficulty placing an unknown aloe into its correct group. Once placed, the going will be easier, since keys to the species are provided. Unfortunately, the keys are not strictly dichotomous, which is a fault that will cause some trouble for users of the book. The 46 species from Madagascar in Part 2 are divided into 9 groups. A comparison with the continental African species is interesting because of the discontinuities usually associated with the two floras. While the aloes appear to form a natural group, some of the Malgache (Madagascar) species, as for example *A. capitata* with dense headlike inflorescences, and *A. suzannae*, which is the only species known with a simple inflorescence up to 9 feet long and flowers apparently nocturnal, have no counterparts on the African continent. Likewise, no grass aloes or "Maculate" (*Saponariae*) aloes are known to occur in Madagascar.

Each species is provided with original literature citations and synonymy. Full descriptions accompany each species, which are couched in outline form for quick reading. The type specimen is cited and the distribution of each species is indicated in a list of herbarium specimen citations, but maps are not included. Hybrids in wild aloes apparently are rather common with frequent reference to natural hybrids in the text. Aloes would seem to be an extremely suitable group for experimental study, and the possibilities for development in gardens would appear to be unlimited. The book, however, does not include cytological data. Many of the species are extremely handsome and more should be introduced to gardens. In habit, the species vary from small acaulescent (stemless) plants 10 inches tall in *A. myriacantha* of East Africa to trees 40 feet tall in *A. eminens* from

Somalia. Flower color varies from yellow to orange and red.

Good black and white habitat photographs are provided for most of the species, and fresh flowers were photographed life size. The *pièce de résistance* are the 106 full page color photographs of aloes in their natural habitat. Mostly, the quality of the color is excellent.

From the point of view of production, the book is of high quality we have learned to associate with botanical publications from the Republic of South Africa, particularly with reference to color. The format is clear with few printing errors. For a book this size, the modest price tag is one of the most attractive features, particularly as compared with the price of similar books published in this country or in Europe.

FREDERICK G. MEYER

The Bird Table Book

Tony Soper. Distributed in American by Tappinger Publishing Company, 29 East 10th Street, New York, N. Y. 10003. 1965. 139 pages, illustrated. \$4.50 (Library).

The author of this charming little book states that his object is to suggest ways in which we may have the interest and pleasure of sharing our lives with wild birds. He feels that we should make our gardens, our city centers, and our industrial areas attractive for birds as well as for ourselves—the two objects are perfectly compatible.

Mr. Soper is writing primarily for the English gardener, conservationist, or bird lover, but much of his material is applicable in America; for example, such basic information as food, water, cover, and nesting sites or boxes. In addition he includes a chapter on predators and poisons, a long chapter of species notes, and an appendix giving much interesting information on everything from the life span of wild birds, how to treat bird casualties, and where to get birdsong recordings all the way to recipes for the bird table and notes on birds and the law. There is also a bibliography as well as an index.

The book is attractively illustrated with black and white photographs and line drawings and should appeal to any gardener who feels that his garden would be more attractive with the addition of the natural color, movement, and song provided by wild birds.

GWM

The Strawberry

G. M. Darrow. Holt, Rinehart, and Winston, New York. 1966. 447 pages, illustrated. \$15.00 (Library). Members' price \$13.00.

"The Strawberry" by George M. Darrow is an excellent book in which information pertaining to the history, breeding, and physiology of the strawberry is presented in a clear and systematic form. There has been a definite need for such a book, and Dr. Darrow's awareness of this fact and his desire to share with others the knowledge he has gained has provided a most in-

formative and useful book. Several other strawberry experts contributed to this book by writing chapters on specific topics.

The introduction is written by the Honorable Henry A. Wallace who contributed greatly to the production of this book through his inspiration, stimulus, and suggestions. He briefly surveys in the introduction the development of varieties which played an important role in the establishment of the strawberry industry in America.

The first part of the book is devoted to the history of the strawberry, early breeding work, and strawberry species. The appearance of the strawberry in many religious paintings in the 1400's is pointed out in Chapter Two. Excellent color photographs illustrate how the strawberry was depicted in some of the paintings. Miss Vivian Lee discusses the early history of the strawberry and traces in a remarkable story the journey of *Fragaria chiloensis*, Chilean strawberry, from Chile to France in 1714. She also describes for the first time in English the observations of Antoine Duchesne who is credited with first identifying the origin of the modern day strawberry. The commonly held view is that almost all the modern day strawberries resulted from crosses of *F. virginiana* and *F. chiloensis*, referred to botanically as *F. × ananassa*. The discussion of the life and work of Duchesne is very well written and makes very interesting reading.

The chapter on early breeding work in Europe emphasizes the contributions of English and French breeders such as Knight, Paxton, and Riffand to the development of the large-fruited strawberry. Color photographs of several of the early varieties developed in England and France are included.

The results of studies on strawberry genetics and cytology and descriptions of the eleven strawberry species are presented to give a clearer understanding of the genus *Fragaria*. The work of Millardet, Richardson, Longley, East, Schiemann and many others is reviewed. Their accomplishments have added much to the present knowledge of the genetic composition of strawberries. In the chapter covering the species there is a very informative description and comparison of the three octoploid species, *F. virginiana*, *F. ovalis*, and *F. chiloensis*.

The second part of the book covers the varieties which have been developed in America since 1800, early and present day breeders and breeding programs in America, and strawberry breeding and industry in other parts of the world. A wealth of useful information about these topics is presented. Color photographs showing varieties and breeding techniques supplement the text.

The physiology and morphology of the strawberry is presented in the last part of the book. The structure of the plant and fruit and the effect of the environment on growth and development are described. A most interesting subject covered in this section is the wide adaptability of the strawberry.

A chapter on breeding for resistance to strawberry pests is included also. The appendix contains a world list of strawberry breeders, parentage of American strawberry varieties, and a list of strawberry literature.

This book is a must for everyone who works with strawberries or has an interest in them. The excellent coverage of the large number of topics makes it a valuable reference. An outstanding part of the book is the beautiful color photographs which in themselves are worth the price of the book.

FREDERICK F. ANGELL

Tree Flowers of the Forest, Park and Street

Walter E. Rogers. Dover Publications, Inc., New York. 499 pages, illustrated. \$3.00.

An unabridged paperback republication of a book first published by the author in limited quantity (1500 copies) in 1935.

In addition to being professor of botany at Lawrence College, the late Walter E. Rogers was also a skilled photographer. In using this talent, he combined the knowledge of trees with an ingenious photographic technique that resulted in this unusual book. Generally, the botanical text, which is on a non-technical level, adds little to previously published popular tree information. When this text is combined with outstanding photographic reproductions of tree flowers, however, the true value of the book emerges. Possibly no where can there be found in a single publication a larger collection of tree flowers, many enlarged 20 to 30 times their normal sizes, so clearly reproduced. From the smaller inconspicuous flower of the "Maidenhair Tree", to the larger showy "Cucumber Tree Magnolia", the author used silhouetted drawings of tree habit and actual size flowers, with photographs to illustrate his text. One hundred twenty-one species, comprising 33 families, are presented in this book the most casual tree lover, as well as the more serious student, should find interesting.

ROLAND M. JEFFERSON

Venezuelan Orchids Illustrated

Volumes 3 and 4. G. C. K. Dunsterville and Leslie A. Garay. Andre Deutsch, London 1965 and 1966. 348 pp. and 244 pp., each with 150 plates, plus maps and photographs; distributed in the USA by Museum Books Inc., 48 East 43rd Street, New York 10017. \$20 per volume

In our time, a great many books dealing with the Orchidaceae have been published. But few of these can equal in artistic magnificence the volumes of *Venezuelan Orchids Illustrated*, of which we now have the third and fourth (out of a proposed six).

The orchids taken up here—650 of them from Venezuelan territory have to date been dealt with—include a considerable percentage which occur in contemporary cultivation at this time. Others, including a fascinating array of "botanicals", especially amongst the myriad pleurothallids, are exciting potentials for the connoisseur collector.

Mr. Dunsterville's plates continue to amaze, with their meticulous attention even to the tiniest, microscopic detail; they are certainly to be considered among the finest critical illustrations of orchids ever published anywhere. His handsome color and monochrome photographs, too, are fascinating; those in the fourth volume are particularly valuable to the orchidologist, showing as they do characteristic orchid habitats.

A considerable number of new species, new nomenclatural combinations, and taxonomic decisions are proposed in these books by the junior author. Certain of these affect orchids of horticultural importance, and I for one would have wished that Mr. Garay had afforded us his reasons for them.

Orchidologists have never reached any sort of agreement, amongst themselves, and doubtless never will. But certain of Mr. Garay's judgments seem poorly founded to me, and I suspect will receive similar unfavorable attention from others in his field. Since this gentleman is Curator of the Orchid Herbarium of Oakes Ames at Harvard, it is indeed surprising that he appears unaware of so many recent pertinent publications.

ALEX D. HAWKES

Magic of Trees and Stones

Katsuo Saito and Sadaji Wada (Translated by Richard L. Gage.) Japan Publications Trading Company, P.O. Box 469, Rutland, Vt. 1964. 282 pages, illustrated. \$12.50. (Library). Members price \$10.62.

This is a handsome book with many black and white photographs both general and detailed and clear diagrams. It would make a good present for the gardener who is interested in design and is mechanical, tidy and master or mistress of his or her entire outdoor premises. The contents deal solely with gardens of Japan, but with the above in mind many of the features could be beautifully translated to the west. The use of stone is shown in many aspects and there is a whole chapter dealing with the construction of walls and terraces, stones for use and stones to admire. The gardens range from small, ancient ones to those surrounding large modern buildings. The text is interesting and informative and brings to the reader the fulfillment of the promise implied by the first sentence: 'Shibusu, the Japanese word that means quiet and refined taste sums up the characteristics of Japanese gardening.'

K. LAHR

The Gardener's Pocketbook

***Eucalyptus maculata*—Spotted gum**

The fruits and also the leaves of this species are identical with those of the lemon gum which is considered by some botanists to be a variety of the same species. However, the bark of the spotted gum is deeply mottled since it sheds in patches and the trunk of this species is usually heavier as are also the branches and foliage. The two forms are about equal in cold hardiness and should be planted only in the areas of mildest climate.

Both the lemon and spotted gums are rapid growing forms of exceptional attractiveness which are useful for skyline, for clustered groups which can add great distinction to an area of sufficient scale. Neither are suited to small scale structures.

Australians who visit California are often surprised at the large use of the

Blue Gum (*E. globulus*) in California since they consider other species more attractive as ornamentals. Californians have been unaware of the landscape values of many of the less common species. Undoubtedly this is a potentially important ornamental species in the coastal area of California from Santa Barbara to San Diego.

—V. T. STOUTEMYER
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Adenophora as garden plants

Of the many genera comprising the family Campanulaceae that grow in the temperate zone, possibly the least well known to the amateur horticulturist is the genus *Adenophora*; and yet Farrer, in one of his books says "it is strangely neglected in ones garden. Many of them are exquisite and graceful." Probably the reason for this neglect is due to the fact that the average gardener cannot distinguish most of them from the popular *Campanulas*. No doubt another reason why they are seldom seen is due to the fact that seeds of many species are not readily procurable in this country. Most of them are native to Japan, China, the Himalayas, and parts of eastern Russia. There is one plant, *A. liliifolia*, that is found in eastern Europe. None grow in the Americas or in western Europe. All in all, there are probably about fifty known species.

Like the well known "Harebell", *Campanula rotundifolia*, all the *Adenophoras* that we have raised, have basal leaves that are different in size and shape from the stem leaves. The main characteristic that distinguishes them from *Campanula* is the fact that the style of the *Adenophora* is attached to a raised disc at the base of the flower. In fact, the name *Adenophora* means "disc bearing." This disc is whitish, and its



PHOTO BY AUTHOR

Spotted gum—*Eucalyptus maculata*.

size and shape often vary in the different species.

As far as I know, there has never been a taxonomic classification of the genus, and from our limited experience, I get the impression that many of the plants that are given specific rank are really varieties. One taxonomist writing on the flora of Japan distinguishes the various species by the size and shape of the disc.

There is another characteristic of the genus that might interest the gardener. Many of them are late summer bloomers; some flower in August and September, and a few flower as late as the Chrysanthemums. We had a couple of plants last fall that were in full bloom on October fifteenth. We originally received seeds of this plant under the name of *A. khasiana*. It greatly resembles *Campanula rapunculoides*, the "Roving Bellflower" but it has even larger violet-colored bell-shaped flowers along the two foot stems, and seems to lack the invasive characteristic of the above mentioned *Campanula*.

Most of the plants that we have raised or seen, are more suitable for the border than for the rock garden, since many of them attain a height of two to four feet. However, there are a few that do not exceed a height of one and one half feet.

A. coelestis. One of the most attractive species. An alpine plant native to

Adenophora khasiana.

PHOTO BY AUTHOR



FROM GARDENERS CHRONICLE

Adenophora farrei.

China. It has an average height of about one foot, and has violet-colored drooping, broadly bell-shaped flowers on the ends of numerous erect stems that emerge from the base. This plant we have never raised, but have only seen pictures of it, as well as several herbarium specimens.

A. nikoensis. A plant native to Japan that we have had, which also attains an average height of one foot, and which bears a bell-shaped violet-colored flower up to one inch long. One characteristic of the plant is the disc at the base of the flower which is rather cup-shaped. We have only had the plant for one year, so cannot attest to its hardiness, but like so many plants of this genus, it probably requires some protection from the mid-day summer sun.

A. tashiroi. Another low growing plant, even lower in height than *A. nikoensis*. Native of Japan and Korea. Has rather thick, toothed, ovate leaves, about an inch long. The stems bear terminal bell-shaped flowers with exserted styles. The disc is tubular.

A. takedai. This Japanese plant seems to vary considerably in size. Some of them are low growing, possibly one foot high, while others attain a height of about two feet. The stem leaves are broadly lanceolate, and the corolla is barely one inch long. The style is not exserted. The disc is cup-shaped, wider than long. We had seeds of this plant, but they failed to germinate.

A. farreri. Classed among the taller

Adenophoras along with *A. khasiana* more suitable for the border, or even for the wild garden in light shade. In its native habitat, *A. farreri* is often found growing in rather shady meadows. It attains a height of about eighteen inches, and as one authority states, "possesses a delicacy of habit surpassing in beauty many of the varieties of the *Campanula* genus." The upright stems arising from the base, have numerous good sized mauve-violet drooping tubular campanulate flowers opening from the base upward; its lobes are rather short, and the style is exserted. Our plant bloomed in July.

A. liliifolia. Our plant bloomed about the end of July, was approximately 2¼ feet high, with many small drooping flowers dangling on the upper half of the upright stems. The stem leaves are small, and narrowed at the base into a very short petiole. The style is considerably exserted. In the original description of the plant, the flowers are described as blue or whitish blue. Our plant had creamy white flowers, the only Adenophora that we have ever grown that had white flowers. It possibly has a wider range than any other species, extending through eastern Europe and Siberia.

The following are interesting and moderately tall species with different shades of violet colored or purpled flowers which usually bloom at different times during the summer:

A. forrestii. About two feet high, and very leafy in the middle part of the stem, with a nodding corolla that is broadly tubular, and a style about the length of the flower. The disc is very short.

A. ornata. Said to occur on shady cliffs in China, averaging about two feet high, with short-stemmed tubular flowers about one inch long. The upper stem leaves are sessile, serrate, and narrow at the base. It blooms in August.

A. palustris. This species seems to vary considerably in height. Though our plant was fully two feet high, one authority states that shorter plants occur that are not too tall for the rock garden. It has sessile, ovate, toothed, stem leaves

that narrow at both ends. The flowers, about one inch long, are drooping, racemose, and somewhat cylindrical. In its native habitat it is said to grow on rather damp ground. There is a picture of the plant in The Royal Horticultural Society *Dictionary of Gardening* (1956).

A. stylosa is a Siberian plant about two feet high, blooming in early summer. It has ovate rather coarsely toothed leaves, with short stems, and drooping, somewhat tubular-shaped flowers. The style is nearly always exserted. It is said that in its native habitat it is usually found on rather dry ground.

Many other species that are generally over eighteen inches high, are frequently seen in botanic gardens, particularly in Europe. All of them bloom sometime during the summer. Among these are *A. bulleyana*, *latifolia*, *potaninii*, *tricuspidata*, and *verticillata*,—the last named also pictured in the R.H.S. *Dictionary of Gardening*. None of them seems to be particularly difficult to raise in a fairly light garden soil. Possibly their chief requirement is that they should be grown in a rather shady location. Of course the height which we have attributed to them will often vary, depending on climate and edaphic conditions.

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Dischidia pectenoides

The genus *Dischidia** contains about 50 species but none of these are likely to be known to general horticulture. Their urn-shaped flowers are small and usually are inconspicuous, because contrary to the flowers of the related genus *Hoya* those of the *Dischidias* do not spread flatly but open only for about 1 mm. at the tip. They usually are pale pinkish in color.

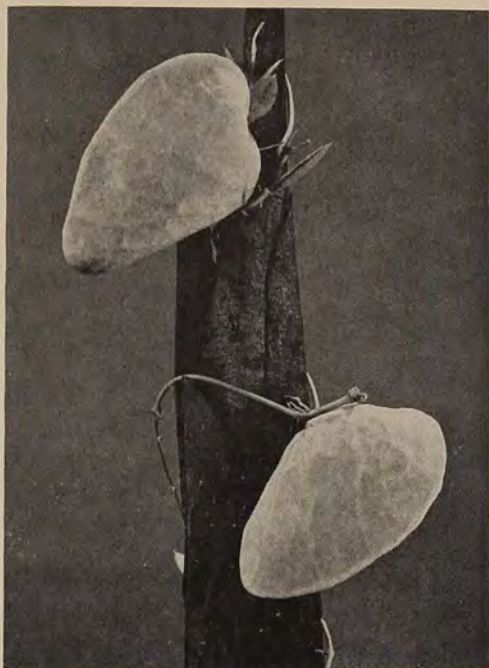
Morphologically (structurally), however, the *Dischidias* are of very great interest because they develop widely varying and most remarkable leaf modifications which are unique in the whole plant kingdom.

The center of distribution of the

* Belongs to the Milk Weed Family (Asclepiadaceae).

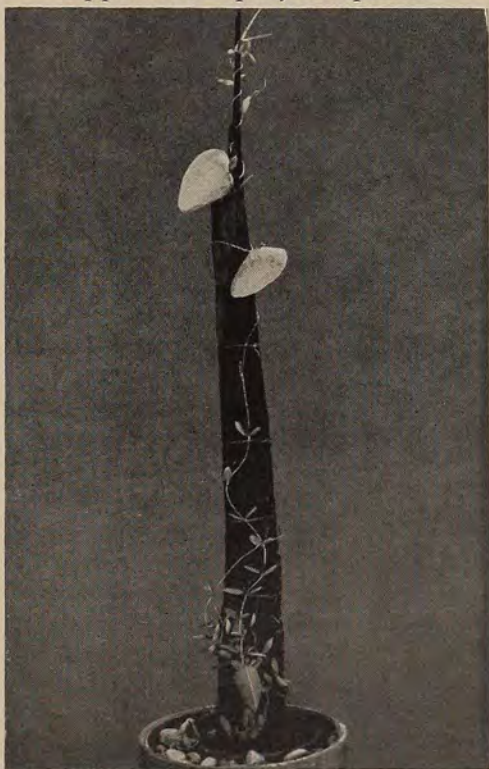


***Dischidia imbricata*.** The tightly appressed, slightly hollow leaves shelter the roots.



Leafbladders of *Dischidia pectenoides*. Notice the position of the upper bladder in which water from the outside cannot enter at all.

***Dischidia pectenoides*.** Notice the open and empty shell of a seed pod at the uppermost tip of the plant.



genus appears to be in Indonesia and Malaysia but some species occur also in the Philippines, Burma, S. China, Formosa, New Guinea, Australia, and some of the S. Pacific islands. Most of them live in tropical regions which are subject to seasonal droughts, and their modified leaves, which with some species assume the shape of hollow bladders, serve the purpose of conserving moisture for the roots which they shelter.

Most fascinating, of course, are those species which produce bladder-like leaves, the function of which has puzzled biologists ever since the first of these plants was discovered. This first species was *Dischidia rafflesiana*, which is more frequently cultivated than any of the

others, and which I described and illustrated earlier in this *Journal* (January 1962, vol. 41, page 51). At that time I still had no real explanation for the function of these bladders, but I have recently found a most excellent paper by H. H. W. Pearson (*Journal of the Linnean Society*, 1902, vol. 39, page 379-389), in which especially *D. pectenoides*—the main subject of this paper—is described in detail and is illustrated by a series of sketches.

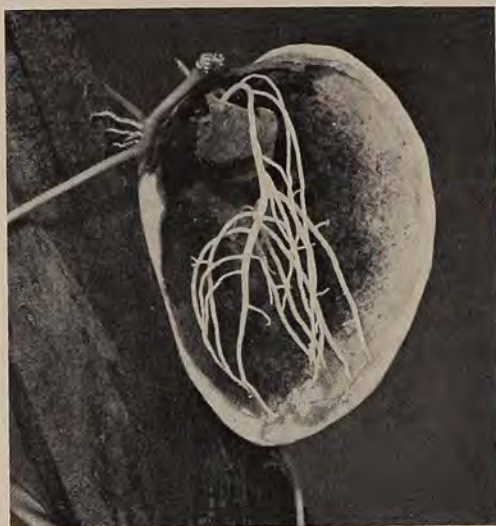
Pearson named this species *pectenoides* because the shape of the bladder reminded him of the shell of a *Pecten* (a scallop), and his careful examination of herbarium material, obtained from the Kew Herbarium, led him to very intriguing conclusions and suggestions.

The leaf-bladders of *D. pectenoides*—as also those of a few other, still largely unnamed species—are even more remarkable than those of *D. rafflesiana*. They are more complex, being actually double bladders, because they contain a small bladder within the large one.

Pearson found the cavity of the large outer bladder densely filled with roots, but stated that he could not establish where the roots came from. On the living bladder it can be seen clearly that in this case the roots do not enter from the outside through the bladder-opening, as they do in *D. rafflesiana*, but are produced inside, from the neck of the inner bladder. This fact suggests very strongly that the inner bladder may actually be not a part of the transformed leaf itself but may have originated rather from the inverted petiole (the leaf-stalk). At any rate, the slanting bladder-opening is left clear and unobstructed.

On the accompanying photograph of the opened bladder, the inner bladder can be seen to be rather small. In fact, it is little over half as large as shown on Pearson's sketches. The reason for this may be that we have no ants. The irritation caused by the ants, crawling around in the still forming bladder, may cause it to enlarge.

Most significant is Pearson's statement



Opened leafbladder of *Dischidia pectenoides*. The roots originate on the neck of the inner bladder.

that the inner surface of the outer bladder contains numerous stomata (breathing openings, characteristic for most plant leaves). In the living bladder, these can, indeed, be seen clearly under magnification. Through these stomata the plant evidently discharges (or transpires) surplus water into the inside of the bladder, and this important discovery explains much which has so far been obscure. Especially in this case, the opening of the bladder is rather small, and its position is frequently such that water from the outside can hardly enter at all.

The strong probability that by means of the stomata the plant may use the bladders in times of surplus to store water, which in times of need can be reabsorbed by the roots in the bladder, is most intriguing. After all, these bladders are transformed leaves, and most of us will have seen at times certain plants discharge surplus water in drops from the margins of their leaves. Such transpired water is lost, of course, but here is an ingenious adjustment which makes it possible to conserve the transpired water for the important use of keeping the roots alive during the dry season.

Pearson, of course, could only surmise, because his specimens were dry, but his

supposition is most reasonable and becomes even more convincing, when one observes the living plant. Bladders are most freely produced, when the plant is kept in a warm, humid atmosphere and is sprayed freely. Its normal leaves are hard and may not be able to transpire at all, and the reaction of the plant to ample moisture seems to be to develop bladders into which it can transpire.

As an explanation for the development of the double bladder Pearson offers the proposal that this appears to be a special provision for the accommodation of small ants. He always found a few dead ants between the roots contained in the outer bladder, while the inner bladder was "crammed" with ants. This led him to presume that the inner bladder served as a refuge for the ants, when the outer bladder became suddenly flooded. It seems to me that, because of the position of the bladder, sudden flooding is a rather unlikely danger. It is sure, however, that through the discharge of water, transpired to the inside, the outer bladder will be too wet for many months at a time to provide a satisfactory shelter for ants. The inner bladder always remains dry. Its position is such that water from the outside cannot enter it under any circumstances, and its inner walls contain no stomata which could discharge water.

There can be little doubt that the reasoning so far is correct, but this

***Dischidia pectenoides* in flower. The bright red flowers remain closed, being cleistogamous. The flowering spurs, once produced, flower again every year, as they do in *Hoya*.**



assurance only increases our wonder how such a complex structure ever could have developed. And, why should such an odd mutation, which results in providing accommodations for ants, be advantageous to the plant? It has to be, or it would not survive.

Pearson speculates that the ants render a valuable service to the plant by carrying organic debris into the outer bladder, in this manner supplying nutrients to the roots. The ants do this, of course, but I am inclined to doubt that this could actually be of importance. Ants are not tolerated in greenhouses, yet our plants show no diminution of growth vigor through lack of organic matter in the bladders.

Quite a few other plants provide homes for ants, usually in hollow stems, and the main service the ants seem to perform in these cases is that of defense against leaf-eating insects and other marauding animals. When a plant, which is infested with ants, is touched by any animal, the ants rush out prepared for war. This is very effective because nobody wants to have anything to do with ants. Eggs, deposited by flying insects, also are destroyed by the ants.

There still remains the question: what attracts the ants to *Dischidia pectenoides*? Pearson, who also was curious about this, observed at the bottom of the outer bladder an accumulation of small, irregularly shaped lumps of cells which were sweet to the taste. On examining the wall of the bladder, with a view of ascertaining their origin, he discovered that the outer tissue of the convex side of the neck had been injured and torn by the ants and that yellow strings of cells, embedded in mucilage and hanging from the wall, were clearly the source of the material at the bottom of the bladder. He concluded that the sweet material thus produced was apparently appreciated by the ants.

Pearson does not mention the flowers of *Dischidia pectenoides*, which he may not have seen but which also are quite remarkable. In the first place, they are bright red, which renders them conspicuous, in spite of their small size, and this



***Dischidia imbricata.* The small, pale pinkish flowers open for about 1 mm. Notice the long spur which bears the flowers and which has produced flowers for a number of years.**

is the only species of *Dischidia* known to me, which has showy flowers. In the second place, the flowers of this species are cleistogamous, which means that they remain closed but are able to fertilize themselves. In fact, this is the only *Dischidia* which ever has set seeds with us. It does so every year.

Why the cleistogamous flowers? Many of the explanations given above, though perfectly logical, are still based largely on speculation. I venture to propose yet another speculation: Undoubtedly, the ants, which in nature always infest this *Dischidia*, do not tolerate on the plant the particular small creatures, whatever they may be—perhaps mites—which normally fertilize the flowers. This threatened the survival of the species, and the development of cleistogamous flowers—not uncommon in the plant kingdom—seems like the logical saving solution.

The additional photographs are of *Dischidia imbricata* which does not produce bladders but is also most interesting. This species shows leaf modifications which might well be considered as a step towards the development of bladder-leaves. Its leaves are shallowly hollow but their rims are so firmly ap-

pressed to the bark of the host tree that an almost air-tight cover is formed over the roots which are sheltered beneath them. Undoubtedly, these leaves also transpire water on their under-surface, keeping the roots moist.

It seems that, once this adaptation is achieved, a complete closing of the leaves around the roots in the form of bladders would be no more than a logical further development.

Several other species of the genus *Dischidia* also produce such tightly appressed leaves which shelter the roots.

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Portlandia grandiflora

Portlandia grandiflora L., native to Jamaica, is an evergreen member of the Rubiaceae. Although Baron H.F.A. Eggers (1) had reported that it grew under cultivation here, I found only two specimens when I reached St. Croix in 1952. One grew at the great house at Estate Beeston Hill, and the other at Estate Anna's Hope about two miles away. There is no record of their origin, but they were probably brought in by personnel of the old agricultural experiment station at Anna's Hope, about 1923, when the arboretum was started.

The species (figure 1) grows from 6 to 14 feet tall. The leaves are opposite, short-petioled, elliptical-oblong, pointed, leathery, shining, veiny, about 8 inches long, 3½ inches wide, reddish when young, dark green when mature. The deciduous stipules are deltoid or ovate.

The flowers (figure 2) are large, 1 to 3 in the leaf axils, short-peduncled, and fragrant. The segments of the calyx-limb are leafy and elliptical-lanceolate. The funnel-form corolla is 6 to 8 inches long; the limb is about 3 inches across, 5-costate, shining white. The ridges of the tube and the edges of the corolla lobes are often reddish in bud, usually fading in maturity. The corolla lobes are rounded-deltoid and plaited-imbricate in bud, with one lobe exterior. The stamens are exerted and the slender anthers are half as long as the filaments.

The two mature plants are narrowly conical in form. Both are about 12 feet high, and the trunks are roughly 5 inches in diameter at ground level. Immediately after every soaking rain there is a heavy bud-set at the end of every twig and branch, and about two weeks later the plants are covered with pure white flowers, about 8 inches long, very much the shape and size of Easter lilies. The flowers always open in the early evening, and remain open for several days, making a beautiful show against the dark green, glossy foliage, and giving out a most pleasant scent, especially at night. As cut flowers, they last about a week.

The flowers are attractive to birds. Bananaquits and Emerald-throated Hummingbirds both of which slit the base of the flowers to reach the nectary. The flowers also attract many large sphinx moths (especially of the genera *Protoparce*, *Erinnyis* and *Pseudosphinx*), which are probably the natural pollinators.

Despite the activity of the moths (and about a hundred selfings by hand), neither plant ever set any seed. Efforts

Fig. 1. *Portlandia grandiflora* in the author's garden, St. Croix, U.S. Virgin Islands.



Fig. 2. The funnel-form flowers of *Portlandia grandiflora* vary from 6 to 8 inches in length.

to root cuttings of mature and green wood were unsuccessful.

About 1956, the late Mrs. Lawrence Bodine obtained three small plants from Puerto Rico, and all bloomed within a year or two. Two of the plants grow erect with a main trunk, and the third is indeterminate in habit. The erect plants have flowers about an inch shorter than the older specimens, and the indeterminate one has blooms an inch longer. In fact they are so long that they hang down and are less attractive than the smaller horizontal ones.

All three plants set seed, and one lot of cuttings of the large-flowered one was rooted successfully, though repeated subsequent trials have all failed. Seed sprouted readily, and about 100 seedlings were given to gardeners in St. Croix and St. Thomas.

I obtained one rooted cutting and two seedlings, which were planted about 15 feet apart in my garden, in full sun, in a very shallow calcareous clay soil underlain by broken limestone. All three plants have grown well. The seedlings are erect and "small" flowered and have reached heights of about 5 and 7 feet, in about 5 years. The cutting now makes a

tangled bush about 4½ feet high and 6 or 7 feet across. It started to flower in about 18 months after being set out, but the first blooms did not appear on the seedlings until about two years later.

Before the first seedling bloomed, no seed was set on the cutting. With the first lot of flowers on the first seedling, a few fruits matured on the cutting, and nearly every bloom on the seedling produced seed. Since then good seed has been produced by about half the flowers on all three plants. A good deal of seed has been given away locally, and I will be glad to furnish small amounts on request to anyone interested. At its best, *Portlandia grandiflora* is so attractive that I would like to see it enjoyed by as many people as possible. It is likely that use of a mist bed, rooting hormones, and possibly bottom heat, would make vegetative propagation easier than I have found it.

Unfortunately, I do not know the cold tolerance of *Portlandia grandiflora*. I would guess it could be grown wherever key lime will do, and that it might even be as hardy as sweet orange. It should be worth trying in much of Florida and in coastal southern California, and should certainly be a great success in Hawaii. In my garden in St. Croix, the *Portlandias* bloom after every heavy rain, winter (when such rains are rare) and summer alike. Virginia R. Hartenstein in *Flowering Plants From Cuban Gardens* (2) (the only horticultural treatment of the plant I have been able to find), says it blooms only in spring and summer, as often as four times a year. Whether this shy flowering in Cuba is a result of cooler winters or more variable day length in an area 6 degrees north of St. Croix, or to a genetic difference in the Cuban plants (grown from cuttings, according to the book), I have no idea. Certainly, the plant is very variable as I know it.

Portlandia withstands drought well. I have no water for irrigation, and my plants survived 1964 in St. Croix. This year was the driest (30.54 inches) of 113 years of record (annual average = 46.81 inches), with many days of drying

winds. For weeks at a time the foliage hung down limply, only to "freshen up" over night whenever about 3/10 of an inch of rain fell. When a shower of half an inch or more occurred there was the usual flush of buds, but several times these dried up without opening if no more rain fell within the next few days.

Portlandia grandiflora seems relatively resistant to pests. Two scales and an aphid occasionally attack it, but these are easily disposed of by a malathion spray. The large flowers are very susceptible to damage by strong winds, and in the exposed position where I grow them sometimes last only a day or two before becoming battered and black-spotted. This is especially true during the January-April dry season when the trade-winds are strongest.

At least two other species of *Portlandia* are reported from Jamaica, but despite several years' effort, I have never been able to get plants or seed. If they are half as good as their relative, they will be well worth having.

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U. S. Virgin Islands

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'Wirt L. Winn', a New Cultivar of the Koehne Holly

Among woody plants there are many obscure forms that have genuine landscape merit. Often such plants languish for years and sometimes they are lost to cultivation, simply because of remaining unrecognized and unpublicized. One of these is the Koehne holly, *Ilex* × *koehneana*, named in honor of Emil Koehne (1848-1918), a renowned German dendrologist. Curiously enough, the name is occasionally listed in horticultural references, but rarely has it been seen in the nursery trade, here or

abroad; apparently no cultivars have been previously selected and named.

The hybrid name, *I. × koehneana*, was applied by the German botanist, Theodore Loesener in 1919 to a hybrid plant of *I. aquifolium* × *I. latifolia*. Koehne had discovered it growing in the Orto Moncioni garden belonging to Giuseppe Gaëta near Florence, Italy. It was this plant, and the herbarium specimen made from it by Koehne, that Loesener used to base his description of the hybrid in 1901, and to erect the species hybrid name in 1919. It is inferred that all progeny resulting from the cross of *I. aquifolium* and *I. latifolia* may be referred to as *I. × koehneana*.

The Koehne holly is distinguished by being intermediate between both parents, but with foliage more closely resembling that of *I. latifolia*. The large (10-16 cm. x 6-8 cm.), elliptic or rarely oval leaves are evergreen, coriaceous, completely glabrous, and somewhat "ol-

ive" green in color. Most leaves have thickened and somewhat revolute margins; and they are provided with 7-10, more or less conspicuous, lateral veins on either side of the midvein which is prominent, and raised on the lower surface, and slightly impressed above. Loesener has further described the short petioled (1-2 cm.) leaves as being densely and closely spinose-dentate, and as having shortly acuminate apices, and wide cuneate to obtuse, or rarely, subtruncate bases.

A plant which has been identified at the United States National Arboretum (NA accession No. 23214) as *I. × koehneana* was obtained in 1963 under the name of *I. × altaclarensis* 'Wilsonii' from Daingerfield Nursery of the National Capitol Parks, National Park Service, Alexandria, Virginia. However, its original source was the Winn Nursery, Inc., of Norfolk, Virginia. It is now appropriate to give this selection of the Koehne Holly, so long ignored horticulturally, the cultivar name of 'Wirt L. Winn'. Wendell Winn, President of the Winn Nursery, Inc., suggested this fitting name in honor of his father, who founded the Winn Nursery in 1920. A description of the plant growing at the National Arboretum follows:

Ilex × koehneana 'Wirt L. Winn'

A heavy-bearing, vigorous, single-trunked, compact and pyramidal tree of 5 meters. It has attained a spread at ground level of almost 3 meters. The trunk, with light gray and smooth bark, is straight and measures 13 cm. in diameter six inches from the ground. The branching pattern is at first spreading, then more or less pendulous, and the purplish, first year stems are strongly ascending. The predominantly smooth, dark green and glossy leaves are elliptic to ovate, and measure 6-11 cm. long by 3-5 cm. wide. The leaf margins are provided with 8-11 fine, but conspicuous, outward pointing spines on each side. The fruit, borne in fascicles of 7-10, is globose and slightly longer than wide or occasionally wider at the apex, measures 7-10 mm. long and wide, and contains four pyrenes. Being inconspicuously

Ilex × koehneana "Wirt L. Winn"

U.S. NATIONAL ARBORETUM





U.S. NATIONAL ARBORETUM

Foliage and fruit of 'Wirt L. Winn'.

punctate, the fruit has a good bright red color.

Authentic voucher herbarium specimens and photographs of 'Wirt L. Winn' have been deposited in the U.S. National Arboretum Herbarium. The cultivar name has been registered with the Holly Society of America, Inc. Reg. #15-66, 1966.

Many characters of 'Wirt L. Winn' indicate that it is an interspecific hybrid. The best evidence of hybrid origin is the overall resemblance to plants resulting from a duplicate cross of *I. aquifolium* and *I. latifolia* made at the U.S. National Arboretum by William Kosar. *Ilex* × *koehneana* 'Wirt L. Winn' has the vigorous growth of *I. latifolia*, but like *I. aquifolium*, it is compact and pyramidal in habit. The leaves, usually larger than those of the typical English holly, are smaller, glossier, darker green and more acuminate than those of *I. latifolia*. The leaf spines, flat and numerous as in *I. latifolia*, are not so strong and rigid as those of the English holly. The distinctly longer fruiting pedicels result in producing a more conspic-

uous display of fruit than is evident for *I. latifolia*, which, typically, has shorter pedicels. The fruit of *I. latifolia*, although red, is prominently punctate and dull. 'Wirt L. Winn', however, possesses bright glossy fruit. The size of the fruit of the hybrid selection is intermediate between the parent species.

Whereas the *I. latifolia* fruit ripens disappointingly late in the Washington, D.C. area (usually January or later), the Koehne holly at the National Arboretum shows great desirability by ripening fruit in mid-December, a feature similar to some of the late fruiting cultivars of English holly. Because *I. latifolia* is of only borderline hardiness in the Washington area, it should be planted in sheltered sites. 'Wirt L. Winn', however, shows promise by being more winter hardy, and is as hardy as *I. aquifolium*. Further testing may show a possible advantage of the hybrid as a substitute for the English holly in the southeastern United States where *I. aquifolium* is difficult to grow, as well as farther north. Another consideration is that staminate plants of *I. aquifolium* and *I. latifolia* may be used as pollinators for 'Wirt L. Winn' due to the three overlapping flowering periods, and to their mutual compatibility.

An additional character, not often mentioned in identifying interspecific hybrids of *Ilex*, is the similarity of the seeds or pyrenes, as they are called in the genus. The pyrenes of all species of holly have distinct shapes and surface markings. As might be expected, the pyrenes of the Koehne holly cultivar are intermediate in size and shape. Evident also is the coarse, prominently raised and reticulate ridged type of surface sculpturing characteristic of *I. latifolia*, intermixed with the smoother, net-veined sculpturing of *I. aquifolium*.

The Koehne holly is a distinguished ornamental among broad-leaved evergreen trees. Its habit is erect and compact with gracefully drooping branches. The very large, glossy leaves are well accented by the handsome and persistent red fruit. For landscape use, 'Wirt L. Winn' and future selections of *I. ×*

koehneana may possess a potentially greater climatic tolerance than *I. aquifolium* or *I. latifolia*.

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New Zealand Crape Ferns

The ferns of New Zealand are a marvelous assemblage, frequently very evident in the wild, widely cultivated in gardens and greenhouses there, and of tremendous potential interest to connoisseur collectors in this country. I say "potential interest," since so few of them have as yet been made available to use—this even though a number of them have long been favorite subjects in Great Britain and on the Continent.

Ferns, in these United States, are today enjoying a notable renaissance of

New Zealand Crape Fern, Todea hymenophylloides, with the giant King Fern, Marattia salicina, growing at Pukekura Park, New Plymouth, New Zealand.

PHOTO BY GEORGE FULLER



New Zealand Crape Fern, Todea hymenophylloides.

popularity. Several interesting books on the Pteridophyta, as an assemblage, have been published during recent years, and a number of reputable nurseries—principally in Florida and California—now offer for sale a gratifying extensive array of species, common and scarce, indigenous and exotic.

To date, the several species of Crape Ferns, of the genera *Todea* and *Leptopteris*, do not appear to be commercially available in this country. This is regrettable, since two of them are among the most spectacular of all known pteridophytes.

Through the kindness of my talented colleague, Mr. George Fuller, of New Plymouth, New Zealand, I have two excellent photographs of one of these, the famed Single Crape Fern or Heruheru, *Todea hymenophylloides*. (The Double Crape Fern, also known as Prince of Wales Feathers or Ngutungutukiwi, *Todea superba*, will be taken up at a later date.)

If we follow the system proposed by Edwin Bingham Copeland (*Genera Filicum*, Waltham, Mass., 1947), both of these should be known as *Leptopteris*, but in New Zealand they are generally considered to be *Todeas*.

Whatever their correct botanical names, these are splendid ferns. As is

shown in Mr. Fuller's photographs, *Todea hymenophylloides* is a caulescent species, the trunk on occasion attaining a height of about one and one-half feet. This caudex is stout, and supports a richly spreading crown of numerous plush-soft fronds, each up to two feet long and one foot broad. These fronds, as the specific name implies, simulate those of the fabled Filmy-Ferns of the genus *Hymenophyllum*. So thin that print can be read through them, they are of an incredible dissected complexity, an odd yet beautiful translucent dull dark-green hue, and give one very much the impression of some sort of artificial ostrich feathers!

In New Zealand, where this species is endemic, it is reasonably common in forested, moist areas throughout the islands. Oddly enough, despite its extraordinary delicacy of foliage, it is frequently to be found in somewhat dry spots. It seems to be readily transplanted into the garden, and thrives (at least in its native country) in the garden when afforded shade and rich soil.

Though this tree-fern in so many respects resembles one of the Filmy Ferns, its botanical affinity is actually with our old friend *Osmunda*, this because of the unique sporangia.

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Tubergen's Scilla

Scilla tubergeniana is relatively a newcomer among the small hardy spring blooming scillas. It was introduced in 1931 by C. G. van Tubergen, Ltd. (Zwanenburg Nurseries) of Haarlem, The Netherlands, and is not yet commonly seen. The bulbs came from the mountains of northwestern Iran (Persia).

There are those whose impatience demands that their gardens have the earliest flowers of spring. They should add Tubergen's scilla to their collection of early bloomers. With me it is earliest of the spring flowering scillas. It blooms around March 1, before winter is

officially over, and about the same time as the common snowdrop and early crocus. This is two weeks or so sooner than the well known brilliant blue *S. sibirica* and its variety *atrocaerulea* (syn. 'Spring Beauty') and than the turquoise blue *S. bifolia* and its several varieties, white to pink.

The flowers of Tubergen's scilla are a very pale lavender or mauve. The garden effect, however, is white. The flowers are starry and one inch wide. The six petals each have a narrow central streak on front and back, blue towards the base of the petal and lavender towards the tip. The leaves are short and thick, four to a plant, and a half to three-quarters inch wide.

The scape, or flower stalk, may have up to five flowers on it. As soon as the stalk appears above the ground the topmost flower starts opening. The stalk

Scilla tubergeniana.

PHOTO BY MARIAN A. LEE



keeps on growing and is ultimately four or five inches tall when all its flowers are open. Cyril Coleman says that if grown in full shade the stalks grow up before flowering. There may be more than one flower stalk from the bulb.

Tubergen's scilla will grow in a woodland setting or in partial shade. My patch grows at the base of a white oak. The bulbs are free blooming. They increase slowly with me, nothing like as

fast as *S. sibirica*, which self seeds. Plant them about two inches deep and two or three inches apart. Tubergen's scilla should be planted along a walkway or driveway where its early flowers will be seen on cold, gusty days before the weather inspires regular inspection tours around more remote parts of the garden.

—FREDERIC P. LEE
7401 Glenbrook Rd.
Bethesda, Maryland 20014



PHOTO BY MARIAN A. LEE

Scilla tubergeniana in a garden planting.

FIRST EDITION

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A Very Special Issue of the American Horticultural Magazine

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with

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