

American

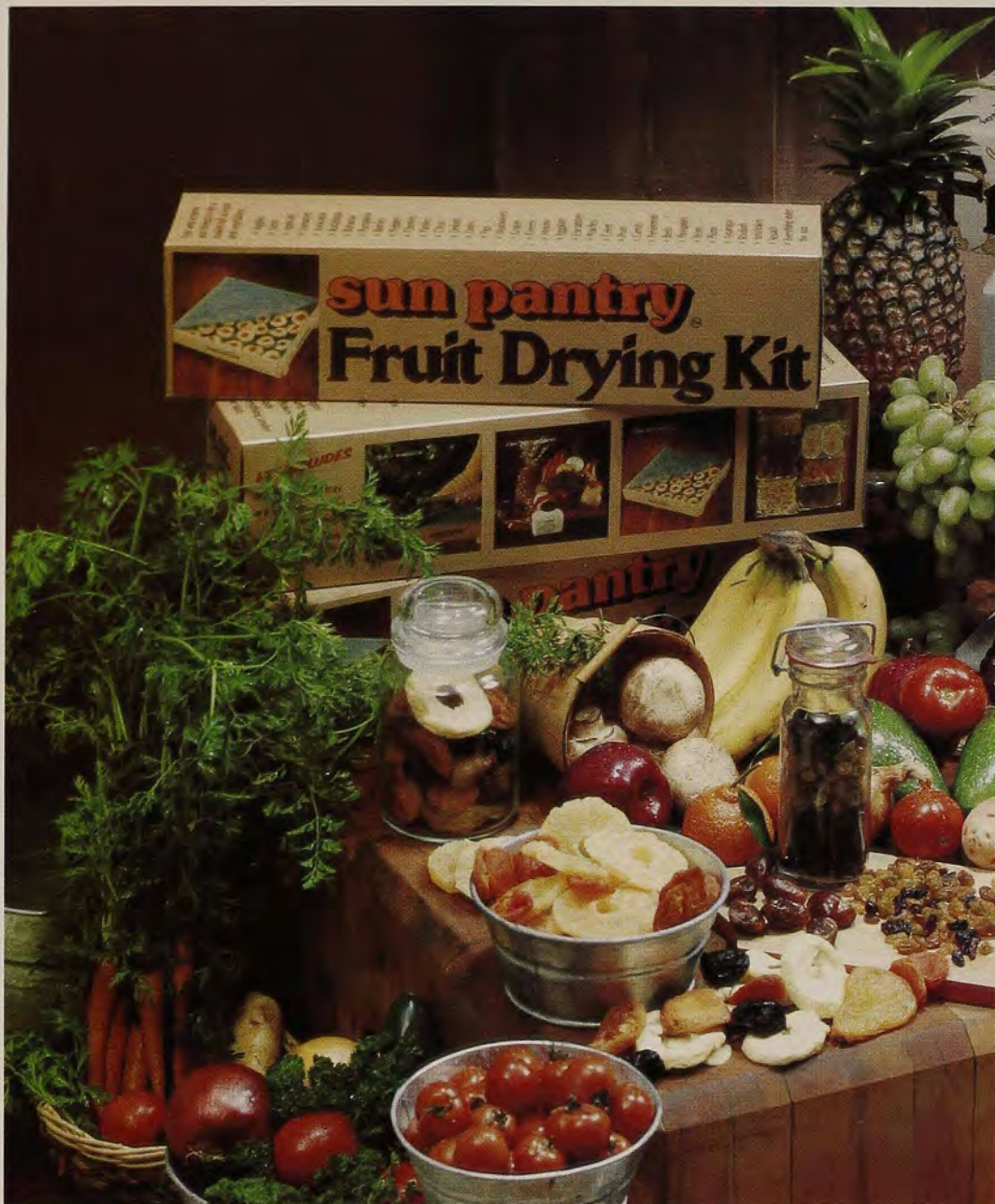
Horticulturist



Volume 56 Number 4 Late Summer, 1977

the 1976 Business Gift

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MURRAY KEENE, Editor
JANE STEFFEY, Editorial Assistant
ANTHEA DE VAUGHAN, Editorial Assistant
DONALD WYMAN, Horticultural Consultant
ALEX BERRY, Art Director
TOM STEVENSON, Book Department
JOHN SIMMONS, Production Coordination

The American Horticultural Society, Publisher
Mount Vernon, Virginia 22121
703/768-5700

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CORRECTION: Volume 56 Number 3, Late Spring 1977, of the *American Horticulturist* contained a rather glaring error. We inadvertently switched the photographs of *Rhododendron laetum* on page 27 and the flower of *Cladrastis lutea* on page 42. For those of us who wish to see a cross between American yellowwood and rhododendron, we may have to wait a few years. Our apologies! —Editor

COVER PHOTO BY: Guy Burgess—Overhead close up view of *Gazania* dramatic South African daisy fast becoming an American favorite.

An Editorial

Yellow Pages for Green Thumbs



Do you need the phone number of the Brooklyn Botanic Garden, the address of the Director of the American Rose Society, the location of a 2-year college in horticulture, or the name of gardens to visit on your way to "Plains"?

Perhaps you could locate this information by checking your files, calling your friends, or writing to our Horticultural Advisory Service—but we have a better way!

Why not purchase the updated 3rd Edition of the *Directory of American Horticulture*? It has just been expanded and has sections that will assuredly be of interest to you.

The American Horticultural Society is indebted to a committee chaired by Ernesta D. Ballard which produced the first *Directory* in 1971. Ms. Ballard and her staff assembled the entire monograph without the benefit of a previous edition to use as a guide. This project was financed by a grant from the Fuller E. Callaway Foundation. Subsequent editions have been produced by the staff of AHS. Why not purchase this useful horticultural tool? One would be handy at your working desk; perhaps you would wish to send another to the recording secretary of your favorite plant society. It makes an invaluable aid for your gardening friends, and is particularly useful at garden club meetings. Perhaps you have an old AHS *Directory*; if you have used it lately you have discovered that it is hopelessly out of date. We have made over 3,000 changes and revisions.

I hope by now you are convinced that a new *Directory* is worthwhile, particularly since we are offering it FOR A LIMITED TIME at a discount to AHS members.

We offer two additional publications that may also be of interest to you:

First, the AHS Plant Sciences Data Center has produced an expanded Index to over 800 horticultural films. They are listed according to subject and distributor. This guide is an excellent reference for garden clubs, service clubs, or individuals interested in educational 16 mm. color films on a myriad of horticultural topics.

Finally, we have revised our 27-page booklet on *Environmentally Tolerant Trees, Shrubs and Ground Covers*. This plant list has been recommended by a nationwide AHS survey program on the performance of plants exposed to environmental stress. If you need to know what type of shrub can be used in high pollution areas, or what type of tree tolerates high salt levels, then this publication is for you.

Please refer to page 33 of this issue. Complete and clip the order form and send it to AHS Publications Committee, National Center for American Horticulture, Mount Vernon, Virginia 22121. TAKE ADVANTAGE OF THE DISCOUNT NOW, because this offer EXPIRES ON SEPTEMBER 30, 1977.

Henry M. Cathey
President



AMERICAN ARBORVITAE
(Thuja occidentalis)

A very attractive, narrowly pyramidal tree eventually reaching a fair size. Instead of the usual needles it produces distinctive and fragrant fan-like growth that is highly pleasing.



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(Pinus sylvestris)

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(Picea excelsa)

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MUGHO PINE
(Pinus mugho mughus)

Entirely different from most of the trees here listed, this is rounded and compact, low-growing specimen with many short stems. The foliage too, helps make it a compact and dark green mound.



AUSTRIAN PINE
(Pinus nigra)

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HOSTA PLA

Fragrant Plantain Lily

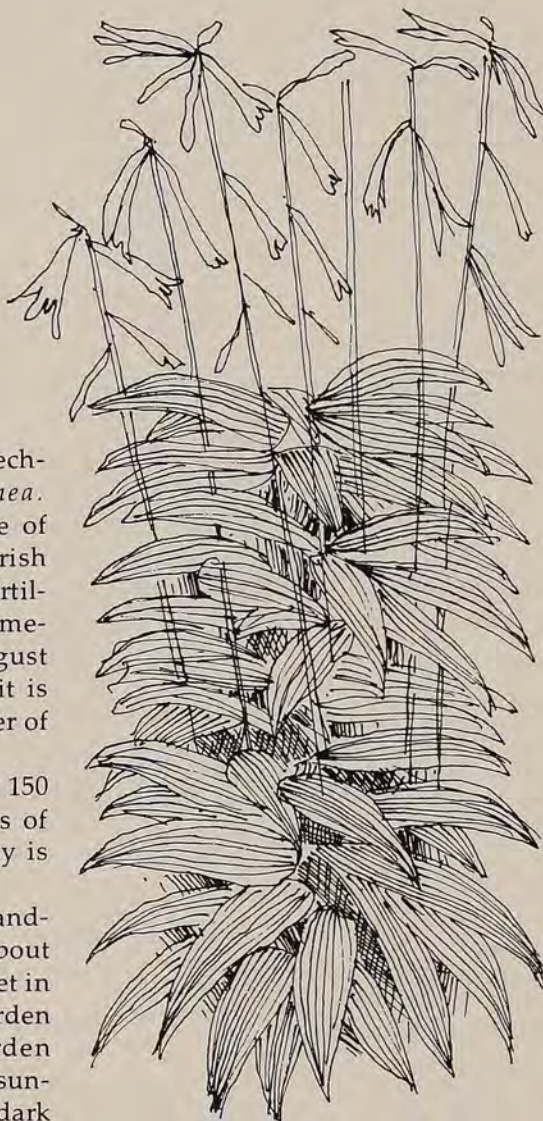
Mervin C. Eisel
Extension Horticulturist
Landscape Arboretum
University of Minnesota
Chaska, MN 55318

The fragrant plantain-lily is technically called *Hosta plantaginea*. Hosta or plantain-lilies are one of the few perennials that will flourish in shady areas if moisture and fertility are supplied. This plant is sometimes referred to as the "August Lily", which is misleading as it is not a true lily, but it is a member of the lily family.

In my garden I grow about 150 species, selections and cultivars of Hosta. The fragrant plantain-lily is one of the best.

This plant will produce a handsome tight mound of foliage about two feet tall and three or four feet in diameter after being in the garden for several years. In the garden where the plant receives some sunlight, the glossy leaves have a dark green color, but with little or no sunlight the leaves are glossy but have a lighter green color.

The bloom of the fragrant plantain-lily is the finest of any Hosta. The waxy flowers are a glistening white and are about four inches in length. The flowers are borne in a cluster on top of spikes that come about six inches above the



foliage. The flowers are delightfully fragrant and an asset to any garden area. The flowers are produced in late August or early September, hence the occasional use of the common name, "August Lily".

Gardeners in northern Europe have difficulty getting bloom on the plant because of their cool summers, but this is not a problem here where

our summers are rather warm. Bloom will be more profuse if the plant receives some morning and afternoon sunlight. In this area this plant sets little or no seed, possibly because of our early fall frost.

The fragrant plantain-lily, like any Hosta, thrives in a fertile moist soil. Generous quantities of well rotted manure or organic matter supplemented with commercial fertilizer should be tilled into the soil prior to planting. Unlike many of our perennials, Hostas seem to be tolerant of poorly drained soil.

It is best to divide Hostas in the spring in areas where the winters are severe. They can, however, be divided at almost anytime during the growing season. If division is made in the fall or plants moved late in the season, a loose winter mulch is recommended. A serrated steak knife is a useful tool for dividing Hostas and other perennials.

The fragrant plantain-lily is a Chinese native while most Hostas are native to Japan. It was probably introduced into the United States in about the early 1800's and has been extensively grown since that time. It is reported to have crossed our country in the pioneers' covered wagons as one of their treasured possessions. At that time it was also grown indoors as a potted plant. The plant has adorned gardens since that time. Today, the plant is commonly available in the nursery trade and is inexpensive.

If you have a shady spot in the garden and desire to plant one of the oldest garden perennials grown in America, consider the *Hosta*.

PLANTAGINEA

The Dependable Hostas

Gertrude S. Wister
735 Harvard Ave.
Swarthmore, PA 19081

Among the plants that thrive in shaded situations, the plantain-lilies must be given a leading place. These hardy herbaceous perennials are often called funkias, and are often so listed in some catalogs, but for many a long year *Hosta* has been the accepted scientific name of the genus.

Hostas are grown chiefly for their foliage effects, although the flowers, usually light purple, but sometimes purest white, can be effective. Those with variegated foliage are especially useful for their all-summer decorative effect.

They can be conveniently considered in three groups, according to leaf size. The leaf blades of the largest-leaved group run from about ten to fifteen inches in length and eight to ten inches in width; those of the medium-sized group from about five to eight inches by two to four inches. The few small-leaved kinds range from about one and a half to five inches by less than an inch to two inches. In the two larger groups there are many with foliage striped, edged, or with large zones of white or yellow, and some retain a uni-

form golden hue throughout the growing season. The small ones are fairly new; the large-leaved and variegated kinds were those that first attracted collectors and gardeners.

The foliage of plantain-lilies does not expand until late spring, which makes it possible for such small early bulbs as *Scilla sibirica* and snowdrops to grow closely around them.

Plantain-lilies can be grown effectively in large masses of a single species or clone, but they also combine effectively with fine-textured plants such as ferns. They are also excellent companion plants for shrubs. They are often used in single lines as edgings, but seem to me to be not at their best used this way, perhaps because their strong constitutions lead them to be left until they are overcrowded and shabby.

Given good soil that does not dry out and protection from hot sun, hostas develop into mounds of foliage effective from late spring until the first frosts. They can be grown from chilly Maine and North Dakota throughout the Midwest and Middle South, are easy, of course, in the Northwest, and along the eastern seaboard well into the south. Like peonies and daylilies, they can almost be considered heirlooms.

It is a pity that the names of the plantain-lilies are so confused. Except for the few specialists who sell them, nurserymen often sell plants incorrectly named. It is now possible for them to straighten out this mess through consultation with the American Hosta Society, if they

will only take the trouble to do so. It is possible that many are hybrid seedlings to which names are assigned to which they have no claim. This situation should be borne in mind by purchasers of hostas.

Large-Leaved Kinds

The plantain-lilies with big leaves are valued for their strong effect. Chief among them is *Hosta sieboldiana* (*H. glauca*), a variable species. Its leaves can reach fifteen inches. The plants most prized have leaves puckered and corrugated, and covered with a bloom like that of a plum or blueberry which gives a blue look. The flowers of these are partially lost in the leaves, and are the palest possible purple. Others of the species have greener leaves and flowers on taller stalks which may be white. Seed from this very fertile species can give some very attractive plants, even variegated foliage. 'Frances Williams' is one of these seedlings, with leaves edged with green gold. Several similar clones have come from bud sports and from seed. Any of these are desirable, and worthy of prominent display.

Hosta plantaginea (*H. subcordata*), the Fragrant Plantain-lily, is loved for the delicious orange-blossom scent of its pure white flowers. They are about five inches long, as against two to three inches for the flowers of other hostas. Seed pods are rare; the seeds are worth growing, as they will be like the parent. The glossy yellow-green of the foliage gives a good contrast with the dull blue-green of *H. sieboldiana*.

Two hybrids of the Fragrant 5

Plantain-lily, obtained by hand crossing, are 'Honeybells' and 'Royal Standard'. Both are scented, but less so than their parent. 'Honeybells' has flowers of pale purple on tall stalks. They fall soon after fading, a good trait. 'Royal Standard' has foliage and white flowers a little smaller than those of the parent. It blooms freely, one of the best hostas in flower, and grows into a splendid large clump.

Hosta crispula (*H. fortunei marginato-alba*; *H. f. albo-marginata*) is to me the handsomest of the variegated Hostas. The leaves, about eight inches long, are long-pointed and wavy, somewhat twisted at the ends, and neatly edged with white. A large plant of it, with its graceful and stately foliage, is a striking object. The pale purple flowers on tall stalks in midsummer are uninteresting. The seed is hardly worth growing; variegated seedlings are unlikely.

There are many related clones grouped under the name *Hosta fortunei*, all sterile or nearly so, pointing to a hybrid origin for the group. *H. fortunei* has been called a "species of convenience". Some clones have white leaf margins and may be listed



Top—*Hosta lancifolia* Thunb. Kabitan
Right—Variegated hosta with Pink Pyrethrum



Photo by Gertrude Wister



Photo by Mervin C. Eisel



Photo by Gertrude Wister

Top—*Hosta plantaginea*
Below—*Hosta* 'Royal Standard'

under the names given as synonyms for *H. crispula*. Best known of the group is probably *H. f. 'Aureomaculata'* (*H. f. viridis-marginata*; *H. f. albopicta*). The large leaves are striking in spring and early summer, the palest of green edged with dark green. Here, the leaves turn uniform green when the weather turns hot; they may keep their contrast longer in cooler climes.

Another good large-leaved plantain-lily is *H. ventricosa* (*H. caerulea*). Although it is called blue, it is actually purple, deeper than most Hostas, with urn-shaped rather than funnel-shaped flowers on stalks that make a well-proportioned plant. The leaves are glossy green above, very glossy underneath. It is a very fertile, very uniform species, its seedlings just like the parents. The pollen, however, will fertilize other hostas, giving rise to hybrids which may or may not be of interest.

Medium-Leaved Kinds

Here again we have a group of related clones, sterile or nearly so, under the name of *H. undulata*, another "species of convenience". *H. undulata* has leaves about six inches long, very wavy and sharp-pointed, their centers broadly banded with white. This widely-grown plant is often used for edging. There are clones with varying widths of center stripes, and one with white-edged leaves. There is one plain green kind, *H. u. erromena*, once considered a separate species, which may sport from variegated kinds, and any such offsets should be cut away, as they are more robust.

The Blunt Plantain-lily (*H. decorata*) is a choice species sometimes sold as 'Thomas Hogg', a name used for several clones with white-edged leaves. The leaves are about six inches long, fairly broad, rounded at the end or with a short point. They and the petioles are neatly edged with white. The effective flowers are urn-shaped, a good purple, borne in good proportion to the plant toward



Hosta with Fern companion planting

the end of July.

Also choice is *Hosta tardiflora*, which blooms here in late September, and may not escape frost farther north. The leaf blades, pointed, are about five inches long,

a glossy dark green. The flowers, thickly set on the stalk, are borne just above the leaf mound. The distinctive foliage and effective flowers make this a plant to acquire whenever possible.

The Narrow-leaved Plantain-lily (*H. lancifolia*) is valued for its bloom in late August. It is a toughy, often used for edging or massing in the shade. Closely related is a plant often called *H. l. albomarginata*, now, unfortunately, called *H. sieboldii*, in spite of the long-standing name *H. sieboldiana* applied to another species. It is a good tough plant, but the white edge of the leaf is less striking than that of other kinds.

Plants sold under the name 'Minor Alba' (not related to the true and scarce *H. minor*) are narrow-leaved, about five inches long, and have flaring white flowers on two-foot stems in August. Seed gives some white-flowered plants, some purple. A delightful white-flowered clone with white-edged leaves is called 'Louisa'.

Small-Leaved Kinds

These are few and scarce. *Hosta*

venusta is somewhat variable, and the seed well worth growing to get the smallest plants. Some have leaf blades only about an inch and a half long. The plants grow into compact clumps, good for a shady spot in a rock garden, topped in late June by flowers on stalks about eight inches tall. Hybrid seedlings can easily be separated from the true species on the basis of size.

Hosta nakaiana is a good plant just a little larger, its leaf blades about three and a half inches long. It blooms in late June.

Space limits me to all too few Hostas. The last few years have seen the appearance of many new clones and recently imported species which can only be had from specialists. Many are not cheap. But considering the long life of hostas, they are a good investment for those who have shade, and enjoy distinctive plants. There is always the chance, too, for the observant gardener to discover

right at home an interesting sport or an unusual seedling.

Plantain-lily troubles are few. Slugs and snails enjoy their leaves, especially the variegated ones, which are perhaps comparable to blanched celery or asparagus. Control with beer or bait should be started early. Sometimes crown rot, also called mustard-seed rot from the appearance of the yellow to brown fruiting bodies, may appear in a garden. Leaves look a little wilted, and pull away easily to reveal a white webbing at the base of the plant. Carefully remove affected leaves to a paper bag and destroy. Drench the base of the plant with "Terraclor" at the rate of one tablespoon to a gallon of water. Repeat as needed. Perhaps "Benlate" would also control this rot.

But these are really only minor problems. By contrast, Hostas can be counted on to give years of pleasure.

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Dicentra cucullaria

Resembling rows of pantaloons carefully hung upside down, the white and pinkish 3/4" flowers sport yellow 'waists'. Hardy, long-lived perennials, they can form a rich carpet of flowers and lush gray-green foliage.



WILD CALLA
Calla palustris

This hardy denizen of the northern swamp clusters many tiny white and green flowers on a 1-1/2" long yellow spike, framed by a snow-white open leaf. The plant tends to spread, as new rootstock is sent out to form next year's growth.



SPRING BEAUTY
Claytonia virginica

Tender and delicate, these rapidly-multiplying flowers appear as harbingers of spring. The petals open to 1/2" diameter and are white or pink with deeper pink stripes. They close at night and on cloudy days.



WHITE TRILLIUM
Trillium grandiflorum

A showy, brilliant white flower with yellow anthers, the wavy petals change to bluish-pink. All its parts are in threes: three leaves, three petals, three sepals, three-chambered pistil, and three stamens.



BLOODROOT
Sanguinaria canadensis

Like bright white stars with fiery yellow centers, this 1-1/4" spring bloomer likes filtered sunlight. As the flowers emerge, its leaves unwrap and expand. Indians used the root for insect repellent and warpaint.

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AH18-77

USEFUL GARDEN CENTER DESIGNS

Lorraine Marshall Burgess
202 Old Broadmoor Road
Colorado Springs, CO. 80906

Are you proud of your community's very own botanical garden? Do you wish you could inform the public of its special horticultural features? Then consider these design solutions from other botanical gardens, and persuade a service club to take on the construction of a useful garden shelter as a fall (summer) (spring) project.

Build an outdoor bulletin board and mount it on a rock base. Design it with a translucent plastic roof and a locked showcase. If your institution has published small booklets, offer them for sale from a small box with a lift lid. Include a coin box drop nearby for collecting dimes or quarters to cover the cost of publication. Arrange for the maintenance of the display by appointing a bulletin board committee to keep show pieces up to date and appropriate to the blooms of the season. (Santa Barbara Botanic Garden, Santa Barbara, California)

Or construct a hexagon structure with a three-way entry and display cabinets on the inside walls. Install a map table in the center of the 'room' as a diagram of the garden's design. Such a structure is sure to have multiple use, first for information, then as a pleasant retreat against the hot summer sun, and finally as a shelter from unexpected downpours. Pave the floor with flag or brick, and plant the outside walls with flowering vines. (Santa Barbara Botanic Garden, Santa Barbara, California)



Lorraine M. Burgess



Cover a registration shelf with a peaked-roof cowling and mount it all on two posts. In the sheltered area arrange magazine-type racks for educational material, membership brochures, or whatever. Invite visitors to register their names and hometowns as they enter the garden. The whole setup is useful and just official enough to discourage vandalism. (Quail Botanic Gardens, north of San Diego, California)

With a little more effort, you can

build a more substantial structure, similar to this roofed, four-way display area. The four showcases are wide enough and high enough to allow for the exhibition of plants, historical objects, or art objects. Ceiling hooks allow for the hanging of two-faced display boards in the middle of the showcases. The four corner nooks offer temporary shelter from sun, cold, wind, or rain. (Sharlott Hall rose and herb garden, Prescott, Arizona.)

Top Left—Display case at Santa Barbara Botanic Garden.

Lower Left—Hexagon garden display center at Santa Barbara Botanic Garden.

Top Right—Self-Service registration booth, Quail Botanic Gardens.

Lower Right—Sharlot Hall Museum and Garden, Prescott, Arizona.



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The versatile but unloved vegetable

Jerusalem Artichoke

D. G. Routley
University of New Hampshire
Durham, NH 03824

Jerusalem artichoke—neither an artichoke, nor from Jerusalem, yet one of the oldest cultivated crops in North America. It is almost totally ignored by gardeners today.

Helianthus tuberosus, actually a sunflower, originated in North America, probably west of the Mississippi. Indians used seeds of the larger seeded sunflowers, like *Helianthus annuus*, for flour, out of which they made breads and soups, and for the oil which they used for cooking and for a hair dressing. But *Helianthus tuberosus* was used exclusively for its tubers, particularly by the Huron Indians. In New England, it was used in pottage, a thick soup. However, one Indian name is *á skibwan*, meaning raw thing, which suggests it was eaten raw like a radish.

Hariot in 1585 may have seen artichokes in Virginia when he described "Kaishucpenauk, a white kind of root about the bignes of hen eggs and nere of that form: their taste was not so good to our seeming as of the other, and therefore their place and manner of growing not so much cared for by us: the inhabitants notwithstanding used to boil and eat many."

There is little doubt that they were being grown by Indians in New England in the 17th Century. Gosnold observed them in the Cape Cod

area in 1602 and so did Champlain a few years later. Indeed, Champlain may have been the first to use the name "artichoke", because he said the Almouchiquois Indians had "force des racines qu'els cultivent, lesquelles ont le goût d'artichaut."



In 1612, Lescarbot found them in New England West and South of Maine. He said they had an agreeable taste and multiplied in a marvellous manner.

Around this time they must have found their way to Europe, for there

is evidence they were cultivated in Rome before 1616. In 1617, Mr. John Goodyer, of Maple Durham, Hampshire, England, "received two small roots thereof, from Mr. Franqueville of London." They may have come from Canada, because Parkinson, in his *Paradisus Terrestrus* of 1629, called the plant "Battatas de Canada", Canadian potatoes. He said they were common in London, being used for pies with fruit and other vegetables. In his *Theatrum Botanicum* of 1646, he also used the term "Hierusalem artichoke".

Once introduced to Europe, Canadian potatoes became widely grown, particularly in the Mediterranean region. In Spanish they were called *girasol* and in Italian, *girasole*, hence the English corruption to "Jerusalem".

Helianthus tuberosus, or Canadian potato, or Jerusalem artichoke, has much to recommend it. Being a native American plant, it seems to be resistant to most insects and diseases occurring here. It grows in almost any soil and requires little fertilizer. The tubers remain in the ground over winter and can be harvested any time until new growth begins in the spring. They don't even need to be planted every year, since the smallest piece of tuber remaining, if it contains an eye, will grow a new plant.

The plants themselves are decorative, growing eight to ten feet. They can be used as an annual hedge but, unfortunately, grow rather slowly at first, so the hedge doesn't really come into its own until summer is over. Only in the fall does the plant really look at its best; then it is crowned with the beautiful golden yellow flowers.

Because the tubers overwinter in the ground, Jerusalem artichokes have the potential for becoming weeds. They escape from gardens, as they no doubt did from ancient Indian gardens, and become established along roadsides and waste places. However, they can be controlled easily in a garden if a metal border strip is placed around them

and if no tubers are scattered about. Even then, the young plants can be cultivated out or killed with an herbicide.

When Lescarbot in 1612 said they multiplied in a marvelous manner, he was entirely correct. In a 1937 Iowa study, the average yield of ten different varieties was almost 11 tons per acre, but some yielded twice that much. More recently, scientists in Manitoba, Canada, found that a Russian strain produced 34 tons per acre; the tubers weighed about one pound each. By way of comparison, a typical yield of white potatoes might be 12 to 15 tons per acre.

Much confusion exists concerning the food value of Jerusalem artichokes. Unlike potatoes, which contain the greater proportion of their substance in the form of starch, artichokes contain no starch. Instead, the carbohydrate is inulin, a polymer of the sugar, fructose. Starch, a polymer of glucose, is completely digestible by humans, but inulin is not. Microorganisms and plants produce the enzyme inulase which breaks down inulin, but higher animals lack this enzyme.

Jerusalem artichokes, when dug fresh in the fall, have very little caloric value. Some inulin may be broken down to usable fructose sugar on prolonged cooking, but both fructose and inulin are soluble in hot water and much may be wasted if the cooking water is discarded. The protein content, like that of white potatoes, is low and they have no special amounts of vitamins or minerals. The best that might be said is that artichokes in the fall might have value in a reducing diet.

The nutritional picture changes if the tubers are stored either in the ground or under refrigeration. The enzyme inulase, present in the tubers, breaks down the inulin to fructose, and the caloric value increases. Figures cited are 22 calories per pound for fresh tubers and 235 for stored tubers. Fructose, however, is the sweetest of the natural sugars,

and the sweet taste of stored tubers may or may not be appealing.

Artichokes have value in the diabetic diet because of the low content of glucose, which diabetics cannot metabolize. Fructose, on the other hand, can be used by the body without a requirement for insulin and, therefore, is a safe form of sugar for diabetics. Artichokes are undoubtedly the cheapest source of this sugar.

If, as mentioned above, fructose is the sweetest sugar, why does it not replace sucrose on our tables and in our cooking? And why wouldn't artichokes be a good source? The fact is that fructose doesn't crystallize



readily like sucrose, but rather remains as a syrup. A syrup is much less manageable than solid crystals, and is practical to use only for special diets. But if fructose isn't finding its way into the sugar bowl, it is being used in the beverage, confectionery, baking, and canning trades. Therefore, it would seem that, of those plants which contain inulin in substantial amounts—dahlia, chicory, Canada thistle, goldenrod, onion, and Jerusalem artichoke—only the artichoke has promise as a source of fructose.

Artichokes may have a great future for production of alcohol. Research in Iowa showed that yeast would convert 90 per cent of the sugar in artichokes to alcohol. The

greatest yield was 28 gallons of alcohol per ton of tubers.

Periodically there is interest in artichokes for animal feed, but they have proved less useful and economical than other crops. The tubers do not store well and the tops make a silage inferior to that from corn.

Without doubt, artichokes are an easy crop to grow by the home vegetable gardener. But what to do with them after harvest? Any number of cooking suggestions have been made by garden writers. Artichokes can be peeled and eaten raw in salads, or soaked in vinegar first. They may substitute for water chestnuts in oriental dishes. Indeed, they make an excellent crisp pickle. They may also be steamed, boiled, baked, and made into casseroles. They may be slow fried or quick fried. And finally, they have even been used in the manufacture of bread sticks, cookies, macaroni and noodles.

What a versatile vegetable! So why doesn't everybody grow them? Apparently the disadvantages outweigh the virtues. Inulin doesn't swell like starch and cooked artichokes remain extremely watery. In frying, a crisp brown coating doesn't develop as on potatoes. And finally there is the taste, described by someone as like that of a Brazil nut, with a coconut celery aftertaste. Whatever the analogy, it is a taste seemingly less than delectable to the western palate. And another drawback is that artichoke tubers do not store like potatoes, quickly rotting if not kept cold.

And so the Jerusalem artichoke was undoubtedly more widely grown in North America and Europe in the 17th and 18th centuries than it is today. With the introduction of the white potato, Jerusalem artichokes went downhill, never to recover their popularity.

But Jerusalem artichokes do make good food for yeasts. Nearly 300 years ago, they were widely planted by the English for making beer. They could stage a comeback!

A PREVIEW OF SOME PLANTS YOU WILL SEE
AT THE 1977 AHS CONGRESS IN CALIFORNIA

See Down Under Plants in L.A.

Lorraine Marshall Burgess
202 Old Broadmoor Road
Colorado Springs, CO 80906

If you have wanted to take a winter trip to the southern hemisphere to see the exotic plants of South Africa, South America, and Australia, but can't quite manage it, consider instead a trip this winter to the Los Angeles State and County Arboretum. Surprisingly, many of the plants you would love in South Africa or South America are flourishing in southern California, much closer to home.

This outstanding Arboretum boasts remarkable collections of living plants from every continent, and those from the southern hemisphere are in peak condition during our winter months. They're yours to observe and enjoy while the snows bluster and blow in other parts of the United States.

Traveling there this winter or early spring you can expect to see a wide range of *Eucalyptus*, that enormous genus of Australian aromatic and sometimes gigantic evergreen trees; the bottle-brush *Callistemon*; the trailing African Daisy, *Osteospermum*; a remarkable display of giant *Aloe* (the plant we usually grow indoors in small sizes on our coffee tables); the *Leptospermum* tea-tree (having nothing to do with the tea plant) of Australian origins, and widely cultivated in California; and *Chorisia*, a South American tree related to *Ceiba*, the silk-cotton tree.

Besides all that, the Demonstration Gardens serve as a good stimulant for the serious gardener. Plant combinations, creative uses, good



terrace, deck, and fencing designs suggest garden ideas worth 'borrowing'.

The Arboretum, sponsored by The County of Los Angeles, is located at 301 North Baldwin Avenue, in Arcadia, 18 miles from the center of Los Angeles. It occupies 127 acres of ground in the San Gabriel Valley at the center of what was the Rancho Santa Anita, a vast land grant dating back to the 1700s. If you're searching for it today, exit the San Bernardino Freeway (Interstate Highway 10) or Interstate Highway 210 at Baldwin Avenue, or look for the Santa Anita Park racetrack, a nearby landmark.

The Arboretum is open from 8 in the morning 'til 5 in the afternoon, free of charge, although donations

will be accepted. The smart garden visitor should allow at least a full day to enjoy the sights. There are tram tours available at 30-minute intervals to take you around the full spread. After this briefing you can return on foot to the areas that interest you most. There are picnic areas, and the Peacock Pavilion Gift and Coffee shops for respite and light refreshment.

If you plan to linger longer, consider enrolling in adult education classes in botany, plant taxonomy, practical horticulture, and botanical sketching. Or investigate the Arboretum's research programs in propagation, in testing and introducing new materials, and in probing smog-related problems or injurious plant diseases. There are also youth classes and workshops for children 6 to 16. With these many activities, a garden-oriented family might well make the Arboretum the focus of an extended visit in the area, winter, spring, summer, or fall.

It's not that the Los Angeles Chamber of Commerce needs any promotion from me, but I must say that southern California is a nice place to visit (once you get used to the crowds). And you can travel there in the winter with a clear conscience. With your garden under a layer of snow, it doesn't need your care now. So — Go West — southwest to be more precise, to see exotic plants from foreign lands. It's worth the trip.



Far Left—*Aloe africana* has bold impact with 3' to 4' blooms on 8' plants. Its spiny, prickly leaves have a sculptural quality. They survive well in areas deficient in rainfall.

Left—*Aloe ferrox* in firecracker red stands 10-12' high. *Aloe barbertoniae* is in foreground.

Below—*Eucalyptus rhodantha*—a South African variety of this enormous genus of evergreen trees.



An Invitation from the Northwest Ornamental Horticultural Society

The members of the Northwest Ornamental Horticultural Society wish to extend an invitation to those attending the American Horticultural Society Annual Congress October 25-29, 1977, in Pasadena, California, to visit the coastal northwest either before or after the Congress. We will have an enthusiastic committee standing by to make the necessary arrangements—*by appointment only*—including courtesy transportation to visit private gardens, rare and unusual plant nurseries, private bonsai collections, the Arboretum and other local horticultural features located in both Tacoma and Seattle. Please give ample advance notice by writing to or telephoning:

The Northwest Ornamental Horticultural Society
University of Washington Arboretum
Seattle, Washington 98195
Telephone: 206-543-8800

Should you arrive in Seattle by air—on a clear day—both Seattle and Tacoma will appear insignificant in scale amongst the vast bodies of water (Puget Sound Basin, lakes, and rivers) all lying at the immediate base of spectacular mountain ranges. Spectacular because they rise majestically from sea level and varying from 10,000 to 15,000 feet.

To quote previous comments made by Dr. Henry T. Skinner: "All this provides a variance of microclimates which supports a uniquely plant-rich region. Not only its own native material but also enabling the cultivation of horticultural specimens from temperate to near subtropical plants. The uniqueness being that this can be duplicated nowhere else in this country. Combine climates with good growing soils, stock with gardeners, amateur and commercial, and the inevitable result is a maxi-sized version of the Jermyns Gardens."

We are looking forward to the opportunity of both meeting you and welcoming you to the Northwest.

Mrs. Pendleton Miller
Member AHS Board of Directors

Following is a small selection of horticultural attractions you may wish to visit.

SEATTLE

Lake Washington Ship Canal—the Canal is an Army Corps of Engineers navigation project located in the heart of Seattle which connects Puget Sound with a large freshwater harbor composed of Salmon Bay, Lake Union and Lake Washington.

The Carl S. English, Jr., Gardens—located on the grounds at the locks, offer an extensive and colorful selection of trees, shrubs and herbaceous plants. Seven acres of outstanding native material and plants grown from seed, obtained from botanical gardens and arboreta world-wide, make this ornamental garden a horticultural mecca of the Pacific Northwest. Native trees, shrubs and groundcover combine with walkways and benches to provide a restful, park-like atmosphere. A brochure is available at the Corps office which shows a suggested garden tour route. The flower beds, shrubs and trees are numbered on a map for easy reference to the plant listings.

The University of Washington Arboretum in Washington Park—This 200 acre facility designed by the Olmsted Brothers of Brookline, Massachusetts, may be expected to have as brilliant a display of autumn color as can be found anywhere in the Pacific Northwest. Although there are numerous areas of bright fall color throughout the grounds, the Japanese Garden is perhaps the jewel of these.

The Home of Mr. and Mrs. Pendleton Miller—this four acre site provides a variety of exposures and horticultural conditions from woodland to arid areas. The garden is intensively developed as a collector's garden and for this reason it is constantly changing. Primarily, it features the species (over 5,000 different species) endemic to thirty-five countries from arctic to subtropical regions. Of particular interest are the *Ericaceae* and evergreen oak collections; and all collections are tied together by the extensive use of Northwest natives. In its entirety it is treated as a single plant with an intermingling root system.

The garden is situated on the bank of Puget Sound fac-

ing the Olympic Mountain Range. On a clear day the garden becomes the foreground of a spectacular view of the mountains directly across the water.

The Garden of Mr. and Mrs. Brian O. Mulligan, Kirkland, Washington—this is a collector's garden of about an acre, 26 years old, situated on a western slope on sandy soil, designed chiefly to provide plant interest throughout the year. The principal features include a number of conifers and dwarf conifers, evergreen and deciduous trees of the Pacific coast and an emphasis on plants and shrubs for winter flowering.

The *Ericaceae* family is well represented with rhododendrons, gaultherias, pernettyas, vacciniums, erica and others. Some rock garden and alpine plants are also grown on walls and banks. A good selection of ground covers is distributed throughout the garden and a wide variety of ferns of all kinds for both woodland and drier areas. A small greenhouse is used partly for propagation and in the winter for protection of less hardy plants.

The Bloedel Reserve—located 45 minutes west of downtown Seattle, on historic Bainbridge Island, the Reserve represents a rather unique variant of a public garden. Not a botanic garden nor an arboretum, yet sharing features of both.

Here, the main objective is to show man working harmoniously with nature, to the mutual advantage of both. With about 110 acres of Puget Sound lowland forest, the Bloedels have created a setting where native and selected exotic ornamental plants share a backdrop of man-made ponds and streams. A Japanese garden area, complete with tea house; a quiet reflection pond surrounded by a tall hedge of yew; a woodland walk through the 'glen' with its waterfall, creek and small pond are just a few of the features found at the Reserve.

Freeway Park—perhaps one key to the revival of inner cities throughout the nation. Buried is a short stretch of Interstate 5, a concrete canyon of 10 lanes of traffic bearing 133,000 cars through the center of Seattle each day. The traffic still moves. But the freeway trench has been bridged over with a splendidly landscaped 6-acre urban park filled with trees and grass and flowers and cascading water—including a 32-ft. high waterfall which totally masks the roar of traffic a few feet below.

TACOMA

"Madera", home of Mrs. L. T. Murray—is an Italian villa set in a park of 27 acres which was landscaped by Fred Cole. Built in 1917, this is one of the older estates in the Lakewood area. Established plantings of our native *Rhododendron macrophylla* line a long drive which winds beneath a 400-year-old fir tree. It passes a Japanese garden especially noted for its refinement and patina where a waterfall cascades into pools surrounded by Japanese maples, Ukon cherry, pines, and forty-year-old azaleas. Lanterns from Japanese temples and carefully placed stones, selected for their symbolic meaning, all add authenticity to this area.

A rolling lawn and stairway to the lake surround the

home where the planting consists of five varieties of dogwood, natives *nuttallii*, and *canadensis* and *Cornus mas*, *Cornus kousa*, and *Cornus florida rubra*. Later hybrid rhododendrons have been placed at key entrances to formal gardens. A green garden of ferns and hosta provides a cool terrace off the dining room.

There is also a rose garden, planted in beds according to color surrounded with borders of peonies and phlox.

"Lakewold"—is one of the oldest gardens in the Lakes District. Giant Douglas fir trees dominate the scene and form the setting for a collection of rhododendrons which thrive with companionable tree species in this cool climate.

Under the guidance of Thomas D. Church, Lakewold has lately been redesigned and refreshed. An outstanding feature from the earliest days is the brick walk leading from the residence to a vine-covered summer house at the end of the garden. Bordering this walk are boxwood parterres, within which spring and summer plantings produce a succession of blooms.

An Elizabethan knot garden forms its geometric pattern with various culinary herbs.

Most recently a rock garden has been added, with paths winding through the woods and down to the shore of the lake.



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A California Magnolia Does Well in Georgia

James Rowland Burgess
1858 Ridgewood Drive, N.E.
Atlanta, Georgia 30307

The *Magnolia grandiflora* 'Samuel Sommer' selected in 1952 by Dr. Maunsell Van Rensselaer, Director of the Saratoga Horticultural Foundation, has lived up to advance notices concerning its beautiful foliage, spectacular blooms, and attractive seed cones. The clone, Plant Patent No. 2015, has also demonstrated remarkable ability to withstand severe and unusual weather conditions.

Two specimen trees were planted by the author on the campus of Reinhardt College at Waleska, Georgia in April 1964. The trees, which were in six-gallon containers had been pruned to four-foot standards with one terminal bud and less than a dozen leaves at the top.

Expecting the trees to be beautiful, we planted them near the entrance to the campus on a clay hillside. We prepared holes seven feet in diameter and three feet deep, spacing them sixty feet apart and fifty to sixty feet from other trees. A mixture of clay, topsoil, and composted hardwood leaves was used to partially refill the holes. A four-inch mulch of aged pine sawdust was applied, leaving a six-inch catch basin for watering. A moderate amount of a special nursery fertilizer was used and water supplied as needed until the trees were well established.

The trees branched well with strong central leaders the first spring and bloomed the following year.

Mature leaves are four inches wide and eight inches long. Leaves are dark green, distinctly veined and delicately edged with a lighter shade of green, tinted yellow. Leaves are thick, slightly cupped on the sides, and firmly attached. They have a waxy appearance on top and a pleasing, velvety, brown tomentum underneath.

Blooms are striking in bud and when opening resemble giant, white cottage tulips. When fully opened they measure from twelve to fourteen inches across. Blooming begins in late May and lasts through July. Flowering is prolific with fifty to sixty blooms per tree.

Seed pods are very symmetrical and uniform in size. Their color changes from the look of fine silver to bright red when the shiny seeds appear.

The ability of the 'Samuel Sommer' to withstand adverse weather conditions is remarkable. Waleska is located in Cherokee County, Georgia, forty-seven miles Northwest of Atlanta with an elevation of twelve hundred and fifty feet above sea level. Freezing temperatures are frequent in winter. Twenty degrees is not unusual and zero temperatures sometimes occur. On January

29, 1966, two years after the trees were planted, the temperature dropped to twelve degrees below zero Fahrenheit with six inches of snow and moderate wind. The young trees survived without protection.

Twice in the late sixties snow and ice storms broke large healthy limbs from trees over a wide area of the campus. Once the tops were broken out of a 'Saint Mary' and a seedling *Magnolia grandiflora*. Neither 'Samuel Sommer' has ever lost a limb or branch from snow or ice.

In August, 1973, a tornado with high winds felled a dozen mature trees including pines and oaks. It completely destroyed two vigorous, twenty-year-old sugar maples located sixty and fifty feet respectively from each of the magnolias. The maple fifty feet away, with a diameter of ten inches, was twisted cleanly from its roots below ground level and the surface was scarcely disturbed. Obviously the main force of the tornado missed the magnolias, but they withstood terrific winds with no broken limbs or branches.

The Magnolia 'Samuel Sommer' is clearly a *super* tree among the trees of the world.

Possible Source: M. Gossler, of Gossler Farms Nursery, 1200 Weaver Road, Springfield, Oregon 97477.

BUDDING

A WAY OF PLANT PROPAGATION

By Robert F. Carlson
Michigan State University
East Lansing, MI 48824

A bud on a plant is only a few millimeters in size, but properly handled can grow into a beautiful rose bush, a dwarf apple tree, or a large shade tree.

In contrast to seed, these tiny buds generally grow into plants identical to the parent variety. Vegetative buds are located on year-old stems at the base of the leaf petiole (Fig. 1). Buds are referred to as being "vegetative" in contrast to seed which are of "genetic" make-up.

In the ornamental and fruit industries, the budding technique is a tremendous tool in propagating varieties true to name, growth and fruiting characteristics. Literally millions of plants are budded annually by nurserymen throughout the world. Many amateurs also use this method to enhance the beauty of the urban landscape.

What is Budding?

Budding is the transfer of one or more buds from a plant to another plant of the same genus or species. The methods of doing this are variable and can be done at different times of the year depending on plant material and location.

The Plant Material

Usually in budding, a rootstock and a variety (cultivar) of an ornamental or fruit variety is involved. However, in changing a young tree from one variety to another variety, only varieties are involved. This is called "top working" and can be done by budding or grafting.

The rootstocks (of roses, apples, cherries, maples, etc.) upon which the variety buds are placed usually

are lined out in rows in the spring. On an amateur scale, these can be planted in the garden or other suitable location. These are budded in August or September. The bud sticks are of current shoot growth with leaves attached. The leaves are cut from the bud stick leaving $\frac{1}{4}$ inch of leaf petiole next to the bud (Fig. 2).

The T-Bud

The most common method of budding is the T-bud. This is usu-



Fig. 1.—The apple seeds at left will grow into trees if properly germinated and cared for, but each resulting tree and fruit will be different and not like the mother tree. The buds to the right (chip buds at the top and T-buds bottom) were cut from a 'Delicious' bud stick and all 8 buds, if properly budded, will grow into 8 new Delicious apple trees similar in tree and fruit to the mother tree.

ally done when the newly formed bud is well developed and dormant and the plant (rootstock) on which the bud is placed is actively growing. In other words, it is done when the bark is slipping, which means that the plant sap is flowing so that the bark easily separates from the wood.

The T-bud is made on 1- or 2-year-old shoots by making a



Fig. 2.—Bud sticks of each showing (top) a bud stick with leaves from which 4 buds (center) have been removed. Bottom, a bud stick with leaves removed ready for bud removal.



Fig. 3.—A one-year-old apple tree showing where it was budded to a dwarfing rootstock and where the rootstock was cut above the bud allowing the McIntosh bud to grow into a dwarf tree.

short cut horizontally across the stem through the bark and another cut about 1 inch long downward and parallel to the stem, forming the T-shaped cut. The top wings where cuts join at the top are lifted so that the bud can be slipped in between the bark and wood.

In removing the bud from the bud stick, hold the stick firmly for cutting a 1-inch sliver containing

the bud. Slip this bud into the open T-cut, making certain that it is parallel with the stock and fits snugly at the top of the T. The bark of the bud should be in contact with the wood of the stock, thus matching the cambium of both bud and stock. The "cambium" is a 3 or 4 cell layer between the bark and the wood. Then wrap the bud with a rubber band so that it is held firmly in place until united with the stock. If the rubber band has not come off by itself one month later, it should be removed.

This newly inserted bud, usually done in August or September, is dormant and will remain so until spring the following year. At that time, the stock upon which the

bud was placed is cut just above the bud allowing the bud to be forced to grow and produce the new plant (Fig. 3).

Inverted T-Bud

The inverted T-bud is sometimes used in budding some plants because healing appears to be more rapid. The method for inverted T-bud is the same as the T-bud, but the bud is slipped into the inverted T from the bottom rather than from the top (Fig. 4).

The Chip Bud

The chip-budding method is similar to the T-bud, but can be done when the bark of the stock is not slipping. As the name indicates, only a chip containing the dormant bud from 1-year shoot is used. The stock for best bud take should be growing or starting to grow, which means that chip budding can be done in the spring.

Note that in most budding of fruit trees, the bud contains a sliver of wood under the bark; however, in some plant budding such as roses, the sliver of wood is removed so that only the bark with intact bud is used.

A chip about 1 inch long is removed from the stock by making a short downward cross cut at the base, at an angle, and a second cut above parallel with the stock, to make the place for the bud. From a dormant bud stick, a similar chip containing the bud is cut and this is placed on the stock matching the original cut surface on the stock. The bud is wrapped with a rubber band to hold it securely until growth commences. After the bud has started to grow and produce a shoot, the stock portion above the bud is cut off (Fig. 5).

In all budding by the T, or chip, or patch bud, the bud should be

A PREVIEW OF SOME PLANTS YOU WILL SEE
AT THE 1977 AHS CONGRESS IN CALIFORNIA

An Introduction to the Complexities of California Flora

Dick Tilforth, Horticulturist
Rancho Santa Ana Botanic Garden
Claremont, California 91711

As the State of California is studied, one of the first facts noted is that it is consistent only in its inconsistencies. It is 158,693 square miles of high and low, wet and dry, cold and hot, and almost everything in between. The diversity of California's topography, weather, and soil types makes the California flora one of extreme variability. A statistical analysis (Howell, *Wasmann Journal of Biology*, Vol. 30, 1972) gives the state 155 families, 857 genera, and 5027 species. If one includes the subspecies, varieties, and hybrids, the count comes to 6658.

These figures may be impressive, but what is more impressive is the great variety of natural landscape situations that cause this vegetative display. The elevation extremes are from 14,494 feet at Mt. Whitney to 282 feet below sea level at Badwater in Death Valley, and these two points are only about 85 miles apart. The rainfall ranges from more than 100 inches a year in the northwestern corner of the state to two inches or less a year in some of the desert districts. Temperatures have climbed to 134° F. in Death Valley and dropped to a recorded low of 45° F. below zero at Boca, Nevada County. The growing periods along the southwest coast are 365 days a year but fewer than 100 days a year in the northern mountainous area.

These extremes, with just about every soil type imaginable, 1555

miles of Pacific Ocean shoreline, two major mountain ranges plus many minor ranges, two large deserts, six large offshore islands, and some rather large areas of volcanic activity (one of which has been historically active) encourage plant endemism.

This collection of climatic, geological, and edaphic conditions has led to the commonly used concept of "Plant Communities." Munz and Keck (1959) use the term "Plant

Community" for each regional element of the vegetation that is characterized by the presence of certain dominant species. Munz and Keck use 29 communities and admit that these are broad headings. Robert F. Thorne, after many years of field work and study of the California flora, has made a further breakdown of these communities and has arrived at 78 communities and sub-communities within the state.

The area commonly called South-



Above—High Sierra near Yosemite National Park, California.

Right—Bird of Paradise Shrub, also known as *luguminosae* is a highly decorative plant in full bloom. Prevailing winds often bend the flower petals into a drift angle somewhat like the tail of a bird.



ern California, as defined by Munz (1935-1974), consists of about one-quarter of the state's total area but contains about 58, or 74%, of the total plant communities. As we can touch only on this southern portion, we find that it loses some of the extremes noted above, but is still a noticeably diverse area. One of my first recollections of this diversity was a leisurely Sunday drive when I arrived in Southern California. This drive started at the seashore, went east to the desert and back by way of the San Gabriel Mountains, reaching a road elevation of over 7300 feet. On this same Sunday drive I saw or could have seen at least thirty of the plant communities mentioned above.

As one travels the highways (or preferably the backroads) of Southern California, one cannot help but notice the changes in the vegetation. Starting at the coastal bluffs in San Diego County one might be surprised to see *Bergerocactus emoryi* and *Opuntia prolifera*, cacti that are usually considered to be in a hot, dry, sandy desert far from the ocean. This community is called the Maritime Desert Scrub in areas of little rain but within a stone's throw of the ocean. These cacti will be in association with shrubs of *Encelia californica*; the Lemonadeberry, *Rhus integrifolia*; and the spiny Box-Thorn, *Lycium californicum*. Also on the coastal bluffs and a little further north can be seen the Sea Bluff Succulent Community. Here is the fleshy-stemmed Giant Coreopsis, a miniature "tree" which can reach a height of five feet or more with yellow flower heads up to three inches across. Here too are several species of the succulent *Dudleya* and the shrubby *Isomeris arborea*, or Bladder Pod, which is covered with yellow flowers nearly all year. If one visits the island of Santa Catalina or San Clemente, one can add to this community the St. Catherine's Lace, *Eriogonum giganteum*. This is an endemic shrub on three of the offshore islands.

Further inland and at a little 24 higher elevation is the hotter, drier

environment of the Inland Sage Scrub Community. Several species of Lupines, both annual and perennial, and some very pretty Monkey Flowers are to be found scattered through this community. Some of the larger shrubs are *Rhus laurina* and *Rhus ovata*, the Laurel Sumac and Sugar Bush.

The Chaparral Community is described as a broad-leaved, sclerophyllus scrub. It is one of the most noticeable communities on the slopes and ridges of Southern California. The Chaparral is characterized by long, hot, dry summers with cool and sometimes wet winters. These scrubby areas are subject to fires that are not regular or frequent but are necessary for the health of both the flora and fauna of this community. The vegetation of the community has adapted to this condition of infrequent fires and many of the dominant shrubs are able to re-establish themselves by stump-sprouting from ground-level crowns. Many of the annual seeds

will not germinate until they have been subjected to the heat of the Chaparral fires. In the spring after a seemingly disastrous fire followed by some winter rain the area comes alive again with new growth, and many annuals show up that haven't been seen for years. Because of the large geographic area occupied by the Chaparral, it has been divided into some very distinct subcommunities by Dr. Robert Thorne. In the south it is represented by Island Chaparral, Chamisal, Red Shanks Chaparral, Desert Transition Chaparral, and Mixed Chaparral.

Island Chaparral of the offshore islands is characterized by several endemics, including several species of Manzanita and Ceanothus, and *Dendromecon rigida* ssp. *harfordii*, the Tree Poppy, with large, yellow, poppy flowers that are evident against the grey-green foliage most of the year. The white-flowered *Crossosoma californicum* is found only on San Clemente and Santa Catalina Islands and again about 300



Limber pine, *Pinus flexilis* at Mt. Baden, elevation 9300 feet.

miles south on Guadalupe Island off the coast of Baja California (Mexico).

Chamisal and Red Shanks Chaparral are both dominated by the genus *Adenostoma*. *Adenostoma fasciculatum*, the Chamise or Chamisal, and *Adenostoma sparsifolium*, Red Shanks or Ribbon Bush, form almost pure stands in their respective communities.

Supporting a different kind of Chaparral are the north slopes of the Transverse Ranges (San Gabriel and San Bernardino Mountains). The northern slopes of these ranges are often called the desert slopes and are the gateway to the Mojave Desert. Here is the Desert Transition Chaparral, and in it are found *Quercus turbinella*, the shrubby Desert Oak, another *Ceanothus* that is a low, rigid shrub with creamy-white flower clusters, the Mexican Manzanita, Antelope Bush, and the Cliff-Rose. All of these are evergreen and capable of survival under very harsh conditions. Here also are the Flannel Bush, *Fremontodendron californicum*, and the common *Yucca whipplei*, Our Lord's Candle. This *Yucca* with its five subspecies can be seen in many chaparral areas of the southern half of the state. When in flower this *Yucca* can change an otherwise drab, scrubby hillside into a glorious sight with the flower stalks ranging from six to ten feet high with their masses of creamy-white blossoms.

In all of the areas discussed the larger, dominant shrubs and trees are mentioned, but at one's feet are often small, ephemeral plants of much interest. For example, in the Desert Transition Chaparral one might see *Allium fimbriatum*, one of the many wild onions to be found in California. This little bulbous plant produces, when the rains have been good, one leaf and a flower stalk only a few inches high with a terminal umbel of lovely rose-purple flowers.

Before the higher elevations are left behind, check the 2000 to 7000 foot level for the Coulter Pine Forest. The Coulter Pine occurs in all the

mountains of Southern California and the coast ranges north to the San Francisco Bay area. It is identified by its long, blue-green needles and its cones that reach a length of twelve inches and are the heaviest pine cones in the world. Along with the Coulter Pine can be found *Quercus kelloggii*, the deciduous California Black Oak. The Black Oak can attain magnificent proportions, a huge, massive trunk, a height of around 80 feet with a large, spreading crown. Along with the pines and oaks there are many shrubs and herbs such as the Pink-Bracted Manzanita and the low perennial Mule Ears, *Wyethia ovata*.

Above the Coulter Pine Forest is the Yellow Pine Forest. This community is dominated by *Pinus ponderosa*, Yellow Pine or Ponderosa Pine, from 4500 to 7500 feet and *Pinus jeffreyi*, or Jeffrey Pine, at 6000 to 9500 feet. Also found in this Yellow Pine Forest is the largest of our California pines, the Sugar Pine, *Pinus lambertiana*. This pine can reach heights of 150 feet or more and has cones that are 12 to 18 inches long. Many other plants of interest can be found here such as the Mountain Dogwood, White Fir, and the lovely Incense-Cedar, *Calocedrus (Libocedrus) decurrens*.

At even higher elevations is found the Lodgepole Pine Forest with *Pinus murrayana*, sometimes as a nearly pure forest, up to 9600 feet.

Pinus flexilis forms the timberline forest called Limber Pine Forest which reaches about 11,400 feet on Mt. San Geronio.

Of special interest is the Bristlecone Pine Woodland with an open, low woodland of *Pinus longaeva* (*P. aristata* of California authors) ranging up to 11,500 feet. One Bristlecone Pine is reported to be 4600 years old (Schulman, 1958), perhaps the oldest living thing in the world. Growing on the dry, rocky slopes of the Inyo-White Mountains and the mountains surrounding Death Valley, it survives for millenia under almost unacceptable conditions.

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To many the desert is a desolate, destitute, barren, and inhospitable land, yet to others it has an irresistible fascination. About two-thirds of Southern California is desert and is divided into two parts, the Mojave Desert, or high desert, and the Colorado Desert, or low desert. The high desert is generally considered to be above 2000 feet and to the north, and the low desert below that elevation and to the south. Again there is a great variety of conditions. Mountains of 4000-6000 feet are not uncommon. Telescope Peak is 11,049 feet high and Clark Mountain is, 7,929 feet high. The Colorado Desert drops to more than 200 feet below sea level at the Salton Sea. More than one hundred families are represented in these deserts and, using Dr. Thorne's concept, there are fifteen plant communities.

The desert communities are all characterized by an extremely harsh environment. Proper study of the adaptation by desert plants to this environment would take a lifetime. Picture a member of the lily family that grows from 15 to 30 feet high, with flowers up to three inches long in dense, elongated panicles. This is the Joshua Tree, *Yucca brevifolia*, of the high desert. There is the Ocotillo, or *Fouquieria splendens*, of the low desert, with its many, spiny canes up to 20 feet high with a scarlet-flowered panicle at the top of every stem. If there has been recent rain, the Ocotillo will have fleshy leaves all up and down the stems. As soon as the soil moisture is depleted, the leaves dry up and drop off. The next rain, regardless of season, will cause the leaves to appear again and the cycle is repeated.

The most common and well known of the desert shrubs is the Creosote Bush, *Larrea tridentata*. This plant covers thousands of miles of non-alkaline slopes and valley floors in the community named the Creosote Bush Scrub. These shrubs are not growing closely together but are spaced as if planted in a uniform, open pattern. Competition is the probable reason for this pattern as

there is only enough moisture to support a limited number of plants. Any seedling that has the misfortune to appear too close to a mature creosote bush soon "learns" that life is hard and that it can be a long time between drinks. This is a country where the yearly but unreliable rainfall amounts to two to six inches and where the hot, dry winds blow frequently.

By contrast there is another desert plant, whose name and location shall remain unstated, that grows only in cracks and crevices in almost vertical limestone cliffs. According to a few men who watch this type of situation, there are less than a dozen plants of this species known to exist. This plant, along with other very selective plants, forms what is called the Desert Rock Plant Community. Among these are species of the Lip Fern and the Cloak Fern. Many of the plants in this group grow nowhere else except in these cracks and crevices where there is no apparent soil, moisture, or relief from the heat and cold and winds of these desert rock faces and slopes.

Because desert rains are usually heavy downpours but of very short duration (usually a matter of a few minutes), the water tends to run off to the lowest point. Here it is absorbed into the sandy soil almost instantly, but below the surface it is sometimes held in storage. These sandy washes and arroyos support the Desert Microphyll Woodland. Here are found the Palo Verde, *Cercidium floridum*; Smoke Tree, *Dalea spinosa*; Desert Ironwood, *Olneya tesota*; Desert Willow, *Chilopsis linearis*, plus many others. These plants can send their roots down to great depths to tap this moisture that is held beneath the hot, dry surface. This group of plants has another thing in common, they can and do present a spectacular floral display if seen at the right time of the year.

As yet nothing has been said about cacti, and to many people the desert means cacti. It is true that in a few areas the cacti are the dominant

plants, but in many of our desert regions they are scarce or missing entirely. On rocky, well-drained slopes of both deserts cacti will be found in abundance in what is known as Stem-succulent Scrub Community. Depending on the location one might find rather large collections of the genus *Opuntia* with its numerous species; the Barrel Cactus, *Ferocactus* species; Hedgehog and Mound Cactus, *Echinocereus* species. The Mammillarias and Coryphanthas are not common, and finding one often takes careful searching.

This very brief introduction to the plant life of California is not intended to answer many questions. Instead it is hoped that by these few words many questions will arise, tempting you to find the answers. The plants of California and their habitats are obviously diverse. What happens to this heritage can only be controlled by our own efforts. If we respect and protect it for what it is, this flora will persevere: if we don't, it will disappear. Students of the many-faceted science of botany have a lot of research yet to do before this assemblage of natural material is fully understood. Plant enthusiasts have years of work ahead of them in understanding, growing, hybridizing, and selecting the best out of this flora. Let us hope that ignorance or apathy will not allow this opportunity for research, development, and enjoyment to be denied to those of the future.

Top Left—'Tree Poppy' at Santa Catalina Island.

Top Right—*Passiflora mollissima* has a less complex flowerhead. The tubular calyx is 5" long.

Bottom—*Pittosporum* Laurel—a delightful ornament.



Photo by Guy Burgess



BUDDING

Continued from page 21

phasing upward, and not upside-down on the stock. If the bud is inverted, chances are less of uniting with the stock and, if it does unite, the resulting shoot from the bud will have an objectionable crook so that a straight tree will not develop.

The Patch Bud

As the name indicates, a patch of the bark (no wood) is removed from the stock. A smooth area of the stock should be chosen since this makes it easy for removing the patch and matching the bud patch. The patch can be either rectangular or square, often depending on the diameter of the stock and size of the bud patch. In doing this, the bark must be slipping for ease of removing the bark patch from both the stock and the scion. The

“scion” refers to the variety where the bud was taken, or sometimes called the “scion variety”.

A similar bark patch with a bud in the center is then removed from the bud stick (scion) and placed on the stock where the patch was removed. Again, it is very important that the area of the patch bud matches completely and securely the patch area on the stock.

The patch bud, once in place on the stock, is wrapped either with grafting tape or with a rubber band. The patch area should be covered with the wrap to prevent drying. Since this is done when the stock is growing, the rubber strip

or tape should be cut to prevent girdling the new bud.

The Shoot Patch Bud

In some difficult to bud or graft plants, such as the Walnut species, the shoot patch has been used with fair success. A 4-inch shoot developed from a bud on a one year branch is used rather than the dormant bud alone, and therefore this is done in late spring when young shoots are developing (Fig. 6.).

The method is the same as for the patch bud in that a patch of bark is removed from the stock, providing

Fig. 4.—Left: The T-bud cut is at the top of this photo and the inverted T-bud below. Right: The same after the 2 buds have been tied with the rubber strip. Note that 2 buds can be put on one stock in case one fails to grow.

Fig. 5. Below—A dormant cherry chip bud placed on an actively growing cherry stock showing how the shoot developed (left) from this chip bud. Note that in this case, the stock was not cut off above the bud because other buds were placed on the same stock making this into a multiple budded tree.

Fig. 6. Top Right—Left: bark patch removed from stock. Right: shoot patch put in place and wrapped with rubber strip. To prevent drying, the patch area should be covered with grafting compound and plastic bag.

Fig. 7. Below Right—About all materials that are needed for budding are a sharp knife and rubber bands. These bands or strips of rubber come in different sizes, an average size being $4 \times 3/16$ inch. Good, healthy plant material also is most desirable for success.





a place for the patch with a 4-inch shoot from the bud stick of the variety to be budded. The patch shoot bud must be rapidly and tenderly handled when transferred to the stock, because this is an actively growing soft shoot. After the transfer has been made, wrap with rubber strips or tape to hold the patch with shoot in place. This accomplished, place a plastic bag over the entire shoot and stock so that humidity is built up inside and around the shoot. Part of the stock above the patch may be cut off to accommodate the plastic bag. Shade the plant or patch area to prevent overheating in the sun. Gradually allow air circulation around the bud by cutting holes in plastic bag and after the patch and shoot bud has taken or is healed, remove the plastic bag.

Budding Skills and Tools

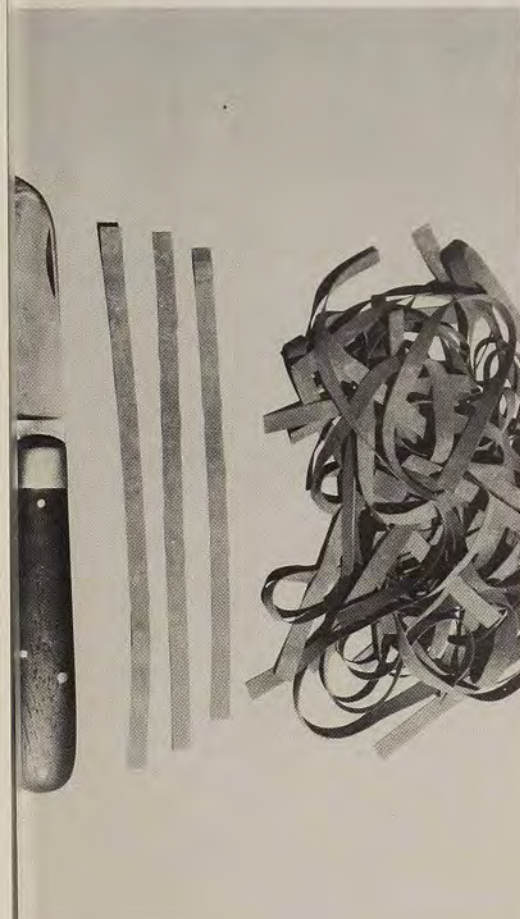
There is no mystery in budding, but a certain amount of skill and "know-how" makes it an interesting art. Anyone who is "handy with his or her hands" can bud. So give it a try, and you will be amazed at your results.

For best success in budding plants of any kind, it must be done at the right time. The plant material (stock and bud) should be available and in condition for proper healing of the bud after it has been put in place on the stock.

As far as tools needed for budding, a sharp pocket knife will suffice. Special budding knives can be obtained also, but success depends more on skill in handling the sharp knife. A good whetstone for keeping the knife sharp is most important (Fig. 7).

Budding rubber bands or tapes are available at nursery supply stores. These should be kept in a cool place when not in use to prevent deterioration.

Finally, it is a good idea to keep a few band aids handy in case of "knife slip". Budding is fun, and with some experience, the results can be pleasing and enjoyable.



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Hemerocallis

Cinderella Has Gone to Town

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Though species of the genus *Hemerocallis* are reported to have grown in the yards of the early colonists, the hybrid daylily as we know it today is a relative newcomer to the United States. With the number of refined cultivars of highly pedigreed modern *Hemerocallis* running well into five figures, it is difficult to believe that only 35 or so years ago hybrid daylilies were almost non-existent in the gardens of America.

The pioneer work of three dedicated botanists during the early decades of this century laid the groundwork for the transformation of old Cinderella *fulva* into a queen of modern perennials. A. N. Steward, professor of botany at Nanking University during the 1920's, collected and brought back many native species of daylily from China and East Asia. A. B. Stout, New York Botanical Garden from 1911 to 1957, studied and described the biology of the plant and expanded the range of the species cultivars through hybridization. E. J. Kraus, professor of botany at the University of Chicago 1927-1949, refined the material then available through thousands of daylily crosses.

Momentum in daylily research and breeding initiated by these early workers came almost to a halt during the Great War years, but was

renewed in the late 1940's and 1950's, when amateur horticulturists, along with professional geneticists and botanists, turned their attention to research and development of this promising new perennial. New forms and colors began to turn Cinderella *fulva* into just a poor relation, as thousands of happy backyard pollen daubers joined in the search for the apple green, the pure white, and the elusive true blue daylily. However, the most radical development in the evolution of the daylily was the emergence on the scene of the tetraploid form in the late fifties. It might be appropriate at this time to note briefly a few facts about tetraploidy for the better understanding of non-professional but interested horticulturists.

Spontaneous tetraploidy, or natural chromosome doubling, occurs frequently among many plant species through natural evolutionary processes. No natural tetraploids in daylily have ever been reported, however. Stout, in 1932, in his survey of chromosome numbers in daylily, found the somatic number of 22 chromosomes to be basic for all species of daylily, excepting several clones which had the triploid number of 33 chromosomes. Therefore the only way of obtaining tetraploids in daylily was by artificial

means.

The agent which has been employed to induce tetraploidy in a number of plant species is colchicine, an alkaloid obtained from the autumn crocus (*Colchicum autumnale*) and originally used in the treatment of gout. In 1937 it was proved experimentally that this substance inhibits certain phases of cell division, but allows the chromosomes to duplicate themselves in the normal manner. Thus, the usual diploid number of chromosomes in the cell is doubled, resulting in four sets of chromosomes in the same cell, or the tetraploid number.

Typically tetraploid plants are larger, and often superior in other ways, to diploid forms of the same variety. The superiority of the induced tetraploid over the diploid form in many plant species led some workers in the late 1940's to attempt to induce tetraploidy in daylilies with colchicine. Among these were Robert Schreiner, W. Quinn Buck, and Hamilton P. Traub, who reported several induced tetraploid forms in daylily in the late forties and early fifties.

The later fifties and early sixties were marked by significant progress in induction techniques with daylily material, both by these early workers and others. By 1959 Robert Griesback and Orville Fay reported

flowering over 100 tetraploids by treating with colchicine many seedlings in a juvenile state of development. During the sixties greater diversity of tetraploid breeding material became available through colchicine treatment of mature clones of different genetic lines. Both professionals and zealous amateurs joined in the efforts to convert old favorites and produce new ones using varying techniques of application of colchicine. In 1964 Toru Arisumi of the United States Department of Agriculture at Beltsville, Md., reported 17 tetraploid forms of named cultivars of various genetic backgrounds. Improved progeny of the induced tetraploids began to appear in commerce and to enter the breeding programs of many workers. By 1967 there were 66 tetraploid cultivars registered by the American Hemerocallis Society which had been grown from the seed of induced material.

Both theoretically and actually, the tetraploid daylily is superior to the diploid in a number of ways. The flower is larger, for one thing. This does not mean that all tetraploid daylily flowers are larger than all diploid flowers. On the contrary, some diploids are larger than some tetraploids. But if the tetraploid and diploid versions of the same cultivar are grown side by side under equal conditions, the overall aspect of the tetraploid is that it is larger, as are all of the floral parts: petals, sepals, ovary, style, stamens, anthers. In some instances the tetraploid will be as much as double the size of the diploid. Petals and sepals are thicker, and substance is heavier. The color of the flower is richer, more intense, because of the thickness of petals. The floral scape is stronger, sturdier. Substance of foliage is increased and its color is darker green, more luxurious. Vegetative vigor in all the plant parts is greater.

In the early days of tetraploids, many daylily enthusiasts were sceptical of the tetraploids and were unable to visualize their potentialities

because of the undesirable characteristics of a number of the induced plants. The flowers of some of them were too stiff to open properly; thick, ungainly scapes were considered unattractive when compared with the thin, graceful scapes of many diploids. And the scrawny little flowers perched four feet aloft on these sturdy columns were viewed dimly with a jaundiced eye by tetraploid sceptics. But however humble the early induced tetraploid may have been in comparison with later advanced diploids, it was not nearly so humble as its diploid counterpart. Some of the earlier diploids used in the experimental work with colchicine were not very far away from Cinderella! And rapid progress away from Cinderella was severely impeded by the barrier of the low fertility factor in the induced tetraploids. A very small percentage of them were seed fertile, though a larger number were pollen fertile. A favorite maxim among early workers was, "If it's fertile, it's good!"

Though breeding with tetraploids in the first decade or so was not an easy process for any of us, selective breeding with the early "dogs," combined with production of newer tetraploids from better genetic material, eventually yielded a breeding supply of tetraploid seedlings. The difficulties involved in getting seedset were considerably diminished when the breeding stock consisted of seedlings rather than induced material. In our own experience, breeding presented no great problem by the time of the 1967 crop of seedlings, many of which were four or five generations away from the induced ancestor, and for the first time parents could be selected almost as rigidly as with diploids, rather than having to cross just those that were fertile, as had been done in the past.

The speeded up tempo of improvements in tetraploid daylilies in the past decade seems to confirm one of the theoretical potentialities of the tetraploid. That is, that increase in chromosome numbers

should be paralleled by increase in the range of heritable traits, thus expanding the number of possible genetic combinations and speeding up the evolution of new colors, forms, varieties. Let us take a look at the metamorphosis of *Cinderella fulva*.

Species daylilies normally send up only one scape each bloom season, but some of today's hybrids grow and may produce bloom the year round. Evergreen varieties perform better generally in southern localities, and some of the remontant types may continue to send up scapes throughout the year. Dormant cultivars do better in more northern climates, and remontance is not uncommon if the growing season is long enough. It is true that the repeat bloom habit has been bred into both diploid and tetraploid hybrids, but it is our experience that tetraploids are more persistent rebloomers than the diploids, some clones sending up new scapes before the first one has bloomed out. This does not mean that a variety with no genetic background for repeat bloom will suddenly turn into a continuous bloomer if it is converted to tetraploid. It means simply that the rebloom habit is increased in the tetraploid if that tendency is already present in the genetic makeup of the plant.

The same kind of generalization can be made regarding other characters of the daylily. The colors in our early tetraploids should have discouraged even the eagerest "hem" beaver: brownish reds, muddy pinks, nondescript yellows and oranges, tawny blends of all of these. All of the colors of the spectrum were present in mixed form, and our job was to unmix and isolate them into basic clear and clean colors. Through selective breeding with the tetraploids, we can now approximate the range of colors of the rainbow. Clear shades of red in all the varying hues are represented; pinks range from pale shell to deep rose, almost red; yellows go from very near white to the deepest gold or orange; and in purple, the grada-

tion ranges from palest lavender through the deeper purples to velvety black.

Though improved colors denote a major advance in this decade of breeding with tetraploids, perhaps the greatest advance has been in the changing form and shape of the modern daylily. The generally larger size of the tetraploid makes it a more imposing, even spectacular, garden flower, in some cases. Greater width of petal and sepal, a more compact overall aspect, has been a primary goal in breeding in a number of ornamental floral species. It has been of particular importance in *Hemerocallis*, inasmuch as the inflorescence produced in the species cultivars is of a generally thin, stringy nature. Petals in present day tetraploid daylilies frequently measure three inches or more in width, sepals two inches. The long spidery petals have become shorter and wider, creating a rounded, overlapping, compact general form. Other shapes break away from careful symmetry into graceful, flexible, twisting or recurved petals and/or sepals in contrast to the stiff, awkward shapes of the earlier tetraploids. And one of the more recent, and most sought after, developments is in the decorative edgings of petals, as well as sepals. Many of today's most popular tetraploids carry very heavy ruffling on the edges, or lacy, knobby piecrust and fluted or pleated edges. Additional features on some are a contrasting margin on the edging, usually gold or amber or white, but other colors are coming. At this time three named tetraploids have a purple margin completely surrounding all three petals. The heavy, creped, seersucker-like finish on a number of the present tetraploids is also a great contrast to the smooth, formal texture of the earlier ones.

Breaks in color and form these days send the "hem bug" scurrying out by daybreak to the seedling patch when the new crop begins to bloom, to see what Santa Claus has brought during the night. Extra

petaloids have cropped out on this one, forming peony shaped blooms; or symmetrically arranged petals and sepals may appear as usual, except that there are eight or ten marching around the flower instead of the normal six. Midribs of petals on a red have put up a ragged, comb-like ridge or crest down the centers. And this lovely pink—the fluted edging on the petals creeps clear down into the heart of the flower and onto the back of the

petal. Or yesterday's bloom on that lime yellow may be still sitting there perkily beside today's wide open, dewy-fresh bloom this cool morning. The near-whites are cloud pale in the soft morning light, the near-blues emulate the summer sky, and the green-throated, cherry-bright reds look like Christmas ornaments.

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Buttercup

To gather wildflowers with a camera is an expression of gratitude for the wonders of nature. This appreciation can become a way of life. The benefits are much more than pictures.

The joy of gathering wildflowers with a camera is in searching for them. It can offer a lifetime of excitement. . . . an adventure you enjoy throughout the year both indoors and out. This is an adventure you can pursue alone or with someone else. However, the best pictures cannot be made when you feel like doing it. Fleeting moments in nature, the hues and shapes of a sunrise or sunset, nesting birds, and wildflowers at their best—are indeed brief. Only the alert can immortalize them on film.

Once you decide to gather wildflowers with a camera, purchase a good pictorial guide. (Suggestion: "A Field Guide to Wildflowers" by R. T. Peterson and M. McKinney.) Make yourself familiar with the color and shape of the flower, note the shape of the leaves and their arrangement on the stem. Note the time of the season when it blooms and the type of terrain where it may be found growing. The first cue to look for is color; therefore, scan the area carefully. After you have gathered a few wildflowers on film—show your collection to friends and social groups. Get as many people as possible familiar with your interest. In this way you will pick up leads in locating the more rare flowers. (Many wildflowers are rare indeed, therefore do not pick them unless you know the plant. Also, be careful not to trample flowers—this is especially important if a group of people is involved.)

If you are a real beginner, a patient photography store clerk can be a big help. Remember that you're doing this for fun, therefore don't let the language of the photo "experts" dull your enthusiasm. Buy the best equipment you can afford and be proud of what you own. The equipment listed here is basic and will supplement whatever approach you may eventually choose.

You should have a single lens reflex camera (SLR), an electronic flash with a guide number of 40± with ASA 25 film, an extension cord for the flash unit, numbers 2 and 3 close-up portrait lenses, a couple of small clamps, insect repellent, a small notebook, pencil, and con-

tainer to carry your equipment. Stay with one film, Kodachrome 25, until you are happy with the results.

To take the picture, thread the close-up lenses 2 and 3 (in this order) onto your camera, set your camera on the proper shutter speed for the electronic flash according to your camera manual, set the f stop at 16 or 22, set the feet at infinity, plug the extension cord into the camera and the light, aim the light at the flower about 15 inches away and approximately 60° to the right or left of the camera. If you are alone, push a stick into the ground and clamp or tie the light onto it at the required position. Find the flower or group of flowers in your viewfinder, move the camera toward or away from the flower until you see it in perfect focus, compose or make the picture—look carefully for distractions, such as sticks, etc.; if you like what you see, release the shutter. For a second picture set the focus at the minimum feet, change the light angle keeping it approximately 16 inches away and repeat the procedure. Shoot a roll of 20 pictures in this way, varying (1) the light to subject distance (an inch or two), (2) the focus ring, (3) the f stop between 11, 16 or 22, and (4) use each portrait lens alone on the camera. Be sure to keep notes recording your camera settings, and light to subject distance for each slide. When you view your slides, check the notes and plan to make adjustments accordingly. The results should excite and motivate you to study and improve your work.

All of the illustrated flowers were growing in Connecticut. If you should be travelling north or south through this beautiful state, stop off at Exit 82 of the Connecticut Turnpike (Route 52). You will immediately make the acquaintance of a town over 300 years old where wildflowers still grow along its country roads and woodland. The town is Norwichtown—settled in 1659. A slow 10 minute ride will get you to "The Green", "Meeting House Rocks", historic old homes and country lanes. Many of these flowers may be found growing along the narrow country Connecticut roads!

Growing Tuberous Begonias

*Robert E. Weidner
Nurseryman
537 Ocean View Ave.
Encinitas, CA. 92024*

If you live in a climate favorable to growing tuberous begonias, "count your many blessings", for they will give you bloom for months in the shade garden.

In coastal California we enjoy them from mid-June to sometime in November or December. In colder climates, early frosts send them into their dormancy.

A great increase of interest has been stirred by people who like to grow plants in containers. Tuberous begonias, given a proper soil, filtered sun, consistent watering plus fertilizing, thrive as well in large pots as planted in the garden. Then to top that there are hanging basket types that provide glorious bloom. Though the blooms are somewhat smaller than the upright varieties, they bloom far more profusely. It is not unusual for a well grown basket to have dozens of flowers at one time.

The parent species come from South America, and so much breeding has been done that no resemblance remains to the original species. Today's plants have many huge blooms four to five inches in diameter, and come in many colors.

In America, nearly all the breeding has been done in a small area of California, mainly around Santa Cruz. We like the American begonias best, because they are bred with disease resistance in mind. In addition, they have produced colors

and forms more to the American taste.

Tuberous begonias are propagated by two methods, cuttings and seed. Only a relative few come from cuttings, and these are to perpetuate and increase a very fine or a named variety. Millions are grown from seed to produce plants for sale or tubers for the ensuing years.

For the home owner, tubers or started plants are most satisfactory.

When tubers are received, they should be started indoors in flats or pots with any porous potting mix, be it leaf mold and sand, peatmoss and perlite, redwood sawdust, finely ground pine bark- whatever is convenient. The tubers are planted hollow-side up and barely covered. Temperatures in the low 70's at night are best. Strong light but not full sun through a window helps keep the growth strong and not stretched.

When the growth is well started, 3-4 inches, a light feeding with fish fertilizer is beneficial. Though one can read of many different fertilizers and changes to get bloom, you may be sure that they are perpetuations of myths of long ago. We have found that fish fertilizer used according to directions on the container will consistently give good results. We especially do not like quick release fertilizers such as ammonium sulfate, for the fine roots are easily burned.

Camellia flowered



When growth reaches 6" or more it is time to pot or plant in the garden. If in pots, use any good light potting mix, and cover the tuber an inch or so. A pot with a 10" minimum diameter and 6" depth should be used. Deeper pots tend to become soggy. Water in thoroughly to settle the plant well. From then on, keep the soil moist. As the plant grows it will use more and more water. Fish fertilizer should be used after two weeks, then every other

week. To help people remember when to fertilize, we say it is a "Half Catholic" plant . . . fish every other Friday.

If you wish to plant in the soil, in your garden, it should have a great deal of humus added, and the bed should be 6" above surrounding soil, to insure perfect drainage. Heretical as it may sound, in our own garden, we merely bring in redwood sawdust or very finely ground bark chips, make a layer 8-10 inches



above ground without mixing with soil. We plant all our shade plants, begonias, fuchsias, primulas, cyclamen, whatever, in this material. All plants root out into the medium, consistent feeding taking care of their nutrition need. It is impossible to overwater; and that is important to a "sprinkler-forgetter" like me.

We have little trouble with insects. Passing earwigs may take a nip now and then. Slugs and snails enjoy the growing conditions, so

As the upright type begins to get taller, the wise gardener will stake them so stray dogs, little boys, and hard winds will not break them.

The varietal forms of the tuberous begonia are many, and we have never detected any great difference in vigor. There are three basic varieties in the large flowering group: camellia flowered or double rose form, the flowers resembling huge roses or camellias; double ruffled carnation type: frilly ruffled petals

Carmel Valley Begonia Gardens
Rt. 2, Box 954
Carmel Valley, Ca. 93921

The Begonia Gardens
Corner of Piraeus and Normandy
Leucadia, Ca. 92024

Plants only—no tubers

Open for viewing and digging
mid-June through mid-September.
No shipping.

If you decide to plant in the ground, plant with the leaves pointing outward. The huge central flower is male, the one or two small single side flowers are female.

An interesting point about tuberous begonias is that they make a compact mass of fine roots, and thus are easy to transplant. We grow 25,000 in raised ground beds, and it is a sight to behold to see thousands of people come from mid-June thru mid-September to dig plants to take home. Their ecstatic remarks make the work worthwhile.

After you have enjoyed your summer's bounty of flowers a light frost will destroy the vegetative growth to ground level.

If the plants are in containers, do *NOT* remove the tubers, but merely put in a place where they can not freeze or be rained upon. The tubers when dormant will not tolerate constant wetness.

If the plants are in beds, and if you live in cold country, let all vegetation dry, then lift the tubers, clean well and allow to sun dry for several days. Then they may be packed in a small carton with *DRY* peatmoss. If you live in California, where there seldom is a deep frost, we find it best to leave the tubers in the ground.

No one can guarantee that tubers will survive. If they do you will see growth start any time from March on. Again they must be put in strong light and the cycle starts again. You may then look forward to yet another summer of the extraordinary color and beauty that the tuberous begonia adds to your garden.



Carnation flowered

baiting is wise.

There are two diseases we are concerned with, stem-rot and powdery mildew. We have seen much more mildew on European varieties, so we tend to omit them. When the plants are established in their permanent home, a week to ten days, we like to drench the plant and soil with "Benomyl". This is a systemic fungicide, available under different trade names in retail outlets. Many fungicides are sold, but "Benomyl" is a good preventive against powdery mildew, and a great aid if stem-rot strikes.

in many variations; Picotee type: both in ruffled and rose form, characterized by a darker edging of each petal, sometimes beautifully variegated throughout the flower.

All of these forms come in both upright and hanging basket varieties.

One can get a beautiful catalog in color merely by writing to:

Antonelli Bros.
2545 Capitola Rd.
Santa Cruz, Ca. 95062

Other sources include:

Franklinia

by
Martha Prince
9 Winding Way
Locust Valley, N.Y. 11560

"October 1, 1765. Fine,
clear cool morning.
The thermometer is 56."

So begins a fragment of the diary of John Bartram of Philadelphia, America's great self-taught botanist and plant collector. Bartram meticulously kept a diary, but only one eight-month section survives, and it includes this notable date. Mystery stories are fascinating, even to botanic scientists (and to flower buffs), and on this lovely October day began a continuing mystery—the whereabouts of *Franklinia alatamaha*.

John and his son William were on a horseback journey near the coast of Georgia, heading for the ferry at Fort Barrington on the Altamaha River. (Where the extra "a" in the botanic name came from is conjecture.) The Bartrams were collecting plant material, both for their own nurseries and for nurseries in England.

"This day's riding was very bad, through bay swamps." He mentions tupelo trees, cypresses in deep water, brush, briars and palmettos, "yet we got safe through all." This was in dry weather, evidently, and he says the day's journey was often on piney ground three or four feet above the swamp. He notes, "In wet seasons most of it is covered with water (for) a long season." After "dining on bread and a pomegranate by a swamp", they lost their way and reached the Altamaha some four miles below Fort Barrington.



Seed Pod



Close up of tree trunk.



Flower of *Franklinia alatamaha*.

Photos by Martha and Jordan Prince

Both Bartrams were very poor at estimating distances, so "four" must be taken with the proverbial grain of salt.

As to the now famous and beautiful *Franklinia*, his brief entry is merely, "This day we found several very curious shrubs, one bearing beautiful good fruit." (He did not mean fruit in the edible sense, but seed.)

In 1773, son William found the trees again. According to his *Travels*, he was on the northeast side of the river, once more on the way to Fort Barrington. This time he mentions that the trees are "in all their blooming graces", and that they appear to be a species of *Gordonia*.

Just two hundred years ago, probably this very month, in 1777, he saw them for the last time, in "perfect bloom."

By this time he has decided the trees are not *Gordonia* at all, but a new "tribe" (a word he sometimes used for genus), which he named for Benjamin Franklin. Actually, he was wrong in 1777, and right in 1773. *Franklinia alataamaha* is a *Gordonia*. Our only other American one is *Gordonia lasianthus*, a much taller and evergreen tree with similar, though smaller, flowers. However, even the new *Hortus Third*, bowing to tradition, merely lists it under *Gordonia* and writes it up under *Franklinia*. It is bad enough to lose a tree; worse to lose its name as well!

William Bartram was not given to poetic adjectives. He burst into them about the flame azalea (*R. calendulaceum*), and now he does once more. After describing it simply as "of the first order for beauty and fragrance of blossoms", he adds, "of a snow white colour, and ornamented with a crown or tassel of gold. . . ."

I will not quote his rather dry botanical description. The tree is really the most special for its late summer and early autumn bloom. It is interesting at all times; the bark is striped distinctively, the buds are round green balls seemingly covered in a soft green shade of matte-

finish satin, the seed capsules are large, hard as nuts, and round. When ripe, the seed capsule splits. Five fissures open from the top, alternately with five from the bottom. There are really five sections with a divider in each. Each "storage bin" holds four neatly stacked seeds (forty seeds in all). The empty pods are attractive to save as a sample of Nature's marvelous design.

The area where the Bartrams found them is Zone 9, but they will grow beautifully in the New York area (in acid soil, moist but well-drained). The easiest propagation is by cuttings; seeds need stratification, and do not germinate well. As each tree produces so many seeds, however, this should not have been a problem in the disappearance of the tree from the wild.

Bartram wrote that there were two or three acres of the trees, or shrubs

as he called them. He lists the height as fifteen to twenty feet; in cultivation today, the mature height may be somewhat more. Another plant collector, Moses Marshall (of Philadelphia also), found and collected plants in 1790. The trees were reported for the last verified time in 1803, by John Lyon, a Scotsman. Lyon for a few years had a nursery in Charleston. It might be noted that the Bartram's nursery catalogue of trees available in 1792 lists *Franklinia*. There exists a copy of the catalogue, handwritten, by George Washington's private secretary, a Mr. Dandridge.

The *Franklinia* trees in today's gardens and arboreta are descendants of these collected trees. However, even today some botanists and others are almost obsessed with finding the original Bartram station. They tramp endlessly through



swamps and over sand ridges, year after year, searching. It is almost certainly a vain project, and for several reasons. First, the identical trees cannot exist, as the tree is not so long-lived. Even the collection in Bartram's Garden (now a park in Philadelphia, open to the public) does not date from the lifetimes of either Bartram.

Next, a look at the government's quadrangle map shows what the land is like. Only the site of Fort Barrington is on safely high ground. Except for that one little spit of land, not a single spot on the northeast side of the river even rates a single 10' contour line. The whole area is known as Buffalo Swamp. My belief is that the original Bartram trees were quite simply drowned! The accompanying map does not extend to the actual mouth of the river, which meanders in channel after channel on a very lazy exit to the Atlantic. A number of marsh "islands" dot the area, but there are only two real islands—Sapello and St. Simon's (noted as a resort). Information furnished by the Tidal Datum Section, of the National Ocean Survey, gives the highest estimated tide at the present-day railroad bridge (just three and a half miles south of Fort Barrington) as 7' above Mean Sea Level. The Chief of the Section, James Hubbard, writes me that the estimate is based on ocean conditions only; the actual water level could reach greater heights due to the incoming fresh water. (The tide gauge at the bridge itself was swept away in the 1930's.) An inundation of the tree site could have been salt water, as well as fresh! No stand of trees could survive such treatment. If I had unlimited research time I would enjoy finding old sea captains' logs for the period after 1803, and look for a hurricane on the Georgia coast. (The government has never tried to reconstruct weather of the time.)

There is another fascinating aspect to the trees' origin. They could *not* have developed as a species in the area where the Bartrams found

them. The whole area is too new in geologic time.

Dr. Robert Carver, of the Geology Department at the University of Georgia tells me "The coast of Georgia is a highly dynamic system, and is constantly changing." In the absorbing science known as paleogeography (the mapping of past time), we find that all the possible locations date from Holocene (or Recent) time. These sites were under the sea until at least the last 5000 years. No tree species can be as young as that!

Right at Fort Barrington the present spit of dry land was underwater for at least a mile back from the present Altamaha. Four miles south (as mentioned by John Bartram), at least three miles on the northeast side were underwater. The whole sand ridge shown on the map was deposited since that time. Spots on that ridge reach forty and even fifty feet in elevation today. Further seaward the marsh islands were all under the ocean. In one sentence (1773) William mentions the rice plantations on Cathead Creek; there was no Cathead Creek.

So, where *did* the trees come from? The obvious answer would be "up-river". I realize no authority has acknowledged a reported "find" as authentic, but I have a small footnote of my own to mention here. My mother and grandmother were both quite good amateur botanists. They often visited relatives near Charleston, Grandmother in the 1870's and Mother around 1900. *Franklinia alataamaha* grew in some Charleston gardens. For the Bartrams it was almost "headquarters", and Lyon had once had a nursery there. When I was a child, in North Georgia, my mother pointed out some late-blooming trees with white flowers—in virgin woods. She said (and I quote), "Poppycock", to the story that the *Franklinia* was lost. I am sure she did not realize the botanic fuss and furor going on about it. "My trees" were not up-river from the Altamaha, but on a small source for the Savannah. One of the Altamaha sources is less than

eight miles away,—still a very small area (but reasonable, even for a rare tree population). I cannot be sure, of course, that they were really *Franklinia*. But what else could they have been? *Gordonia lasianthus* is a fairly common coastal wetland tree, but this was in the lower Blue Ridge Mountains. For me, it is now *my Franklinia* that is lost! Searching in a vaguely remembered area of the deep woods is difficult, and I have never had the time in the years since I became really interested. Someday, when botanists give up on the coastal search, I may arrange for a helicopter expedition to search for "my" lost *Franklinia*, many miles away.

Coincidentally, a few years ago the then President of the Bartram Society (a descendant of John's) had separately put forth the theory that the trees originated upstream. An article of mine brought us together for a correspondence.

If you have access to an arboretum, *Franklinia alataamaha* is worth a special late summer visit. The finest painting of the flowers that I know of is the one in Audubon's *Birds of America*. It is Plate 185 (Bachman's Warbler), and it is not by Audubon at all. He almost never touched a background. This was painted by a little Charleston spinster named Maria Martin, in 1833. It is also identified as *Gordonia pubescens*; I can find nothing as to where that name originated. The painting shows, and beautifully, more precise detail than does a photograph. There is a black and white drawing by William himself in the British Museum in London, but I know of no currently available published source. Any library should have the Audubon book for you to study. I have painted the flowers myself, but that picture is in the Hunt Collection at Carnegie-Mellon University in Pittsburgh.

Meanwhile, the mystery of the lovely *Franklinia* cannot be called "solved", and filed away. Perhaps it never will be, and will tantalize botanists forever.

A PREVIEW OF SOME PLANTS YOU WILL SEE
AT THE 1977 AHS CONGRESS IN CALIFORNIA

CHORISIA SPECIOSA
Floss Silk Tree

By Francis Ching, Director Arboreta and Botanic Gardens,
County of Los Angeles Arcadia, CA 91006



Unlike temperate areas of the United States, Southern California enjoys a milder climate although extremes of winter and summer temperatures can vary from 20°F to 110°F. The climate is subtropical (or Mediterranean) in nature; true tropics can rarely survive a winter, and temperate-type plants noted for their fall foliage color are in limited numbers and not always dependable.

Although fall foliage color may be undependable, fall flower color is not lacking as such plants as *Chorisia speciosa* (Floss Silk Tree) provide a spectacular colorful flower show

each year. From as early as August through January, these rapid growing trees from Brazil will produce flowers in varying shades of light to dark pink with centers ranging from white to shades of yellow. The five petaled flower very closely resembles a hibiscus measuring up to eight inches in diameter. Mature trees will produce a profusion of flowers for three months at a time with the fallen flowers forming a solid carpet to match the colorful overhead canopy.

Chorisia is native to Brazil and was first planted in the Los Angeles area in the early 1930's. Of the few

planted, only a handful have survived, the most notable one being at the Bel Air Hotel. In 1953, Dr. Sam Ayres collected a package of *Chorisia* seed while on a trip to Brazil which he shared with the Arboretum. These initial plantings of trees performed so spectacularly well that the Arboretum made propagating material available to the nursery industry as a part of its Plant Introduction Program for Southern California.

The trees are fast growing, averaging six to eight feet for the first year and then slow as branching takes over, and finally reach a mature stage by forming a canopy of thirty to forty feet in diameter at a height of 40 to 60 feet. Besides producing a wide variation of pink colored flowers, seedling grown trees may take as long as ten or more years before flowering while grafted varieties will flower in three or four years in five gallon containers. Since mature trees reach a height of sixty feet, they are definitely not for small gardens.

Some trees will flower while in full leaf while other trees will drop all of their leaves prior to flowering. Clonal selections will vary, as 'September Splendour' will start to flower in August while in full leaf reaching its peak in mid-September with medium pink flowers. 'Los Angeles Beautiful' peaks in mid-November with the darkest of flowers while 'Lasca Beauty,' another deep pink flower, is at its best in mid-December devoid of any leaves.

The compound leaves are divided into five to seven leaflets. New leaves appearing in early spring are somewhat bronze colored turning to a rich apple green.

A very distinguishing characteristic of this tree is its unmistakably green trunk and branches and its numerous thick based spines (which turn greyish with age) covering the tree and branches. A few trees have been noticed to be thornless but no more desirable as the thorned trees apparently have their merits.

Books

Reviews by Tom Stevenson

WYMAN'S GARDENING ENCYCLOPEDIA

by

Donald Wyman

Macmillan Publishing Co.

New York, N.Y. - 1977

1221 pages, illustrated, \$19.95

Donald Wyman was horticulturist at Harvard University's Arnold Arboretum for 33 years and is now horticulturist emeritus. A former president and director of the American Horticultural Society, he has received highest horticultural awards in the United States and Great Britain.

The encyclopedia, a revised and expanded edition, is an unexcelled guide to all aspects of gardening, indoors and out, covering techniques from greenhouse management to tree surgery.

More than 9,500 different plants are described with information on hardiness, ornamental value, cultivation, propagation, diseases and pests. There are 10,000 articles, 206 drawings, 170 photographs (62 of them in full color), and a 6-color Hardiness Zone map of the United States and Canada.

Some 52 lists of plants for specific purposes are given, most of them containing the scientific name, height, hardiness zone, and common name of each plant. This can be a considerable aid to the busy gardener who wishes to make a quick selection of plants for some specific purpose in his garden.

Plants have been listed alphabetically with descriptions after the scientific names. Common names are cross-indexed. Exceptions are fruits and vegetables which are listed and described according to their common names.

The generic discussions include the correct pronunciation of the genus, general notes about plants in the genus, where they are native, how they are propagated and notes on insect and disease pests and their control.

WILDFLOWERS

by

Mary Ferguson and Richard Saunders

Van Nostrand Reinhold Ltd.

New York, N.Y. - 1977

190 pages, wonderfully illustrated,

\$19.95

Mary Ferguson has been recognized internationally for her wildflower photography. Richard Saunders retired recently as professor of history at Un-

iversity of Toronto and now spends much of his time as a naturalist and nature photographer.

The book includes 150 full color reproductions. Each flower is accompanied by a descriptive text that provides important botanical details as well as other information, both fact and folklore.

The flowers are arranged in four major groups according to their common habitats, with brief introductions describing each habitat and the characteristics of the flowers found there.

The purpose of this book, they say, is to show the beauty of some common and some rare wildflowers to remind us of those we might look for in spring, summer or fall.

"Since only a few of thousands may be presented, we believe we have chosen some of the loveliest. Our hope is that, knowing even a few of our wildflowers by name and sight, people will appreciate them in their natural setting and leave them there. If they are not destroyed, they will continue to bloom for generations to come."

MANUAL OF WOODY LANDSCAPE PLANTS

by

Michael A. Dirr

Stipes Publishing Co.

Champaign, Ill. - 1977

532 pages, illustrated, \$12.80

paperback, \$16.80 hard back

Professor Dirr is with the Department of Horticulture, University of Illinois. This book is a revised edition on one published in 1975.

It details the common and not so common woody ornamental deciduous trees, shrubs, ground covers, and vines as well as the narrowleaf and broadleaf evergreens which are adapted to Midwestern and Eastern climates, the author says.

"It is designed as a teaching text for woody plant materials courses but should serve as a valuable reference to anyone interested in woody plants.

"As a teacher of woody plants I was often frustrated by the lack of a good text which included identification characters and the ornamental and cultural features. This text attempts to fill the gap and provide the student and interested plantmen with concise, factual treatment of the subject matter.

"Much of the information is based on my observations and subsequent inferences I have drawn concerning the relative merits of a particular plant. I plan to revise and enlarge the book in three years . . ."

The book provides the vital statistics for a large number of landscape plants and should be in every public library.

Seed pods are green colored about eight inches long and shaped like an avocado. When the pod dehisces in summer, a puff of silky cottony material expands out from the pod forming a white ball hanging much like a Christmas ornament. Like its cousin the Kapok tree, this material has been used for stuffing pillows, cushions, and mattresses.

Mature trees are hardy to temperatures as low as 27°F for brief periods. Young seedlings may have their tips burnt but will recover well. *Chorisia* grow well along the coastal areas and inland 100 miles to Palm Springs and from San Diego to Santa Barbara and beyond. They may also be found growing in the warmer areas of the Gulf States. At the Arboretum, trees have performed equally well in good and marginal soils. Infrequent deep watering during the summer months appears to be best for maximum growth. These trees will not perform well in a lawn where the watering is usually frequent and shallow. *Chorisia* appear to be free of diseases and pests and are not visually affected by smog.

Another species, *Chorisia insignis*, is distinguishable by its white petaled flowers with yellow centers that fade to brown with age. While trees of this species at the Arboretum are all small in stature, no more than fifteen feet tall, it is not known why others in the Los Angeles area grow as tall as *C. speciosa*. *Chorisia insignis* usually has an extended flowering period from November through March with scattered flowers appearing throughout the year.

In keeping with the Arboretum's program of serving its community of seven million people, 1,000 trees of *Chorisia speciosa* were grown for Arbor Day 1977. These trees were distributed to 1,000 participating schools in the Los Angeles area. Added to the numerous *Chorisia* already distributed and planted, this spectacular fall flowering tree may one day become the most beautiful and dominant tree in the Southern California landscape.

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Gardeners' Questions & Answers

By Tom Stevenson

Q: Birds go after my peaches and grapes before they are ripe enough to pick. Can I pick them early and let them ripen indoors?

A: Peaches are best if allowed to stay on the tree until fully ripe. Tree ripened peaches gain as much as 300% in quality during the last few days of maturation, according to specialists.

A peach with whitish, yellowish or golden ground color is nearly ripe. It is at this stage they are usually picked for sale at roadside stands. Peaches picked a little early will turn soft and have good flavor if kept in a cool place out of the sun. The longer grapes stay on the vine, the sweeter they will be, up to a certain point. They will not get any sweeter after being picked. A taste test is the best guide to ripeness of grapes. Pick them when the flavor suits your taste. In some cases it may be possible to use netting to keep birds from getting at the fruit.

Q: When is a good time to take rose cuttings and how should I go about rooting them?

A: Late August and early September are good times to take rose cuttings. Miniatures, climbers and ramblers are easy to root while hybrid teas are more difficult.

The cutting should be 8 to 9 inches long. A shoot that has just borne a flower makes a good cutting. Remove the flower stem. Take the cutting by making the cut just below a leaf. Remove the lower leaves from the cutting, leaving two or three at the top. Put the cutting between moist newspaper to keep it from drying out. Dipping the bottom end of the cutting in Rootone (available at large garden centers) just before planting encourages rooting.

Q: I planted radishes this spring and all I got was a lot of healthy leaves, no radishes. Was it because the seed was no good?

A: Most likely it was due to one of three things: Sowing the seed too thick and not thinning when they came up; application of too much nitrogen fertilizer; or heavy clay soil.

The plants need to be spaced at least one inch apart; they need to be given enough fertilizer (the amount depends on the fertility of your particular soil) to grow rapidly because if they grow slowly they do not have the best flavor; if they get too much nitrogen almost all of the growth will be above ground.

Radishes mature quickly and retain their good flavor only a few days after maturing, so it is best to make small plantings at weekly intervals rather than one or two big ones.

Q: What can you spray cabbage with to control worms? They start eating the cabbage before it heads.

A: Cabbage and related crucifers are attacked by diamond back moth worms, imported cabbage worms and cabbage loopers. All three are most destructive and must be controlled if you are to get a crop.

Bacillus thuringiensis, sold under the trade names of Dipel, Thuricide and Ciotrol, is a safe microbial insecticide which destroys all three species of worms. A spray or dust program should begin soon after planting and continue every seven days through harvest if worms become a problem. Directions on the label should be read and followed closely.

Q: Can impatiens plants be grown indoors during the winter as house plants?

A: It can be done and it is a good idea to take cuttings in August and September to root for indoor use in the winter.

Make the cutting four to six inches long, make the cut just beneath a leaf where the stem is swollen. It can be rooted in a glass of water or sand. After they root, they can be grown in water or in good potting soil.

The potted cuttings should be left outdoors in a semi-shady place until late summer.

The major problem getting impatiens to bloom indoors is insufficient light during cloudy winter weather. Artificial light, as from a floor lamp, will help.

Q: I love fresh mushrooms and I'd like to grow them if it is possible and practical for me to do so. Can you tell me how to get started?

A: Mushrooms are hard to grow and unless you have know-how and ideal conditions, you can buy fresh mushrooms at the store cheaper than you can raise them. To start, go to the public library and borrow a book on how to grow them.

You need a cool basement with a temperature of 60°F or lower. The humidity must be maintained above 70% to avoid production of dry, tough mushrooms. The room must be kept well ventilated.

A special compost is needed. This is usually made from horse manure and straw. It is very difficult to prepare a suitable compost in small quantities and your best bet is to buy prepared compost from a commercial source.

